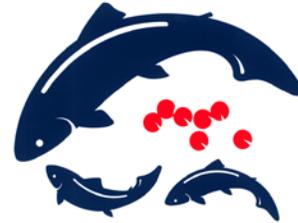


FISHERY RESEARCH



LOWER SNAKE RIVER
COMPENSATION PLAN
Hatchery Program



An IDACORP Company

2013 CALENDAR YEAR HATCHERY STEELHEAD REPORT:

IPC and LSRCP Monitoring and Evaluation
Programs for the State of Idaho



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INTRODUCTION

The Lower Snake River Compensation Plan (LSRCP) steelhead hatchery mitigation program was established to provide in-kind and in-place mitigation for lost harvest opportunity resulting from the construction and operation of the four lower Snake River hydroelectric dams (Ice Harbor, Lower Monumental, Little Goose, and Lower Granite dams). The Idaho component of the mitigation program calls for the operation of broodstock collection and rearing facilities operated by the Idaho Department of Fish and Game (IDFG) and the U.S. Fish and Wildlife Service under the auspices of the LSRCP. It is anticipated that the summer steelhead hatchery smolt release programs operated in Idaho will return 117,780 (71% of the total) adult steelhead towards the total LSRCP mitigation goal of 165,300 adult steelhead.

In addition to the LSRCP, Idaho Power Company (IPC) maintains a hatchery steelhead mitigation program for the loss of production due to the construction and operation of the Hells Canyon Complex (Brownlee, Oxbow, and Hells Canyon dams). Mitigation goals established through the Hells Canyon Settlement Agreement specifies an annual smolt production target of 400,000 pounds to be reared at the Niagara Springs Fish Hatchery, which equates to approximately 1,800,000 yearling smolts at 4.5 fish per pound.

This report summarizes the various components of hatchery steelhead monitoring and evaluation (M&E) activities associated with the LSRCP and IPC mitigation programs, which occurred in Idaho during the 2013 calendar year. Information is provided for steelhead from six broodstock collection sources and four rearing hatcheries operated by the Idaho Department of Fish and Game (IDFG) and the US Fish and Wildlife Service (USFWS).

As this report summarizes information for a calendar year, data from multiple brood years are included. Brood year specific reports are produced annually by monitoring and evaluation staff and are available as IDFG reports at the following address: <https://researchidfg.idaho.gov/Fisheries%20Research%20Reports/Forms/Show%20All%20Reports.aspx>. Because of the five-year life cycle of steelhead and to allow for downriver harvest to be reported, the most recent brood year report available is current year minus seven.

Steelhead Broodstock Collection Facilities

The IPC and LSRCP mitigation programs utilize steelhead eggs collected from females trapped at four hatchery weirs and one satellite facility (Table 1, Figures 1 and 2). With the exception of Clearwater Fish Hatchery, which initiated an angler broodstock collection program in 2010, none of the other steelhead rearing hatcheries discussed in this report (see below) collect broodstock, but receive eggs and/or fry from off-site sources. In most cases, broodstock collection is managed as a segregated program; one exception is the integrated supplementation program in the East Fork Salmon River (EFNAT).

Table 1. Broodstock collection facilities that provide steelhead eggs to the LSRCP and IPC mitigation hatcheries in Idaho.

| Broodstock Collection Facilities | Hatchery Abbreviation | Stock Abbreviation | Mitigation Program |
|--|------------------------------|---------------------------|---------------------------|
| Dworshak National Fish Hatchery ¹ | DNFH | DWOR | USACOE |
| South Fork Clearwater River ² | CLFH | SFCR | LSRCP |
| Oxbow Fish Hatchery | OXFH | OX | IPC |
| Pahsimeroi Fish Hatchery | PFH | PAH | IPC |
| | | USAL | LSRCP |
| Sawtooth Fish Hatchery | SFH | SAW | LSRCP |
| East Fork Satellite Facility ³ | EFSF | EFNAT | LSRCP |

1. Dworshak National Fish Hatchery operates a steelhead mitigation program funded by the U.S. Army Corps of Engineers (USACOE) that is not included in this report.
2. Broodstock is currently collected in the South Fork Clearwater River by angling.
3. Operated by Sawtooth Fish Hatchery.

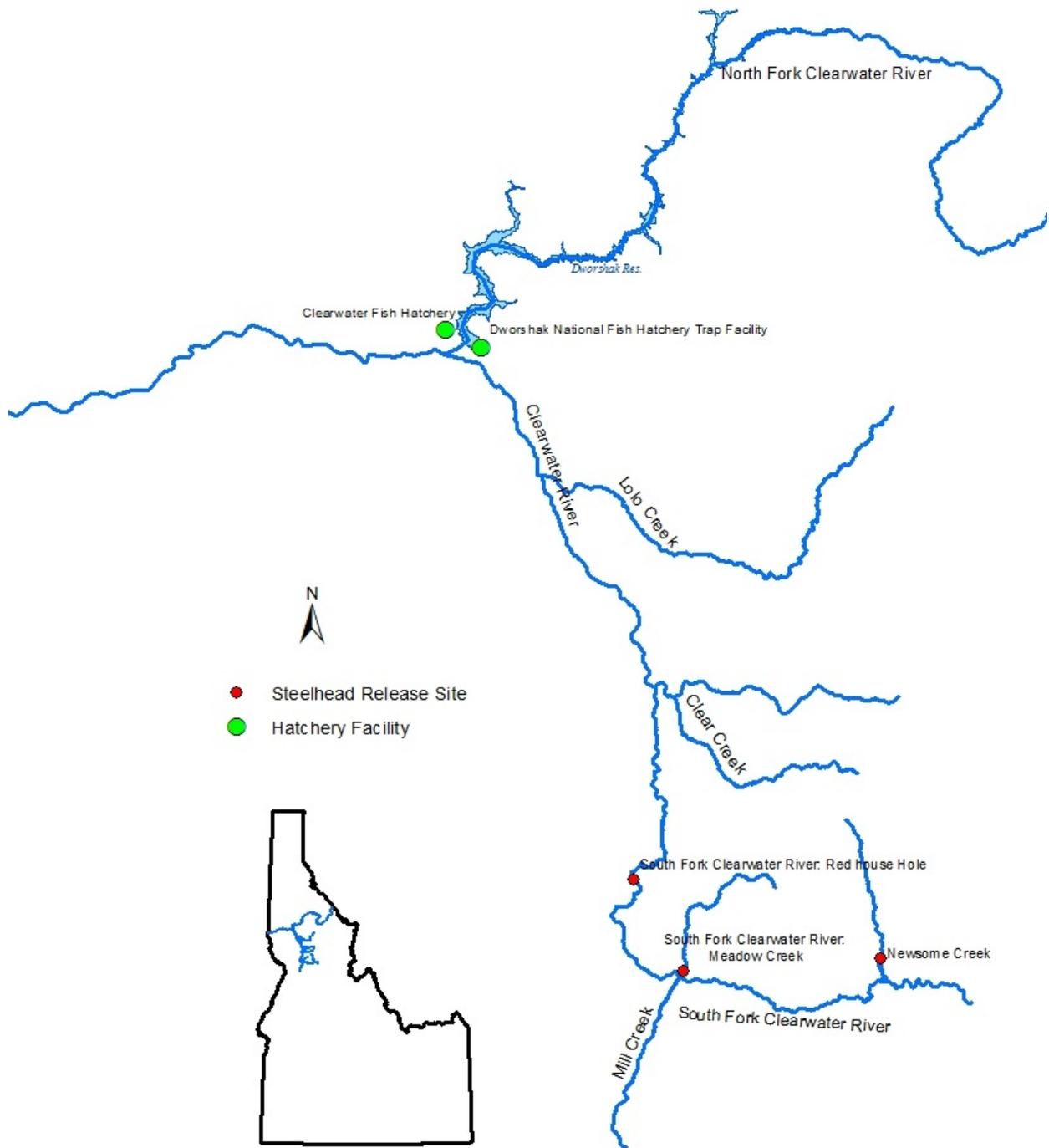


Figure 1. Location of steelhead release sites and hatchery facilities in the Clearwater River basin associated with the LSRCP mitigation program.

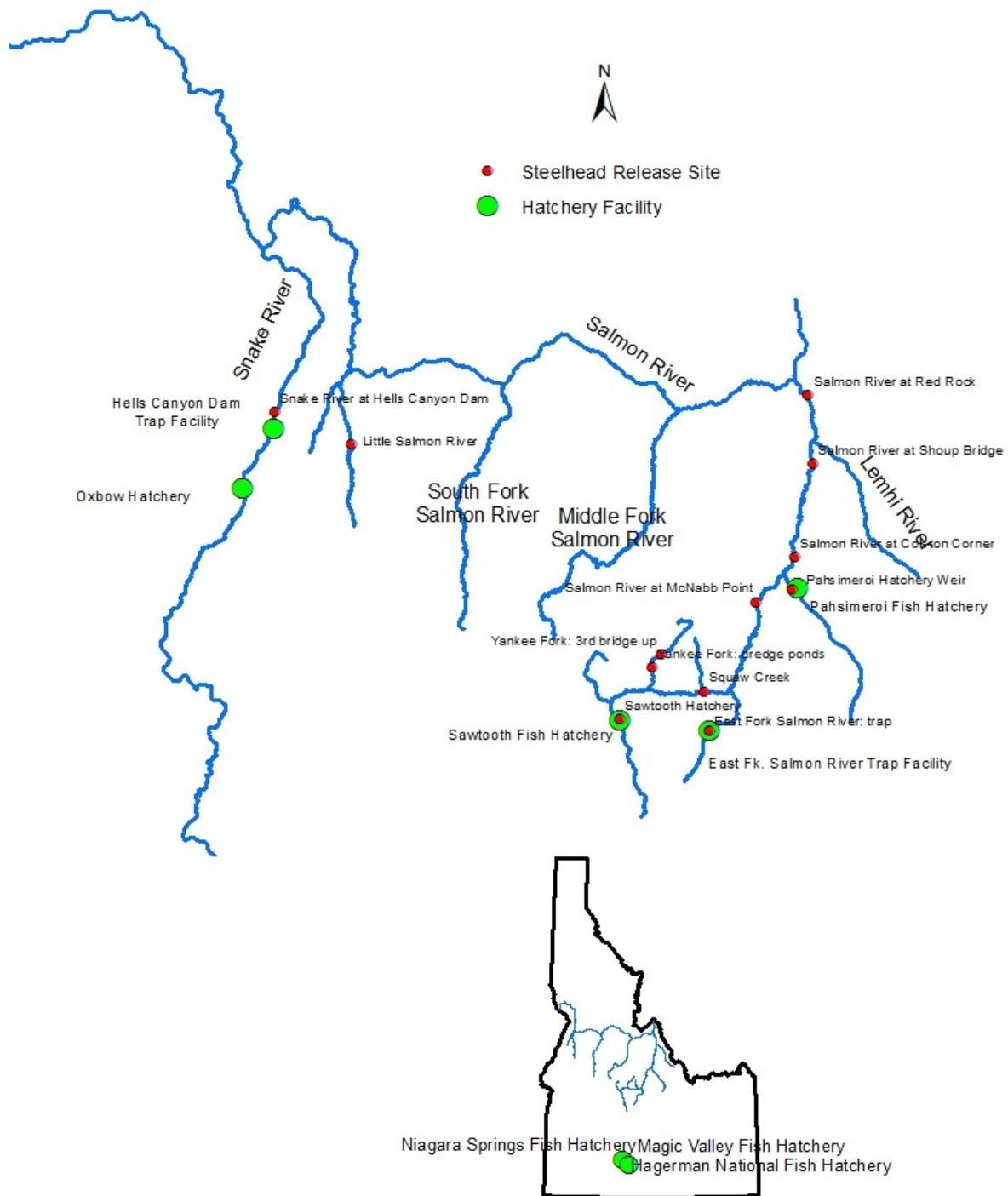


Figure 2. Location of steelhead release sites and hatchery facilities in the Salmon and Snake river basins associated with the LSRCP and IPC mitigation programs.

IPC Rearing Facilities

Niagara Springs Fish Hatchery (Niagara Springs) is located on the Snake River near Wendell, Idaho. Niagara Springs receives eyed eggs from Pahsimeroi Fish Hatchery (PAH stock) and from Oxbow (OX stock) Fish Hatchery. Steelhead produced at Niagara Springs are released in the Snake and Salmon rivers (Table 2, Figure 2). The smolt production goal for Niagara Springs is 400,000 pounds of smolts annually, which equates to approximately 1,800,000 yearling smolts at 4.5 fish per pound.

LSRCP Rearing Facilities

Clearwater Fish Hatchery (Clearwater) is located at the confluence of the North Fork Clearwater River near Ahsahka, Idaho and is the only LSRCP steelhead rearing facility located in current-day anadromous waters within Idaho (Figure 1). The annual mitigation goal for this facility is to produce 42,000 adult steelhead. Clearwater annually releases 843,000 smolts to achieve this goal. Clearwater's annual production target was originally 1,750,000 smolts; however, production was reduced to 843,000 smolts due to limited water availability and to provide more rearing space for the Chinook salmon program at that facility. Despite these changes, the adult return goal remains the same. Clearwater primarily receives green eggs from one stock (DWOR) and rears them to yearling smolts for release into the South Fork Clearwater River (Table 2). However in 2010, a program was initiated to develop a hatchery stock (SFCLW) that is locally adapted to the South Fork Clearwater River by utilizing broodstock collected by anglers as a temporary measure until an adult collection facility can be constructed in the South Fork Clearwater River (see the Localized Broodstock Development section of this report). In addition to its primary mitigation function, Clearwater also receives green DWOR eggs that are incubated to the eyed egg stage before being transferred to Magic Valley Fish Hatchery for final rearing and release into the Salmon River as part of the Upper Salmon River B program (a B-run stock locally adapted to the upper Salmon River). Transferring DWOR eggs to Magic Valley Fish Hatchery will be phased out in the future as USAL production increases.

Hagerman National Fish Hatchery (Hagerman National) is located along the Snake River in southern Idaho near the town of Hagerman, Idaho (Figure 2). The annual mitigation goal for this facility is to return 40,800 adult steelhead. Hagerman National's annual production target was originally 1,700,000 smolts; however, production has been incrementally reduced to 1,460,000 smolts as a result of continued reductions in flow from the springs that provide water for the hatchery. Hagerman National receives eyed eggs from two stocks (SAW and EFNAT), which are reared to yearling smolts and released in the upper Salmon River (Table 2). The rearing of EFNAT smolts at Hagerman National began in brood year 2009. Prior to this, EFNAT smolts were reared at Magic Valley Fish Hatchery.

Magic Valley Fish Hatchery (Magic Valley) is located along the Snake River near Filer, Idaho. The annual mitigation goal for this facility is to return 34,980 adult steelhead. Magic Valley's annual production target was originally 1,749,000 smolts; however, production has been incrementally reduced to 1,540,000 smolts as a result of continued reductions in flow from the springs that provide water for the hatchery. Magic Valley receives eyed eggs from three stocks (DWOR, PAH, and USAL), which are reared to yearling smolts. Magic Valley is responsible for rearing all LSRCP-funded DWOR, USAL, and PAH production released into the Salmon River.

JUVENILE PRODUCTION AND RELEASES

Marking

All marking and tagging of juvenile steelhead in 2013 was conducted by staff from the Pacific States Marine Fisheries Commission (PSMFC) marking crew. For more information and a complete overview of the fish marking program, see the “2013 Idaho Anadromous Fish Marking Program” report, available through IDFG.

During calendar year 2013, M&E staff collaboratively developed mark and loading plans with hatchery and marking personnel. In May, a loading plan was developed that outlined preliminary mark and coded wire tag (CWT) numbers for Brood Year 2013 steelhead. In November and December, both a Passive Integrated Transponder (PIT) Tag loading plan for Brood Year 2013 and a mark/CWT plan for Brood Year 2014 were developed. Loading plans are designed to indicate where specific groups of marks and tags should be applied at each individual hatchery, taking into account family units, rearing containers, and any specific treatments of fish. Plans are developed in an effort to maximize tag representation while at the same time maintaining a manageable tagging and rearing scheme.

Under current operations, steelhead typically can receive an adipose fin clip (Ad clip) mark and two types of tags (CWT and/or PIT). In addition, all hatchery-origin steelhead are parental based tagged (PBT) through genetic analysis of tissue samples collected from every fish used as broodstock. The purpose and uses of those marks and tags are outlined below.

Adipose Fin Clips

The presence or absence of an adipose fin (Ad clip) is used as the sole designator of a harvestable hatchery-origin fish in mark selective fisheries and is also one of the primary indicators of origin at hatchery traps. Some non-Ad clipped hatchery smolts are released to meet other management objectives but can generally be identified as hatchery origin by secondary characteristics (fin erosion or coded wire tags).

Coded Wire Tags

Coded wire tags (CWT) have been an important tool for monitoring and evaluating steelhead release group-specific harvest and stray estimates. These tags also provide a known age component at hatchery traps to use in assigning an age composition to the entire hatchery return at each trap. Lastly, CWTs are used as a differential mark for broodstock and weir management purposes. The use of CWTs for monitoring and evaluating steelhead harvest and stray estimates is being replaced with Parentage-based Tagging (PBT) beginning with brood year 2008, when 100% of the adult steelhead spawned within Snake River basin hatcheries had fin tissue samples taken to create a parentage-based genetics database (Steele et al. 2013). Smolts released in 2013 from brood year 2012 are the last group that were tagged and released with CWTs for the purpose of harvest estimation.

Parental Based Tags

Parentage-based tagging (PBT) involves annual sampling and genotyping of hatchery broodstock, creating a database of parentage genotypes. The database stores information on 95 single nucleotide polymorphism (SNP) markers from essentially all of the brood fish that contributed progeny to the population of released steelhead smolts. Progeny from any of these parents (collected either as juveniles or adults), can be nonlethally sampled and, if genotyped,

be assigned back to their parents, thus identifying their hatchery of origin and brood year (Steele et al. 2013). Advantages of PBT over CWT technology include increased sample size of the tag group and the option of acquiring nonlethal tissue samples at any stage of their life history with minimal handling. By genotyping all parental broodstock, every juvenile is genetically "tagged."

As the PBT program matured the ability to track family units was refined in an effort to maximize PBT's applicability for management needs. Production was not tracked to release site in brood years 2008 and 2009; as a result only the stock and brood year can be determined for these recoveries. In 2010, hatchery staff began tracking family units through the rearing cycle to release site. By brood year 2012 nearly all release groups were "PBT" tagged at a very high rate (94% average). This allowed the PBT to be used for a variety of evaluations including estimating stock composition of fisheries and escapement at Lower Granite Dam. CWT and PBT based evaluations of harvest will continue concurrently through spawn year 2016, which will be the last year that CWT-tagged fish will be returning to the selective fishery as ad-clipped fish.

Passive Integrated Transponder Tags

Passive integrated transponder (PIT) tags serve multiple purposes and like CWTs and PBT are an important tool for monitoring and evaluating hatchery steelhead programs. PIT tags are used to generate estimates of juvenile survival to Lower Granite Dam and juvenile run timing through the Snake and Columbia River hydropower system. As fish return as adults, PIT tags provide in-season stock- and age-specific return estimates and arrival timing, as well as conversion rates between dams. All of these parameters are outlined in this report.

All PIT tags implanted in hatchery steelhead go through the sort-by-code process prior to juvenile outmigration. The sort-by-code process enables managers to predetermine how a PIT-tagged fish will be treated if detected in one of the juvenile bypass systems at a Snake River or Columbia River dam. As part of ongoing research for the Comparative Survival Study (CSS), sort-by-code is used to determine if a PIT-tagged fish should be treated as the run-at-large or by default, returned to the river (<http://www.fpc.org/>). The majority of PIT tags (about 70%) are assigned to the run-at-large group, which means if detected, they will either be transported downriver on a barge or truck, or returned back to the river based on what the current protocol is at that particular dam for the untagged population. The remaining 30% are assigned to the return-to-river group and are treated independently of the untagged population and automatically returned to the river, if detected. Because the run-at-large component represents the untagged population, they are the only tags that are expanded to generate the adult return estimates outlined above.

Juvenile Release Information

From March through May 2013, 5,666,811 (1,805,437 IPC; 3,861,374 LSRCP) brood year 2012 yearling steelhead smolts were released at locations in the Clearwater, Salmon, and Snake rivers (Figure 1 and Figure 2; Table 2). All facilities met or slightly exceeded their smolt release target except for Clearwater, which was approximately 115,000 smolts long of its target, and Niagara Springs, which met its release target of 1,800,000 smolts but was 115,352 pounds short of meeting its mitigation goal of 400,000 pounds. Clearwater was able to increase steelhead production in brood year 2012 because rearing space was available as the facility initiated a summer run Chinook salmon program. This was a one-time opportunity that will not be repeated because the rearing space will be utilized for the summer Chinook program in the future.

Table 2. Summary of brood year 2012 hatchery steelhead released in 2013 from IPC and LSRCP facilities.

| Hatchery | Release Site | Stock | Total Release | AD Only | AD/CWT | CWT | No Mark | PIT Tag ¹ | PBT-tagged smolts |
|-------------------------------|------------------------------------|-------|------------------|------------------|------------------|----------------|----------------|----------------------|-------------------|
| Clearwater | Newsome Creek | DWOR | 121,648 | - | - | - | 121,648 | 3,390 | 113,258 |
| | Meadow Creek | DWOR | 258,967 | 258,967 | - | - | - | 7,076 | 258,967 |
| | Meadow Creek | DWOR | 71,484 | - | - | - | 71,484 | 1,992 | 71,484 |
| | Meadow Creek | SFCLW | 144,286 | 70,660 | 73,626 | - | - | 3,896 | 142,195 |
| | Meadow Creek | SFCLW | 152,761 | - | - | 152,511 | 250 | 4,190 | 152,761 |
| | Red House Hole | DWOR | 208,673 | 137,473 | 71,200 | - | - | 5,988 | 204,581 |
| Clearwater Totals | | | 957,819 | 467,100 | 144,826 | 152,511 | 193,382 | 26,532 | 943,246 |
| Hagerman National | Up. EF Salmon R. | EFNAT | 155,612 | - | - | 146,695 | 8,917 | 9,737 | 146,462 |
| | McNabb Pt. | SAW | 127,179 | 38,392 | 88,787 | - | - | 2,192 | 127,179 |
| | Sawtooth Weir | SAW | 842,034 | 754,002 | 88,032 | - | - | 15,321 | 842,034 |
| | Yankee Fork | SAW | 214,860 | 126,379 | 88,481 | - | - | 3,989 | 214,860 |
| Hagerman Totals | | | 1,339,685 | 918,773 | 265,300 | 146,695 | 8,917 | 31,239 | 1,330,535 |
| Magic Valley | Colston Corner | PAH | 94,360 | 420 | 93,940 | - | - | 1,495 | 94,360 |
| | Little Salmon | DWOR | 220,162 | 126,735 | 93,427 | - | - | 3,492 | 215,669 |
| | Little Salmon | PAH | 219,155 | 126,417 | 92,738 | - | - | 3,688 | 219,155 |
| | Pahsimeroi | DWOR | 75,786 | - | - | 75,194 | 592 | 3,889 | 75,013 |
| | Pahsimeroi | USAL | 112,571 | - | - | 111,533 | 1,038 | 7,762 | 112,571 |
| | Red Rock | PAH | 93,908 | 414 | 93,494 | - | - | 1,500 | 89,213 |
| | Shoup Bridge | PAH | 93,563 | 93,563 | - | - | - | 1,498 | 93,563 |
| | Squaw Creek | DWOR | 188,535 | 125,867 | 62,668 | - | - | 2,890 | 188,535 |
| | Yankee Fork 3 rd bridge | DWOR | 250,965 | 188,299 | 62,666 | - | - | 7,668 | 246,573 |
| | Yankee Fork Ponds | DWOR | 214,865 | - | - | - | 214,865 | 3,591 | 211,599 |
| Magic Valley Totals | | | 1,563,870 | 661,715 | 498,933 | 186,727 | 216,495 | 37,473 | 1,546,251 |
| Niagara Springs | Hells Canyon Dam | OX | 252,613 | 193,735 | 58,878 | - | - | 4,092 | 248,603 |
| | Hells Canyon Dam | PAH | 319,252 | 289,891 | 29,361 | - | - | 4,983 | 259,298 |
| | Little Salmon | PAH | 451,040 | 358,426 | 92,614 | - | - | 7,084 | 439,171 |
| | Pahsimeroi | PAH | 782,532 | 690,588 | 91,944 | - | - | 12,051 | 559,658 |
| Niagara Springs Totals | | | 1,805,437 | 1,532,640 | 272,797 | - | - | 28,210 | 1,506,730 |
| Grand Totals | | | 5,666,811 | 3,580,228 | 1,181,856 | 485,933 | 418,794 | 123,454 | 5,326,762 |

¹ PIT tag release numbers are not in addition to other mark tag combinations but are included in those groups.

Out-migration Survival and Environmental Conditions

Juvenile survival rates of PIT-tagged steelhead are estimated using the PitPro program (Westhagen and Skalski 2009) developed in the School of Aquatic and Fishery Sciences at the University of Washington. This program generates a point estimate and a standard error that is used to generate 95% confidence intervals. The program uses the Cormack-Jolly-Seber model (Cormack 1964; Jolly 1965; Seber 1965) for single release and multiple recapture events, which accounts for differences in collection efficiency at the main-stem Snake and Columbia River dams.

Juvenile survival of all release groups to Lower Granite Dam in 2013 had a weighted average of 71.0% and ranged from 14.1-100% (Table 3). The low survival rate of 14.1% was the ad-intact USAL-B smolts released into Yankee Fork dredge pond #1. The simultaneous release of PIT-tagged USAL-B and SAW smolts into the free-flowing reaches of the main stem of the Yankee Fork had a survival rate of 66.9% and 84.1%, respectively. The low survival rate of the ad-intact group may be related to a low discharge at the outflow of the pond creating a partial blockage with the presence of debris in the channel leading to the free-flowing reaches of the Yankee Fk. Excluding the low survival rate of the Yankee Fk. dredge pond release group, all other release group survival rates were at least 53.9% and averaged 74.8%.

Juvenile survival estimates of the various release groups to Lower Granite Dam were compared with previous years' estimates (Table 4). All 2013 (BY2012) Clearwater Fish Hatchery release groups had a lower survival rate than in any of the previous years that survival records to Lower Granite Dam are available for those release groups. Although not presented elsewhere in this report, the Clearwater 2013 release group averaged 7.0 fish/lb for DWOR stock smolts and 8.6 fish/lb for SFCLW stock smolts, which is substantially smaller than the release groups in the three previous years. The reduced size at release is a result of a break in the upper water intake structure at the face of Dworshak Dam, reducing the volume of warmer water temperatures being available for rearing fish at Clearwater Fish Hatchery between August 2012 and March 2013. Survival rates of Niagara Springs release groups ranged from 53.9% for OX stock releases at Hells Canyon Dam up to 78.9% for PAH stock releases at the Little Salmon River, which is lower than the average for the previous eight years. Size at release of smolts raised at Niagara Springs ranged from 7.3 fish per pound up to 6.0 fish per pound, substantially lower than the goal of 4.5 fish per pound. This smaller size was due to factors related to below average feed conversion at Niagara Springs Fish Hatchery.

Appendix A provides juvenile release timing information and environmental conditions in the upstream migration corridor. Appendix B summarizes arrival timing at Lower Granite Dam as well as spill and outflow that coincided with the migration period.

Table 3. Estimated survival from release to Lower Granite Dam for brood year 2012 steelhead released from IPC and LSRCP hatchery facilities in 2013. All release groups were AD-clipped unless otherwise noted.

| Hatchery | Release group | Stock | PIT Tags Released | Release Date | Size at Release (fpp) | 50% Passage Date | 80% Arrival Window | % Survival (95% CI) |
|-------------------|-----------------------------------|---------------------|-------------------|--------------|-----------------------|------------------|--------------------|----------------------|
| Clearwater | Meadow Cr. | DWOR | 7,076 | 4/8/2013 | 6.84 | 22-Apr | 4/16 - 5/15 | 62.7 (57.1 - 68.3) |
| | Meadow Cr. | DWOR ¹ | 1,992 | 4/12/2013 | 6.73 | 22-Apr | 4/14 - 5/15 | 61.7 (51.1 - 72.3) |
| | Meadow Cr. | SFCLW | 3,896 | 4/11/2013 | 8.65 | 22-Apr | 4/17 - 5/14 | 70.0 (62.4 - 77.6) |
| | Meadow Cr. | SF CLW ¹ | 4,190 | 4/10/2013 | 8.50 | 25-Apr | 4/17 - 5/15 | 61.0 (53.0 - 69.0) |
| | Newsome Cr. | DWOR ¹ | 3,390 | 4/10/2013 | 7.43 | 12-May | 4/21 - 5/17 | 56.3 (48.3 - 64.3) |
| | Red House Hole | DWOR | 5,988 | 4/9/2013 | 6.95 | 16-Apr | 4/14 - 5/6 | 67.0 (61.5 - 72.5) |
| Hagerman National | E. Fork Salmon | EFNAT ¹ | 9,737 | 4/24/2013 | 4.53 | 15-May | 5/9 - 5/17 | 62.6 (59.1 - 66.1) |
| | McNabb PT | SAW | 2,192 | 4/4/2013 | 3.79 | 3-May | 4/16 - 5/14 | 100.9 (82.6 - 119.2) |
| | Sawtooth Weir | SAW | 15,321 | 4/8/2013 | 4.17 | 7-May | 4/27 - 5/16 | 76.3 (70.5 - 82.1) |
| | Yankee Fork | SAW | 3,989 | 4/26/2013 | 4.42 | 11-May | 5/9 - 5/15 | 84.1 (75.7 - 92.5) |
| Magic Valley | Salmon R. @ Colston | PAH | 1,495 | 4/10/2013 | 4.44 | 9-May | 4/27 - 5/14 | 91.0 (70.6 - 111.4) |
| | Little Salmon R. @ Stinky Springs | DWOR | 3,492 | 4/16/2013 | 4.54 | 11-May | 5/2 - 5/17 | 92.1 (82.8 - 101.4) |
| | Little Salmon R. @ Stinky Springs | PAH | 3,688 | 4/11/2013 | 4.68 | 7-May | 4/23 - 5/16 | 95.3 (85.5 - 105.1) |
| | Pahsimeroi R | DWOR ¹ | 3,889 | 4/18/2013 | 4.58 | 11-May | 5/3 - 5/15 | 78.5 (69.0 - 88.0) |
| | Pahsimeroi R | USAL ¹ | 7,762 | 4/18/2013 | 4.54 | 8-May | 5/1 - 5/14 | 80.1 (74.2 - 86) |
| | Salmon R. @ Red Rock | PAH | 1,500 | 4/8/2013 | 4.69 | 6-May | 4/22 - 5/15 | 86.6 (72.1 - 101.1) |
| | Salmon R. @ Shoup Bridge | PAH | 1,498 | 4/9/2013 | 4.65 | 3-May | 4/22 - 5/14 | 89.1 (68.8 - 109.4) |
| | Clayton Ranger Station | DWOR | 2,890 | 4/22/2013 | 4.44 | 13-May | 5/7 - 5/18 | 75.3 (65.5 - 85.1) |
| | Yankee Fork | DWOR | 7,668 | 4/26/2013 | 4.31 | 13-May | 5/9 - 5/20 | 66.9 (62.1 - 71.7) |
| | Yankee Fork | DWOR ¹ | 3,591 | 4/24/2013 | 4.34 | 1-May | 5/19 - 6/17 | 14.1 (7.1 - 21.1) |
| Niagara Springs | Hells Canyon Dam | OX | 4,092 | 3/19/2013 | 7.25 | 15-May | 4/30 - 6/1 | 53.9 (48.0 - 59.84) |
| | Hells Canyon Dam | PAH | 4,983 | 3/21/2013 | 7.29 | 12-May | 4/4 - 5/31 | 64.6 (59.6 - 69.6) |
| | Little Salmon R. @ Stinky Springs | PAH | 7,084 | 4/8/2013 | 6.18 | 12-May | 4/25 - 5/19 | 78.9 (73.7 - 84.1) |
| | Pahsimeroi | PAH | 12,051 | 3/26/2013 | 6.00 | 12-May | 4/13 - 5/16 | 65.1 (61.8 - 68.4) |

¹ Intact adipose fin release group.

Table 4. Annual and nine-year estimated survival (percent) from release to Lower Granite Dam for steelhead smolts released from IPC and LSRCP hatcheries, by stock and migration year. Prior to migration year 2008, PIT tag sample sizes were small resulting in spurious survival estimates in some years.

| Rearing Hatchery | Stock | Migration Year | | | | | | | | | 2005-2012 Average |
|----------------------------------|--------------------|----------------|------|-------------------|------|------|------|------|------|------|----------------------|
| | | 2005 | 2006 | 2007 ⁴ | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | |
| Clearwater FH | DWOB | 83.4 | 80.4 | 80.5 | 69.5 | 83.1 | 83.3 | 80.3 | 74.0 | 62.8 | 79.3 |
| | SFCLW | | | | | | | 80.4 | 81.5 | 65.4 | 80.9 |
| Clearwater Average | | 83.4 | 80.4 | 80.5 | 69.5 | 83.1 | 83.3 | 80.3 | 76.7 | 63.6 | 79.7 |
| Hagerman FH | EFNAT ¹ | | | | 78.2 | 71.8 | 70.9 | 79.9 | 81.2 | 62.6 | 76.4 |
| | SAW | 75.7 | 76.5 | 60.1 | 85.5 | 80.8 | 74.6 | 79.9 | 72.3 | 80.4 | 75.7 |
| Hagerman Average | | 75.7 | 76.5 | 60.1 | 85.5 | 80.8 | 74.3 | 79.9 | 73.5 | 78.3 | 75.8 |
| Magic Valley FH | DWOR | 69.4 | 71.9 | 83.8 | 76.4 | 78.9 | 76.5 | 72.0 | 77.2 | 63.4 | 75.8 |
| | PAH | 75.8 | 85.8 | 78.0 | 79.6 | 81.7 | 86.6 | 78.4 | 85.5 | 91.7 | 81.4 |
| | USAL ² | | | 69.9 | 78.7 | 73.5 | 84.3 | 89.3 | 76.4 | 80.1 | 78.7 |
| Magic Valley Average | | 73.3 | 75.9 | 84.2 | 81.6 | 79.7 | 81.2 | 76.4 | 80.1 | 73.7 | 79.1 |
| Niagara Springs FH | OX | 71.2 | 49.0 | 80.2 | 87.9 | 88.9 | 91.8 | 72.8 | 71.8 | 53.9 | 76.7 |
| | PAH | 77.4 | 76.3 | 129.5 | 83.8 | 89.7 | 95.2 | 76.4 | 74.9 | 69.0 | 87.9 |
| Niagara Springs Average | | 74.6 | 65.1 | 109.2 | 85.7 | 89.3 | 93.6 | 75.3 | 73.5 | 66.9 | 83.3 |
| Grand Average³ | | 76.6 | 72.3 | 87.9 | 81.0 | 83.8 | 83.7 | 77.5 | 75.7 | 70.9 | 79.8 |

¹ Prior to migration year 2010, EFNAT smolts were reared at Magic Valley Fish Hatchery.

² Prior to migration year 2010, the USAL smolts were released at Squaw Pond or Squaw Creek.

³ The annual survival estimate is a weighted average.

⁴ Prior to migration year 2008, PIT tag sample sizes were small resulting in spurious survival estimates.

ADULT RETURNS

Adult hatchery steelhead from brood years 2010, 2009, and 2008 returned to Idaho during the 2012-13 run as one-, two-, and three-ocean adults, respectively. This section accounts for adult hatchery steelhead returning to Bonneville Dam (Bonneville), Lower Granite Dam (LGD), and back to hatchery traps in Idaho.

Returns to Bonneville Dam and Lower Granite Dam

Estimates of the stock and cohort composition of returning adult steelhead in spawn year 2013 were made with PIT tag detections at Bonneville and LGD and with PBT analysis at LGD. For the purposes of this report, spawn year 2013 encompasses adult return data to Bonneville and LGD between July 1, 2012 and June 30, 2013. This is the first run year that both PIT tag detections and PBT analysis were used, providing an opportunity to compare both methodologies.

Escapement Estimates Based on PIT Tag Detections

Adult steelhead escapement estimates derived from PIT tag detections at Bonneville and LGD are the sum of expansion rates of detected PIT tags representing various release groups during the migration period. Tag expansions of release groups were based on tag rates of juveniles at release and are assumed to be the same as when they return as adults; PIT tag release groups are an aggregate of smolts that are of similar age, stock, and origin (rearing hatchery) that are released at the same location. An adjustment was made to the escapement estimate at Bonneville to account for a 98.3% detection efficiency. This was derived from the proportion of PIT tags that were detected at mainstem upstream arrays that were not detected at Bonneville. The detection rate for Bonneville was not applied as an adjustment to estimates made at LGD. Adjustments are not made to account for predetection tag loss (shedding) or differential survival of tagged fish because these are unknown variables unless specific release groups are reevaluated for expansion rates at their spawning destination (hatchery rack). Sawtooth Fish Hatchery has a PIT tag detection array on the ladder to its adult trapping facility enabling expansion adjustments to be made on the 2010 and 2011 Sawtooth Weir release groups (see Research Section, this report). Tables 5 and 6 summarize the expanded adult return estimates for each rearing hatchery by stock at Bonneville and LGD. These adult return estimates are likely underestimates because, except for the Sawtooth release group (see "Estimating a Correction Factor for PIT Tag Expansions in Steelhead Returning to Sawtooth Fish Hatchery Trap" in Research section), they are not corrected for tag loss or differential mortality between tagged and untagged fish. During the 2012-13 steelhead run an estimated 91,925 adult steelhead from Clearwater, Hagerman National, Dworshak National, Magic Valley, and Niagara Springs fish hatcheries returned to Bonneville Dam (Table 5). The majority of these fish (57,874) escaped fisheries in the middle Columbia and lower Snake rivers and crossed LGD (Table 6).

Lower Granite Dam Escapement Estimates Based on Window Counts and PBT Analysis

In return year 2013 Parental Based Tagging (PBT) was used to partition out stock- and age-specific adult steelhead returns to LGD. The Army Corps of Engineers (COE) estimates the number of steelhead daily at LGD by enumerating fish that pass a counting window located in the adult fish ladder from the hours of 0400-2000. The window counts are split into clipped and unclipped groups based on the presence or absence of an adipose fin when they are observed. The adipose clipped group consists of hatchery fish, and the unclipped group is composed of

natural and unclipped hatchery fish. Counting only occurs for 50 of the 60 minutes in each hour, thus the window counts are expanded by (5/6) to account for all fish passing the counting window during counting hours. It is important to note that the COE window counts do not account for after-hours passage, lock passage, or steelhead that fall back over LGD with or without subsequent reascension. Total escapement of adult steelhead for spawn year 2013 was the accumulated daily counts reported by COE during which the fish ladder was operational between July 1, 2012 and June 30, 2013. This year over 90% of the run had crossed LGD by December 17, 2012, which is when the fishway was closed until February 28, 2013.

Stock and age composition of the adult return to LGD is based on information obtained from fish sampled at the LGD adult trap. The adult trap at LGD is located in the fish ladder upstream from the fish counting window and is used to examine fish for marks and tags and to collect tissue samples for PBT analysis from steelhead passing LGD. Fish are trapped by operating a trap gate that diverts fish migrating up the fish ladder into a collection chamber according to a predetermined sample rate. The sample rate determines how long the trap gate remains open during four intervals each hour, and the trap is operated 24 hours per day under normal operation. Data and biological samples are collected from steelhead that are captured in the LGD adult trap according to established protocols. If the trapping rate changes during the season, subsample rates for steelhead captured in the trap can also change to maintain a consistent sample rate across the run. Additional information about the LGD adult trap can be found in Schrader et al. (2014).

For spawn year 2013 the trap was operational for 205 days during the time period when counts were made by the COE. It was closed for 14 consecutive days in August when water temperatures reached 70 degrees Fahrenheit and for 25 days in November and December prior to when the ladder was closed for winterization.

During periods of operation, the trap rate varied from 10% to 18% of the weekly ladder count. A subsample was selected from the trap for PBT analysis for an overall sample rate of 1.5% of all fish identified as fish of hatchery origin (Ad-clip or Coded Wire Tag). All fish identified as wild/natural origin were sampled but some of those were later identified through genetic analysis to actually be unclipped fish of hatchery origin. A subsample of these was randomly selected to be included in the PBT analysis for a sample rate of 1.5%. The total number of fin tissue samples taken from hatchery origin fish was 2,206, which included 1,150 taken from ad-clipped fish and 1,056 from unclipped hatchery-origin fish (Table 7). Of these samples, 1,278 were selected to be included in the analysis. Genetics testing results were used to assign these fish of hatchery origin back to a broodstock pairing found within the PBT database, providing information on the spawn year, stock, and hatchery of origin. Since the PBT database had not been developed to allow assignment of all progeny back to release site during production of the 2008, 2009, and 2010 brood years, a PBT hatchery/stock release group is defined as an aggregate of smolts that are of the same age, stock, and hatchery of origin. Expansion rates of the PBT release groups are based on the proportion of progeny that are the offspring of successfully genotyped broodstock within the PBT database. Brood fish that were not successfully genotyped reduces the PBT tagging rate of the overall release group. Expansion rates are therefore applied to PBT hatchery/stock release groups the same way they are applied to PIT-tagged release groups.

Genetic testing of the 1,278 samples from the LGD trap resulted in successfully assigning 1,201 of them to 36 hatchery/stock release groups in the PBT database (Table 8). There were 77 that did not assign to any hatchery/stock release groups. Stock and age composition of the total hatchery escapement to LGD was based on the proportions of the

various hatchery/stock release groups identified from the PBT samples. Genetic samples that did not assign to a group were included but given an expansion value of 1.0. Adjustments were made to the total escapement of adult hatchery steelhead at LGD based on the proportion of trapped unclipped fish that had CWT, the presence of dorsal fin erosion on ad-intact fish (“stubbies”), and on the proportion of fish originally identified as wild/natural origin that assigned to a hatchery/stock release group through PBT. The adjusted total hatchery steelhead escapement estimate was 86,015 fish, which was multiplied by age and stock proportions to acquire escapement estimates of individual release groups.

Confidence intervals for hatchery stock composition estimates were generated using the script *resampit.r* performed in the R programming environment (R Development Core Team 2010). The *resampit.r* script resamples (bootstraps) with replacement from the original PBT assignment data set. The *resampit.r* script resamples (bootstraps) with replacement from the original PBT assignment data set. Within each iteration, the original stock assignments (including unassigned fish) were resampled with replacement 1,278 times (the number of samples in the original dataset) and stock assignment frequencies for that iteration were tabulated. Stock frequencies for each stock/cohort in each iteration were then divided by the PBT tagging rate (to account for untagged fish) for that stock to estimate the true number of fish from each stock within the mixture. Samples that did not assign to a release group were given a PBT tagging rate of 1.0. Finally, the expanded stock assignments were then divided by the number of samples in the original dataset to estimate stock proportions. We performed 5,000 iterations and the 95% confidence intervals were then generated by removing $\alpha/2$ proportions from the extremes of the 5,000 ordered stock proportions (Table 9). The *resampit.r* script was written and provided by M. Ackerman (PSMFC, Eagle Fish Genetics Lab).

The two methods of using PIT tag expansions and PBT analysis for estimating stock and cohort composition of the adult escapement over LGD are independent of each other and expected to differ slightly. Estimates derived from both methodologies are combined into one graphic illustration providing a visual comparison of the two methods (Figure 3). Escapement estimates based on PIT tag detections for 23 of the 32 groups were less than the PBT estimate and of those, 12 were outside the 95% confidence intervals of the PBT estimate. In nine of the groups represented by both, PIT tag estimates are higher than the PBT estimates but still within the 95% confidence interval. Both methods of estimating the stock composition of escapement have potential for bias. For estimates based on PIT tag detections, the expansion values will underrepresent the population-at-large if PIT tags are shed or if there is differential mortality between tagged and untagged fish within the same release group. The most likely source of bias using PBT to estimate stock composition escapement is through the trapping and sampling protocol. Although sampling at the ladder is designed to randomly trap a known percentage of the population of returning adults throughout the migration period, there were intervals when the trap was not operating due to mechanical issues or when water temperatures reach 70 degrees F. In both instances fish were observed to be ascending the ladder while no samples were taken. However, the counts were low during those time periods so no adjustments were made to the PBT release group assignment model.

Table 5. Summary of expanded PIT tag estimates for one-, two-, and three-ocean (Brood Years 2010, 2009, and 2008) steelhead passing upstream of Bonneville Dam by hatchery and stock. Estimates are adjusted for 98.3% detection efficiency.

| Hatchery | Stock | 1-Ocean | 2-Ocean | 3-Ocean | Total |
|--------------------|-------------------|---------------|---------------|------------|---------------|
| Clearwater | DWOR | 349 | 11,936 | 54 | 12,339 |
| | SFCLW | 129 | 0 | 0 | 129 |
| | CLFH Total | 478 | 11,936 | 54 | 12,468 |
| Dworshak | DWOR | 666 | 9,556 | 489 | 10,712 |
| | DNFH Total | 666 | 9,556 | 489 | 10,712 |
| Hagerman | SAW ¹ | 15,180 | 10,793 | 0 | 25,974 |
| | EFNAT | 1,287 | 690 | 0 | 1,977 |
| | HNFH Total | 16,467 | 11,483 | 0 | 27,950 |
| Magic Valley | DWOR | 395 | 1,762 | 2 | 2,159 |
| | PAH | 6,191 | 1,358 | 0 | 7,549 |
| | SAW | 1,065 | 657 | 0 | 1,722 |
| | USAL | 160 | 766 | 11 | 937 |
| | MVFH Total | 7,811 | 4,543 | 13 | 12,367 |
| Niagara Spgs. | OX | 955 | 12,573 | 1 | 13,529 |
| | PAH | 8,802 | 6,097 | 0 | 14,898 |
| | NISP Total | 9,757 | 18,669 | 1 | 28,427 |
| Idaho Total | | 35,179 | 56,188 | 557 | 91,925 |

¹ Estimates for SAW release group from Hagerman Hatchery are adjusted for tag loss from spawn year 2012.

Table 6. Summary of expanded PIT tag estimates for one-, two-, and three-ocean (Brood Years 2010, 2009, and 2008) hatchery steelhead passing upstream of Lower Granite Dam by hatchery and stock.

| Hatchery | Stock | 1-Ocean | 2-Ocean | 3-Ocean | Total |
|--------------------|-------------------|----------------|----------------|----------------|---------------|
| CLFH | DWOR | 184 | 8,326 | 53 | 8,563 |
| | SFCLW | 117 | | | 117 |
| | CLFH Total | 301 | 8,326 | 53 | 8,680 |
| DNFH | DWOR | 542 | 6,246 | 243 | 7,030 |
| | DNFH Total | 542 | 6,246 | 242 | 7,030 |
| HNFH | SAW ¹ | 10,569 | 3,670 | - | 14,239 |
| | EF NAT. | 958 | 509 | | 1,467 |
| | HNFH Total | 11,527 | 4,179 | | 15,706 |
| MVFH | DWOR | 156 | 1,239 | 1 | 1,396 |
| | PAH | 3,695 | 755 | - | 4,451 |
| | SAW | 613 | 405 | - | 1,017 |
| | USAL | 79 | 511 | 11 | 602 |
| | MVFH Total | 4,543 | 2,910 | 12 | 7,466 |
| NISP | OX | 563 | 8,603 | 1 | 9,167 |
| | PAH | 5,946 | 3,878 | - | 9,824 |
| | NISP Total | 6,510 | 12,481 | 1 | 18,992 |
| Idaho Total | | 23,424 | 34,141 | 308 | 57,874 |

¹ Estimates for SAW release group from Hagerman Hatchery are adjusted for tag loss from spawn year 2012.

Table 7. Total number of tissue samples taken from adult steelhead at LGD for PBT analysis to estimate proportional stock composition of the escapement estimate and to calculate confidence intervals around the total escapement estimate of each PBT release group.

| Mark/Tag | Initial Sample Rate | n | Samples Included in the Analysis | Final Sample Rate |
|--------------------------|----------------------------|--------------------|---|--------------------------|
| Ad-clipped fish | 1.5% | 1,150 | 1,150 | 1.5% |
| Ad-intact fish with CWT | 1.5% | 25 | 25 | 1.5% |
| Ad-intact without CWT | 15.0% | 1,031 ¹ | 58 | 1.5% |
| Total PBT Samples | | 2,206 | 1,278 | |

¹ 452 of these were originally identified at the LGD trap as fish of wild/natural origin but subsequently assigned to a hatchery release group.

Table 8. Assignment results of all PBT samples taken from one-, two-, and three-ocean (Brood years 2010, 2009, and 2008) adult steelhead of hatchery origin at the Lower Granite Dam trap during the 2012-13 run.

| Hatchery | Stock | 1-Ocean | 2-Ocean | 3-Ocean | Unassigned | Total |
|-----------------------|--------------|----------------|----------------|----------------|-------------------|--------------|
| Clearwater | DWOR & SFCR | 3 | 159 | | | 162 |
| Dworshak | DWOR | 17 | 132 | 2 | | 151 |
| Hagerman | EFSW | 11 | 5 | | | 16 |
| | SAWT | 148 | 57 | | | 205 |
| Magic Valley | DWOR | 2 | 21 | | | 23 |
| | PAHH | 71 | 6 | 1 | | 78 |
| | SAWT | 19 | 5 | | | 24 |
| | SQUW | 3 | 6 | 1 | | 10 |
| Niagara Spgs. | OXBO | 16 | 102 | | | 118 |
| | PAHH | 86 | 80 | 1 | | 167 |
| Sho-Ban Tribe Egg Box | PAHH | | 2 | | | 2 |
| Little Sheep Cr.-OR | LSCR | 5 | 10 | 1 | | 16 |
| Wallowa-OR | WALL | 33 | 89 | | | 122 |
| Grand Ronde-WA | CGRW | 34 | 25 | | | 59 |
| Lyons Ferry-WA | LYON | 33 | 10 | | | 43 |
| | TUCW | 3 | 2 | | | 5 |
| Unassigned | Unassigned | | | | 77 | 77 |
| Grand Total | | 484 | 711 | 6 | 77 | 1,278 |

Table 9. Summary of escapement point-estimates for one-, two-, and three-ocean (Brood years 2010, 2009, and 2008) hatchery steelhead returning to Lower Granite Dam, based on analysis of PBT samples. The range in parenthesis represents the 95% confidence interval.

| Hatchery | Stock | 1-Ocean | 2-Ocean | 3-Ocean | Total |
|--------------------------------|-------------|----------------------|-----------------------|-------------|---------------|
| Clearwater | DWOR & SFCR | 209 (3-487) | 10,947 (9,363-12,599) | | 11,156 |
| Dworshak | DWOR | 1,182 (626-1,808) | 9,088 (7,642-10,534) | 199 (3-499) | 10,469 |
| Hagerman | EFNAT | 740 (337-1,211) | 337 (67- 673) | | 1,077 |
| | SAW | 9,961 (8,480-11,442) | 3,836 (2,894-4,846) | | 13,797 |
| Hagerman Total | | 10,701 | 4,173 | 0 | 14,874 |
| Magic Valley | DWOR | 139 (2-348) | 1,446 (895-2,065) | | 1,585 |
| | PAH | 4,925 (3,815-6,035) | 426 (142-781) | 67 (1-202) | 5,418 |
| | SAW | 1,279 (740-1,885) | 337 (67-673) | | 1,616 |
| | USAL | 202 (3 to 471) | 404 (135-740) | 67 (1-202) | 673 |
| Magic Valley Total | | 6,545 | 2,613 | 134 | 9,292 |
| Niagara Spgs. | OX | 1,124 (632-1,686) | 7,846 (6,384-9,307) | | 8,970 |
| | PAH | 5,965 (4,786-7,283) | 5,644 (4,445-6,843) | 71 (1-214) | 11,680 |
| Niagara Springs Total | | 7,089 | 13,490 | 71 | 20,650 |
| Sho-Ban Egg Box | PAH | | 141 (2-353) | | 141 |
| Little Sheep Cr.-OR | LSCR | 381 (76-762) | 702 (281-1,194) | 67 (1-202) | 1,150 |
| Wallowa-OR | WAL | 2221 (1,481-2,961) | 5,990 (4,779-7,202) | | 8,211 |
| Grand Ronde-WA | CGRW | 2288 (1,548-3,029) | 1,756 (1,124-2,458) | | 4,044 |
| Lyons Ferry-WA | LYON | 2,221 (1,548-3,029) | 679 (272-1,155) | | 2,900 |
| | TUC | 202 (3-471) | 135 (2-337) | | 337 |
| Unassigned | Unassigned | 2,791 (1,632-4,007) | | | 2,791 |
| Grand Total of Assigned | | 33,039 | 49,714 | 471 | 83,224 |

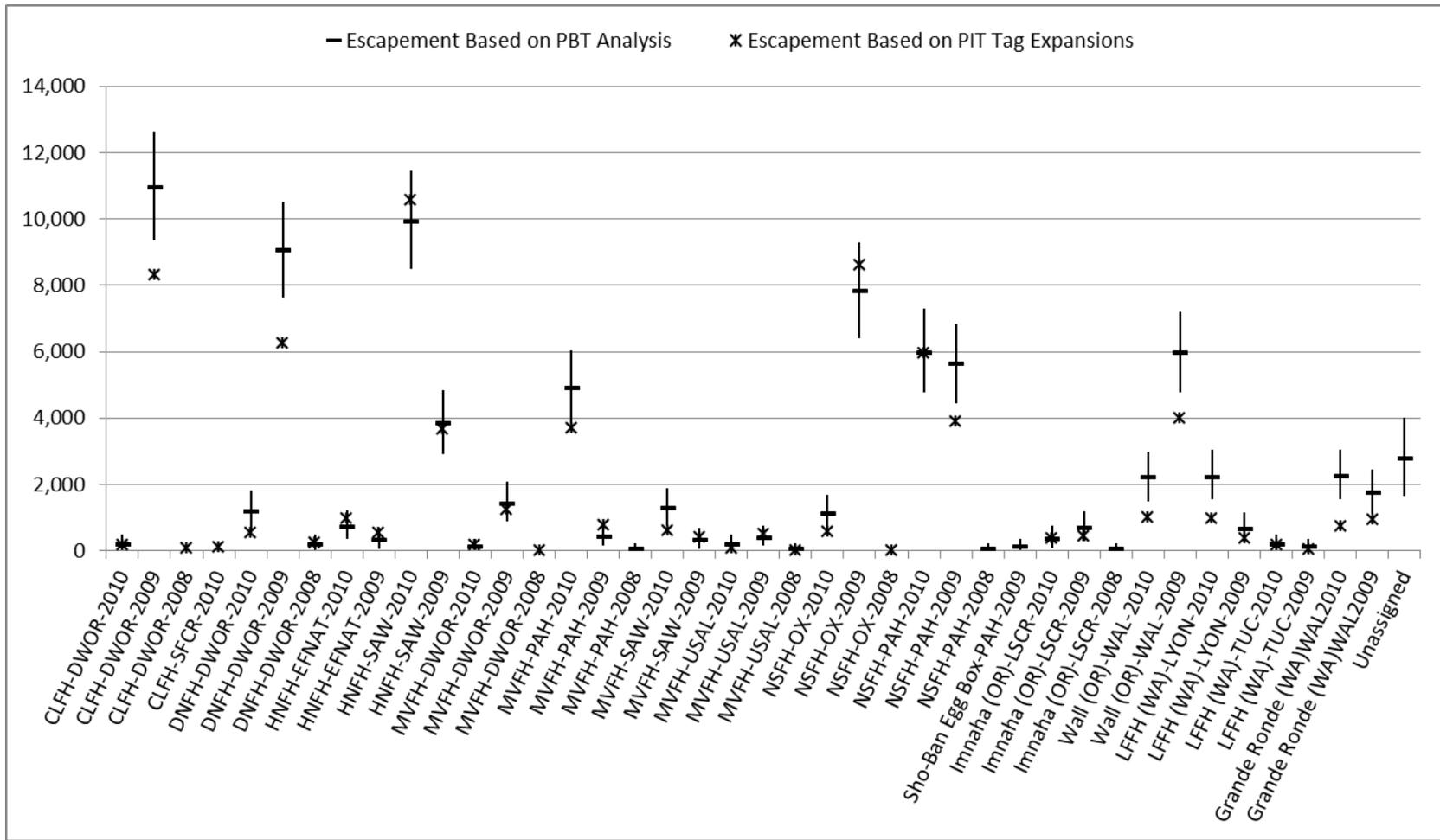


Figure 3. Comparison of escapement of various release groups (Hatchery-Stock-BY) to LGD between estimates made with PBT analysis with 95% C.I. and estimates made with PIT tag expansions.

Conversion Rates Between Dams

Conversion rates from Bonneville Dam to McNary Dam and from Bonneville Dam to Lower Granite Dam were based on detections of PIT-tagged adult hatchery steelhead. Tables 10 and 11 provide the number of tags detected, which are grouped by stock, release basin, and brood year for three cohorts. For the purposes of this report, PIT tag detections include all sort-by-code categories (RAL and RTR) and conversions represent all losses between dams, including harvest, strays and mortalities. The group represented by the largest number of PIT tag detections is the BY2009 DWOR stock returning to the Clearwater River basin. For 1-ocean and 2-ocean fish, conversion rates between Bonneville Dam and McNary Dam ranged from 57% for the USAL-Salmon BY2010 group up to 90% for the EFNAT-Salmon BY2010 group. Conversion rates between Bonneville Dam and Lower Granite Dam ranged from 40% for the DWOR-Salmon BY2010 group up to 77% for the EFNAT-Salmon BY2010 and BY2009 groups. The total numbers of PIT tags used in these analyses are low in some groups, particularly for the BY2010 groups in which the majority of the population follows a 2-ocean life history before maturity.

Table 10. Total number of PIT tagged adult hatchery steelhead detected in the Columbia River hydropower system and their conversion rates from Bonneville Dam to McNary Dam during the 2012-13 run.

| Stock-Basin | 1-Ocean | | | 2-Ocean | | | 3-Ocean | | | Average |
|------------------|------------|--------|------------|------------|--------|------------|------------|--------|------------|---------|
| | Bonneville | McNary | Conversion | Bonneville | McNary | Conversion | Bonneville | McNary | Conversion | |
| DWOR-Clearwater | 17 | 15 | 88% | 513 | 389 | 76% | 10 | 8 | 80% | 76% |
| SFCLW-Clearwater | 8 | 6 | 75% | | | | | | | 75% |
| DWOR-Salmon | 5 | 3 | 60% | 30 | 26 | 87% | 2 | 2 | 100% | 84% |
| EFNAT-Salmon | 48 | 43 | 90% | 31 | 25 | 81% | | | | 86% |
| OX-Salmon | | | | 55 | 41 | 75% | | | | 75% |
| PAH-Salmon | 226 | 184 | 81% | 128 | 101 | 79% | | | | 81% |
| SAW-Salmon | 282 | 236 | 84% | 85 | 64 | 75% | | | | 82% |
| USAL-Salmon | 7 | 4 | 57% | 49 | 41 | 84% | 1 | 1 | 100% | 81% |
| OX-Snake | 10 | 8 | 80% | 125 | 94 | 75% | 1 | 1 | 100% | 79% |

Table 11. Total number of PIT tagged adult hatchery steelhead detected in the Columbia River hydropower system and their conversion rates from Bonneville Dam to Lower Granite Dam during the 2012-13 run.

| Stock-Basin | 1-Ocean | | | 2-Ocean | | | 3-Ocean | | | Average |
|------------------|------------|-----|------------|------------|-----|------------|------------|-----|------------|---------|
| | Bonneville | LGD | Conversion | Bonneville | LGD | Conversion | Bonneville | LGD | Conversion | |
| DWOR-Clearwater | 17 | 13 | 76% | 513 | 361 | 70% | 10 | 7 | 70% | 71% |
| SFCLW-Clearwater | 8 | 6 | 75% | | | | | | | 75% |
| DWOR-Salmon | 5 | 2 | 40% | 30 | 21 | 70% | 2 | 1 | 50% | 65% |
| EFNAT-Salmon | 48 | 37 | 77% | 31 | 24 | 77% | | | | 77% |
| OX-Salmon | | | | 55 | 35 | 64% | | | | 64% |
| PAH-Salmon | 226 | 158 | 70% | 128 | 89 | 70% | | | | 70% |
| SAW-Salmon | 282 | 207 | 73% | 85 | 59 | 69% | | | | 72% |
| USAL-Salmon | 7 | 4 | 57% | 49 | 36 | 73% | 1 | 1 | 100% | 72% |
| OX-Snake | 10 | 6 | 60% | 125 | 87 | 70% | 1 | 1 | 100% | 71% |

Run Timing

Run timing curves were generated at Bonneville Dam, Lower Granite Dam, and hatchery traps by graphing the cumulative percentage of fish returned by return date. For returns to Bonneville and Lower Granite dams, PIT tag detections were used to generate stock-specific timing curves for adult hatchery-origin fish. The run timing difference between A-run and B-run type stocks is clearly visible at Bonneville Dam in Figure 4; B-run stocks (DWOR and USAL-B) arrive approximately one month later than A-run stocks (EFNAT, OX, PAH, and SAW). Run timing differences are less pronounced but still noticeable at Lower Granite Dam, where upriver migration is likely influenced by in-river conditions including water temperatures (Figure 5). The DWOR adults released in the Upper Salmon River continue to follow a pattern of returning later than DWOR adults returning from Clearwater releases. This is a pattern that has been observed the previous three runs (Stiefel et al. 2013).

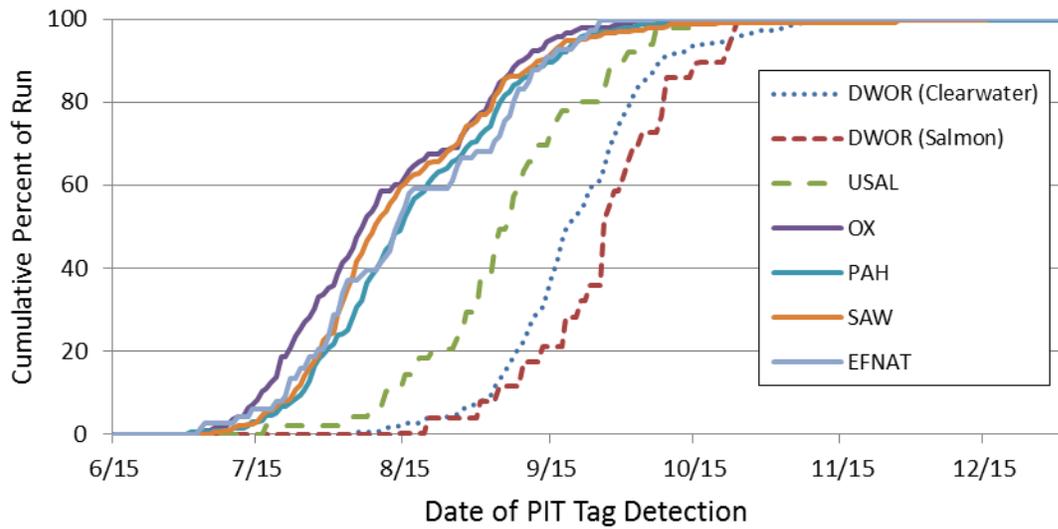


Figure 4. Run timing of hatchery steelhead at Bonneville Dam based on PIT tag detections during the 2012-2013 run.

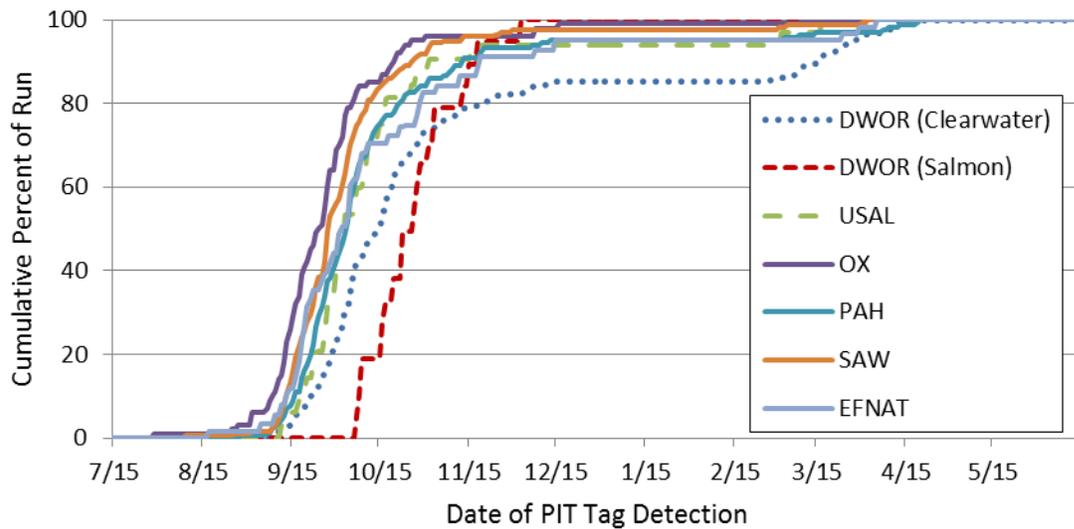


Figure 5. Run timing of hatchery steelhead at Lower Granite Dam based on PIT tag detections during the 2012-2013 run.

Idaho Recreational Fisheries

Harvest surveys (mail and telephone) are conducted to estimate statewide harvest (SWH) and angler effort in the fall and spring steelhead fisheries after the conclusion of each season (fall and spring). Results of the SWH survey indicate that anglers harvested 24,853 hatchery steelhead during the fall of 2012 season, and 15,696 steelhead during the spring of 2013 season in Idaho. This information is summarized for each river section (Figure 6) and season combination (stratum) (Table 12). Angler surveys conducted by roving creel survey personnel gather information from anglers and their catch throughout the fishing season. Data gathered during these surveys include the collection of Coded Wire Tags (CWT) from tagged fish and fin clips for PBT information. These data are used in conjunction with the SWH survey results for stock specific harvest estimates within various river reach strata. The acquisition of CWT and PBT data each provides an independent estimate of the stock composition of the harvest and enables us to compare the two methods. With both methods the composition of the harvest is estimated by the total number of tagged fish sampled and the number of fish that each recovered tag represents (expansion value). Estimating the composition of the harvest requires acquiring a large enough sample of fish from the population to assure that all stocks within the fishery are represented in the sample. Since more than 95% of all smolts released are PBT tagged, there is a higher probability of representing all stocks and cohorts in the sample.

During the fall of 2012 fishing season there were a total of 572 CWTs recovered from all location strata except the upper Salmon River (18-19), where angler contact surveys were not made due to low angler effort. During this same time period there were a total of 792 PBT samples taken from six strata. Efforts to collect tissue samples by creel survey personnel did not include reaches of the Salmon River upstream of strata 13-14 during the fall of 2012. No PBT samples were taken from fish harvested during the spring season from strata 1 due to low angler effort and harvest within that time and section stratum. During the spring of 2013 there were 313 CWTs and 1,068 PBT samples recovered from the fishery (See Appendix C for a complete list of CWTs and PBT lab results used in the analysis).

Differences between the two methodologies of determining the stock composition of the angler harvest were assessed with a comparison of harvest of specific hatchery/stock release groups to the hatchery-stock level (Tables 13 and 14). Although CWT recoveries provided stock composition information to the release site level, most were pooled to provide harvest estimates to the hatchery-stock level to be comparable with the analysis of PBT data. This was done because parentage could be assigned only to the brood year-hatchery-stock level for many hatchery/stock release groups prior to the 2010 brood year. Future comparisons will be release site specific. A more detailed comparison is provided to the brood year-hatchery-stock level within Appendices C5 and C6. Composition of the harvest from within strata 2 (Snake River between the mouth of the Salmon River upstream to Hells Canyon Dam) was based only on CWT samples due to unequal sampling effort for CWTs and for PBT. In this particular case, only CWTs were gathered from anglers fishing the lower reaches of strata 2 while CWTs and PBT tissue samples were gathered from anglers fishing near Hell's Canyon Dam. Although not presented in the table of results, the genetics lab results indicate that all PBT samples collected from this stratum were of OX stock origin while CWTs indicate a mixed stock in the angler harvest.

Overall results of the comparison indicate some differences in the stock composition between the methodologies within several strata, which is probably due to low sample sizes in a

few instances and the presence of multiple stocks within some strata at various times of the fishing season. As demonstrated in the case of strata 2, sampling effort needs to be structured to include anglers from all reaches of a stratum, possibly even weighting the sampling to reflect angler effort from within the strata.

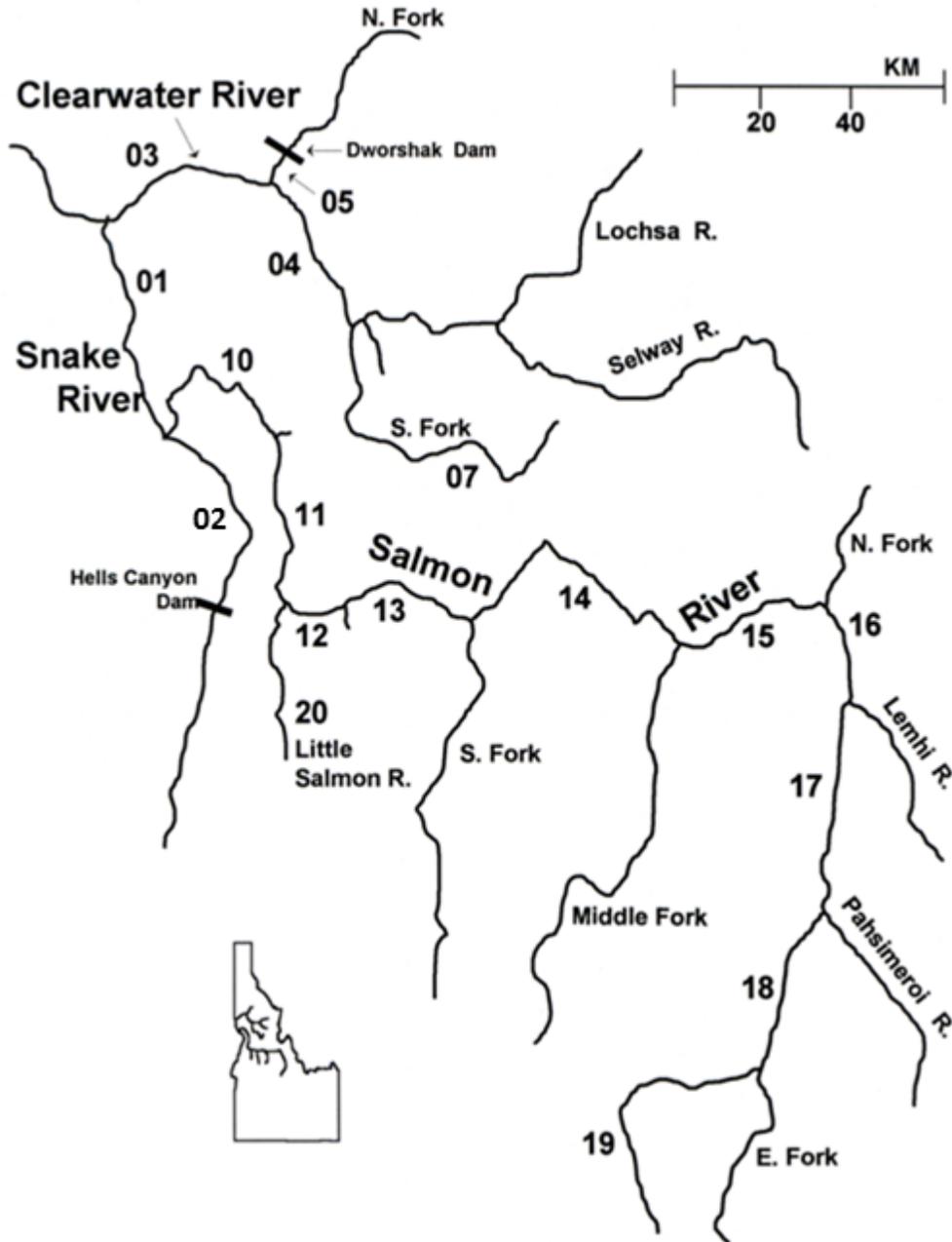


Figure 6. Idaho Department of Fish and Game river section designations where hatchery steelhead are available for harvest. Major tributaries or dams indicated on the map are used as section boundaries.

Table 12. Adult steelhead harvest estimated from statewide angler survey after the close of the 2012-13 fishing season.

| Location Stratum | Location Code | Location Description | Fall Effort (Angler Days) | Spring Effort (Angler Days) | Fall Harvest | Spring Harvest | Total Harvest |
|-------------------------|---------------|---|---------------------------|-----------------------------|---------------|----------------|---------------|
| 1 | 1 | Snake R.; State Line to Salmon R. | 12,860 | 1,228 | 2,300 | 239 | 2,539 |
| 2 | 2 | Snake R.; Salmon R. to Hells Canyon Dam | 3,834 | 1,410 | 1,088 | 333 | 1,421 |
| 3-4 | 3 | Clearwater R.; Mouth to N.Fk. | 50,001 | 9,404 | 8,632 | 2,083 | 10,715 |
| | 4 | Clearwater R.; N. Fk. to S. Fk. | 8,655 | 5,546 | 1,113 | 1,203 | 2,316 |
| 5 | 5 | N. Fk. Clearwater R. | 3,646 | 2,906 | 504 | 392 | 896 |
| 7 | 7 | S. Fk. Clearwater R. | 3,123 | 8,802 | 188 | 1,548 | 1,736 |
| 10-12 | 10 | Salmon R.; Mouth to Whitebird Cr. | 4,855 | 1,148 | 1,082 | 347 | 1,429 |
| | 11 | Salmon R.; Whitebird Cr. To Little Salmon | 11,312 | 3,209 | 2,037 | 874 | 2,911 |
| | 12 | Salmon R.; Little Salmon to Vinegar Cr. | 7,299 | 1,769 | 1,835 | 457 | 2,292 |
| 13-17 | 13 | Salmon R.; Vinegar Cr. To S. Fk. Salmon | 3,468 | 1,319 | 892 | 324 | 1,216 |
| | 14 | Salmon R.; S. Fk. Salmon to Middle Fk. Salmon | 4,230 | 3,740 | 674 | 694 | 1,368 |
| | 15 | Salmon R.; Middle Fk. Salmon to N. Fk. Salmon | 11,886 | 7,936 | 2,692 | 1,489 | 4,181 |
| | 16 | Salmon R.; N. Fk. Salmon to Lemhi | 6,268 | 5,239 | 1,001 | 999 | 2,000 |
| | 17 | Salmon R.; Lemhi to Pahsimeroi | 3,228 | 5,119 | 249 | 929 | 1,178 |
| 18-19 | 18 | Salmon R.; Pahsimeroi to E. Fk. Salmon | 1,174 | 4,232 | 0 | 398 | 398 |
| | 19 | Salmon R.; E. Fk. Salmon to Sawtooth H. | 2,047 | 6,864 | 123 | 1,767 | 1,890 |
| 20 | 20 | Little Salmon R. | 2,429 | 4,777 | 443 | 1,620 | 2,063 |
| Statewide Total: | | | 140,315 | 74,648 | 24,853 | 15,696 | 40,549 |

Table 13. A comparison of estimates of the adult steelhead stock composition between CWT recoveries and PBT analysis from fish harvested in the fall of 2012.

| Hatchery | Stock | Tag Type | Snake R. Sect. 1 | Snake R. Sect. 2 ¹ | Clearwater R. Sect. 3-4 | N. Fk. | | | Little Salmon R. Sect. 20 | Total Harvest | |
|--------------|-----------|----------|------------------|-------------------------------|-------------------------|-----------------------|-----------------------|-----------------------|---------------------------|---------------|------------------------------------|
| | | | | | | Clearwater R. Sect. 5 | Salmon R. Sect. 10-12 | Salmon R. Sect. 13-14 | | | Salmon R. Sect. 15-17 ² |
| Clearwater | DWOR/SFCR | CWT | 19 | 20 | 5,881 | - | - | - | - | 5,920 | |
| | | PBT | 134 | - | 2,916 | 19 | - | - | - | 3,069 | |
| | Total | CWT | 19 | 20 | 5,881 | - | - | - | - | 5,920 | |
| | | PBT | 134 | - | 2,916 | 19 | - | - | - | 3,069 | |
| Dworshak | DWOR | CWT | 57 | - | 3,210 | - | - | - | - | 3,267 | |
| | | PBT | 134 | - | 3,586 | 431 | - | - | - | 4,151 | |
| | Total | CWT | 57 | - | 3,210 | - | - | - | - | 3,267 | |
| | | PBT | 134 | - | 3,586 | 431 | - | - | - | 4,151 | |
| Niagara Spgs | OX | CWT | 186 | 322 | 196 | - | 1,413 | 590 | 689 | 287 | 3,683 |
| | | PBT | 428 | - | 956 | - | 1,651 | 305 | - | 184 | 3,524 |
| | PAH | CWT | 556 | 49 | 123 | - | 1,632 | 272 | 60 | 156 | 2,848 |
| | | PBT | 233 | - | 195 | - | 1,340 | 510 | - | 171 | 2,449 |
| | Total | CWT | 742 | 371 | 319 | - | 3,045 | 862 | 749 | 443 | 6,531 |
| | | PBT | 661 | - | 1,151 | - | 2,991 | 815 | - | 355 | 5,973 |
| Hagerman | DWOR | CWT | - | 7 | - | - | - | - | - | - | 7 |
| | | PBT | - | - | - | - | - | - | - | - | - |
| | SAW | CWT | 338 | 101 | 33 | - | 219 | 244 | 2,128 | - | 3,063 |
| | | PBT | 131 | - | 188 | - | 308 | 321 | - | - | 948 |
| | Total | CWT | 338 | 108 | 33 | - | 219 | 244 | 2,128 | - | 3,070 |
| | | PBT | 131 | - | 188 | - | 308 | 321 | - | - | 948 |
| Magic Valley | DWOR | CWT | 155 | 36 | - | - | 381 | 122 | 803 | - | 1,497 |
| | | PBT | 24 | - | 96 | - | 289 | 75 | - | - | 484 |
| | PAH | CWT | 209 | - | 129 | - | 1,094 | 309 | 229 | - | 1,970 |
| | | PBT | 36 | - | 99 | - | 964 | 256 | - | 87 | 1,442 |
| | SAW | CWT | 66 | 7 | - | - | 62 | 29 | 34 | - | 198 |
| | | PBT | 36 | - | 47 | - | 24 | 25 | - | - | 132 |
| | USAL | CWT | - | 5 | - | - | - | - | - | - | 5 |
| | | PBT | - | - | - | - | - | - | - | - | - |
| | Total | CWT | 430 | 48 | 129 | - | 1,537 | 460 | 1,066 | - | 3,670 |
| | | PBT | 96 | - | 242 | - | 1,277 | 356 | - | 87 | 2,058 |
| Oregon | Total | CWT | 709 | 540 | 95 | - | 153 | - | - | - | 1,497 |
| | | PBT | 725 | - | 387 | - | 96 | - | - | - | 1,208 |
| | Total | CWT | 709 | 540 | 95 | - | 153 | - | - | - | 1,497 |
| | | PBT | 725 | - | 387 | - | 96 | - | - | - | 1,208 |

| Hatchery | Stock | Tag Type | Snake R. Sect. 1 | Snake R. Sect. 2 ¹ | Clearwater R. Sect. 3-4 | N. Fk. | | | Little Salmon R. Sect. 20 | Total Harvest | |
|-------------------|-------|----------|------------------|-------------------------------|-------------------------|-----------------------|-----------------------|-----------------------|---------------------------|---------------|------------------------------------|
| | | | | | | Clearwater R. Sect. 5 | Salmon R. Sect. 10-12 | Salmon R. Sect. 13-14 | | | Salmon R. Sect. 15-17 ² |
| Washington | Total | CWT | 4 | - | 80 | - | - | - | - | 84 | |
| | | PBT | 286 | - | 897 | 18 | - | - | - | 1,201 | |
| | | CWT | 4 | - | 80 | - | - | - | - | 84 | |
| | | PBT | 286 | - | 897 | 18 | - | - | - | 1,201 | |
| Unassigned | | PBT | 131 | - | 376 | 36 | 283 | 74 | | 1,016 | |
| Total By Tag Type | | CWT | 2,298 | 1,088 | 9,745 | - | 4,954 | 1,566 | 3,943 | 442 | 24,036 |
| | | PBT | 2,298 | - | 9,745 | 504 | 4,954 | 1,566 | - | 442 | 19,509 |

- ¹. No PBT samples from Section 2 were included in the stock composition analysis.
- ². No PBT samples were collected from Sections 15-17 during the fall fishery of 2012.

Table 14. A comparison of estimates of the adult steelhead stock composition between CWT recoveries and PBT analysis from fish harvested in the spring of 2013.

| Hatchery | Stock | Tag Type | Snake R. Sect. 1 ¹ | Snake R. Sect. 2 ² | Clearwater R. Sect. 3-4 | N. Fk. Clearwater R. Sect. 5 | S. Fk. Clearwater R. Sect. 7 | Salmon R. Sect. 10-12 | Salmon R. Sect. 13-17 | Salmon R. Sect. 18-19 | Little Salmon R. Sect. 20 | Total Harvest |
|--------------|-----------|----------|-------------------------------|-------------------------------|-------------------------|------------------------------|------------------------------|-----------------------|-----------------------|-----------------------|---------------------------|---------------|
| Clearwater | DWOR/SFCR | CWT | - | - | 2,617 | - | 1,548 | - | - | - | - | 4,165 |
| | | PBT | - | - | 1,383 | 16 | 1,392 | - | - | - | - | 2,791 |
| | Total | CWT | - | - | 2,617 | - | 1,548 | - | - | - | - | 4,165 |
| | | PBT | - | - | 1,383 | 16 | 1,392 | - | - | - | - | 2,791 |
| Dworshak | DWOR | CWT | - | - | 669 | 392 | - | - | - | - | - | 1,062 |
| | | PBT | - | - | 1,792 | 365 | 34 | - | - | - | - | 2,192 |
| | Total | CWT | - | - | 669 | 392 | - | - | - | - | - | 1,062 |
| | | PBT | - | - | 1,792 | 365 | 34 | - | - | - | - | 2,192 |
| Niagara | OX | CWT | - | 92 | - | - | - | 144 | 136 | - | 580 | 952 |
| | | PBT | - | - | - | - | - | 274 | - | - | 475 | 1,055 |
| | PAH | CWT | - | 70 | - | - | - | 741 | 2,004 | - | 643 | 3,458 |
| | | PBT | - | - | - | - | - | 501 | 1,082 | - | 472 | 2,055 |
| | Total | CWT | - | 162 | - | - | - | 884 | 2,140 | - | 1,223 | 4,410 |
| | | PBT | - | - | - | - | - | 775 | 1,082 | - | 947 | 2,804 |
| Hagerman | DWOR | CWT | - | - | - | - | - | 21 | - | - | - | 21 |
| | | PBT | - | - | - | - | - | - | - | - | - | - |
| | SAW | CWT | - | - | - | - | - | - | 1,367 | 2,026 | - | 3,393 |
| | | PBT | - | - | - | - | - | 146 | 2,343 | 2,041 | - | 4,530 |
| | Total | CWT | - | - | - | - | - | 21 | 1,367 | 2,026 | - | 3,414 |
| | | PBT | - | - | - | - | - | 146 | 2,343 | 2,041 | - | 4,530 |
| Magic Valley | DWOR | CWT | - | 19 | - | - | - | 229 | 171 | 115 | 191 | 726 |
| | | PBT | - | - | - | - | - | 181 | 30 | 99 | 156 | 466 |
| | PAH | CWT | - | 57 | - | - | - | 544 | 611 | - | 205 | 1,416 |
| | | PBT | - | - | - | - | - | 415 | 629 | - | 447 | 1,491 |
| | SAW | CWT | 13 | - | - | - | - | - | 145 | 24 | - | 182 |
| | | PBT | - | - | - | - | - | 16 | 175 | 12 | - | 203 |
| | USAL | CWT | - | - | - | - | - | - | - | - | - | - |
| | | PBT | - | - | - | - | - | - | - | - | - | - |
| | Total | CWT | 13 | 76 | - | - | - | 773 | 927 | 139 | 397 | 2,324 |
| | | PBT | - | - | - | - | - | 612 | 834 | 111 | 603 | 2,160 |
| Oregon | | CWT | 226 | 96 | - | - | - | - | - | - | - | 321 |
| | | PBT | - | - | - | - | - | - | - | - | - | - |
| | Total | CWT | 226 | 96 | - | - | - | - | - | - | - | 321 |
| | | PBT | - | - | - | - | - | - | - | - | - | - |
| Washington | | CWT | - | - | - | - | - | - | - | - | - | - |
| | | PBT | - | - | 16 | - | - | - | - | - | - | 16 |
| | Total | CWT | - | - | - | - | - | - | - | - | - | - |
| | | PBT | - | - | 16 | - | - | - | - | - | - | 16 |

| Hatchery | Stock | Tag Type | Snake R. Sect. 1 ¹ | Snake R. Sect. 2 ² | Clearwater R. Sect. 3-4 | N. Fk. | S. Fk. | Salmon R. Sect. 10-12 | Salmon R. Sect. 13-17 | Salmon R. Sect. 18-19 | Little | Total Harvest |
|-------------------|-------|----------|-------------------------------|-------------------------------|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------|---------------|
| | | | | | | Clearwater R. Sect. 5 | Clearwater R. Sect. 7 | | | | Salmon R. Sect. 20 | |
| Unassigned | | PBT | - | - | 96 | 11 | 121 | 145 | 175 | 12 | 70 | 630 |
| Total By Tag Type | | CWT | 239 | 333 | 3,286 | 392 | 1,548 | 1,678 | 4,435 | 2,165 | 1,620 | 15,696 |
| | | PBT | - | - | 3,286 | 392 | 1,548 | 1,678 | 4,435 | 2,165 | 1,620 | 15,124 |

^{1.} No PBT samples were collected from Section 1 during the spring fishery of 2013.

^{2.} No PBT samples from Section 2 were included in the stock composition analysis.

Hatchery Trap Returns

Daily trapping numbers were used to summarize the run timing for hatchery- and natural-origin fish collected in hatchery traps. Arrival timing at Hells Canyon Dam was not included, as the trap is operated intermittently (primarily in the fall) and would not show representative run timing. South Fork Clearwater River broodstock are collected by an angler contribution program and are therefore also not represented. Figures 7 and 8 summarize the run timing of steelhead returning to hatchery traps in the upper Salmon River in 2013, which is similar to previous years (Stiefel and Rosenberger 2011; Stiefel et. al 2012; Stiefel et. al 2013).

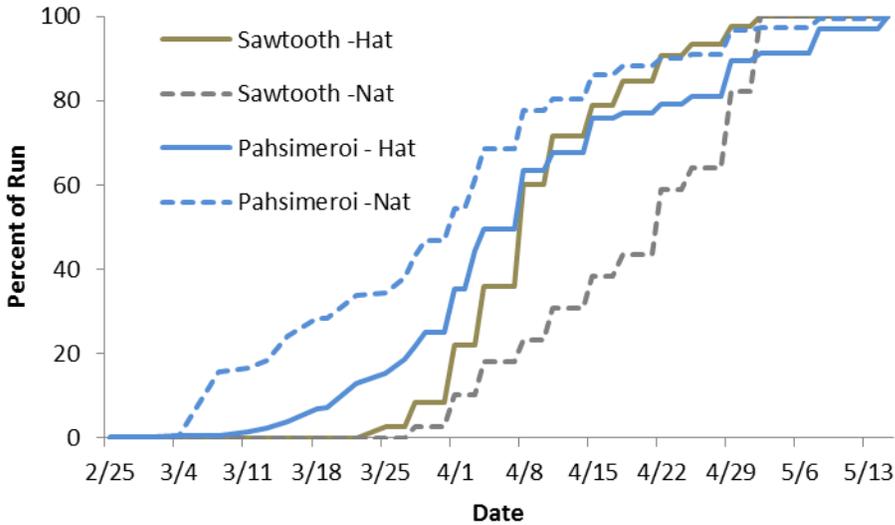


Figure 7. Run timing of adult hatchery and natural origin steelhead arriving at the Pahsimeroi and Sawtooth traps in 2013.

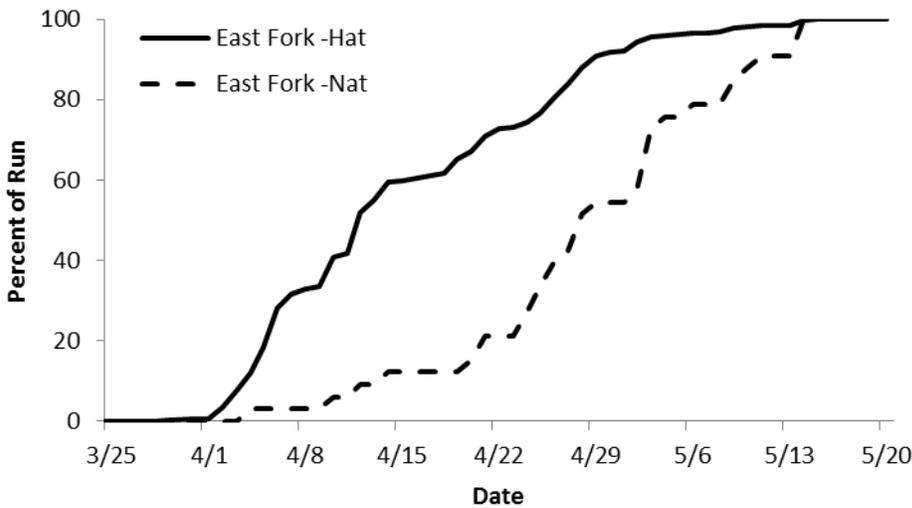


Figure 8. Run timing of adult hatchery and natural origin steelhead arriving at the East Fork Salmon River trap in 2013.

Steelhead that escaped fisheries were collected at hatchery weirs and traps where they were enumerated and processed. We estimated the age composition of adults returning to individual hatchery facilities by one of three methods, depending on the availability of known age information (CWTs and/or PBT) recovered from returning adults. In cases where enough known age information is available, the statistical computer program *R* (R Development Core Team 2010) was used with the *mixdist* library package (Macdonald 2010) to estimate the proportion of each age group that was used to calculate the number in each age class. *Rmix*, as it is called, was designed to estimate the parameters of a mixture distribution with overlapping components, such as the overlapping length distributions associated with adult steelhead returns composed of multiple age classes, and applies the maximum likelihood estimation method to a population based on a known-age subsample. If known age information was lacking, then age composition was estimated using the FAO-ICLARM Stock Assessment Tools (FiSAT) II software (Gayanilo et al. 2005). This method also applies the maximum likelihood concept and provides an estimated proportion of fish for each age class that is used to calculate the size of each age class. In some cases, where neither program could be used because of few returning adults, an age was assigned by applying a length cutoff after visually reviewing length frequencies. A summary of adults trapped by ocean age is shown in Table 15.

Table 15. Age composition and average fork length (cm) of adult steelhead returning to hatchery traps in 2013.

| Hatchery Trap | Stock | Origin | Males | | | | Females | | | | Total Return |
|---------------|-------|--------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--------------|
| | | | One-ocean | | Two-ocean | | One-ocean | | Two-ocean | | |
| | | | Num. | Avg. Len. | |
| Sawtooth | SAW | H | 1,586 | 60 | 440 | 68 | 726 | 57 | 1,081 | 68 | 3,833 |
| | | N | 12 | 60 | 9 | 72 | 7 | 59 | 11 | 68 | 39 |
| East Fork | EFNAT | H | 392 | 59 | 27 | 74 | 124 | 58 | 144 | 69 | 687 |
| | | N | 6 | 58 | 3 | 79 | 1 | 59 | 23 | 74 | 33 |
| Pahsimeroi | PAH | H | 1,415 | 56 | 466 | 71 | 1,209 | 55 | 1,273 | 68 | 4,363 |
| | | N | 55 | 58 | 16 | 72 | 56 | 58 | 51 | 69 | 178 |
| | | H | 66 | 62 | 99 | 78 | 10 | 62 | 248 | 73 | 423 |
| Hells Canyon | OX | H | 210 | 56 | 800 | 71 | 152 | 56 | 1,727 | 69 | 2,889 |
| | | N | 33 | 61 | 13 | 75 | 68 | 59 | 25 | 68 | 139 |

Localized Broodstock Development

East Fork Natural Program

The East Fork Salmon River Trap (EF weir) is a satellite facility of SFH and is utilized to collect broodstock for the East Fork Natural (EFNAT) steelhead supplementation program. The goal of this hatchery program is to aid in the recovery of the natural steelhead population in the East Fork Salmon River by supplementing the natural spawning population.

Hatchery production and release goals were reduced from 160,000 smolts after migration year 2013 to 60,000 smolts in 2014. A total of 35 females were spawned in 2012 to meet release goals. The hatchery production goal for migration year 2014 is to release 60,000 integrated steelhead smolts into the E.F. Salmon River near the adult trap. To achieve this production goal, approximately 87,500 green eggs are needed from approximately 16 females. Naturally produced adults will be prioritized for inclusion into the broodstock but if insufficient natural adults are available, hatchery-origin adults will be included in the broodstock. Specific broodstock and spawning protocols are detailed in the draft HGMP. An Annual Operating Plan summarizing the current year's broodstock and spawning protocols is jointly developed pre-season by Nampa Research staff and by Sawtooth FH staff.

For the 2013 brood year, the trap was in operation from March 27 through May 18. During this time 720 adult steelhead were trapped, which included 419 males and 268 females of hatchery origin, and 9 males and 24 females of natural origin (Table 15). A total of 34 adult steelhead were ponded at the trap facility, which included 14 females of natural origin and 20 males of hatchery and natural origin (Table 16). Spawning operations were spread out over five egg takes between May 3 and May 17. A total of 78,458 eggs were taken from the spawning of 12 females of natural origin, 5 males of natural origin, and 8 males of hatchery origin. Fish released upstream of the trap include 412 males (409 hatchery origin, 3 natural origin) and 278 females (268 hatchery origin, 10 natural origin). The proportion of fish released upstream to spawn naturally that were hatchery origin was 98.1%.

Table 16. Disposition of adult steelhead trapped at the East Fk. Salmon River facility spawn year 2013.

| Disposition | Origin | Males | Females |
|------------------------|----------|------------|------------|
| Spawned | H | 8 | 0 |
| | N | 5 | 12 |
| KNU | H | 1 | 0 |
| | N | 1 | 0 |
| Prespawn Mortality | H | 1 | 0 |
| | N | 0 | 2 |
| Released Above Weir | H | 409 | 268 |
| | N | 3 | 10 |
| Total Trapped | H | 419 | 268 |
| | N | 9 | 24 |

Upper Salmon B-run Program

IDFG is in the process of replacing an out-of-basin B-run stock with a locally adapted stock in the Salmon River basin. The development of a locally adapted hatchery stock in the Upper Salmon River, that matures predominantly (approximately 90%) after two or more years in the ocean, began in 1997 with the release of out-of-basin Dworshak National Fish Hatchery smolts (DWOR) in Squaw Cr. Adults from these releases returned as two-ocean fish in 2002 and provided the founding stock (USAL) for the Upper Salmon B-run program. From 2003 through 2009, DWOR and USAL smolts continued to be released to evaluate and further develop the USAL stock.

The USAL broodstock collection was shifted from Squaw Creek to the Pahsimeroi River in 2010 with the release of 95,023 USAL smolts (Adipose fin intact and 100% CWT) into the Pahsimeroi River below the weir. The eventual goal is to shift the broodstock collection facility to another suitable site in the near future. Field operations related to development of the USAL program continued at the Pahsimeroi Fish Hatchery with the release of 111,533 USAL ad-intact CWT smolts supplemented with 75,194 DWOR ad-intact CWT smolts at the Pahsimeroi weir in 2013 (Table 2). Collection of locally adapted broodstock came exclusively from the Pahsimeroi weir for the first time in 2013 with a total return of 423 USAL fish (Table 15). Of the 423 USAL stock steelhead that were trapped at Pahsimeroi in 2013, 60% of the males were age 4 (two-ocean), and 96% of the females were two-ocean fish. A total of 1,249,800 USAL green eggs were collected with 1,169,943 eyed eggs being sent to Magic Valley Hatchery for rearing supplemented with 203,482 eyed eggs from Dworshak National Fish Hatchery.

An abnormal phenotype (possibly albinism) was observed in 5-7% of brood year 2009 production (the primary broodstock for brood year 2013 production) and efforts were made to minimize the inclusion of these family units in the production intended for the broodstock release site (Pahsimeroi weir). The Eagle Genetics Lab processed PBT samples from broodstock in-season and provided a relatedness coefficient for offspring (IDFG unpublished information). This information was used to identify the most unrelated crosses to be used for the brood release; the more related crosses were intended to be released at offsite releases. Despite these efforts, the same abnormal phenotype was observed in 5-7% of the early rearing vats intended for the brood release as well as other release groups. In an effort to eliminate the abnormal phenotype from the stock, release strategies were modified mid-rearing cycle and no USAL smolts will be released at Pahsimeroi. Instead, the entire release group will be composed of 130,000 DWOR smolts that are 100% CWT and be used as broodstock when they return in 2017.

Broodstock collection will continue at PFH until there are enough USAL adults at another facility to support egg-take needs required to meet release goals.

South Fork Clearwater River Program

In 2010, IDFG initiated a program to develop a hatchery stock that was locally adapted to the South Fork Clearwater River. Although hatchery fish have been released for years at Red River and Crooked River satellite facilities, very few hatchery adult steelhead returned to these sites; likely the result of fallout due to a partial migration barrier near Golden, Idaho. To overcome this constraint, a volunteer angler contribution program has been used to collect broodstock in the South Fork Clearwater River. Managers have initiated planning to build a suitable trapping facility in the South Fork Clearwater drainage to perpetuate this program. In 2013 anglers caught and donated a total of 117 females and 92 males of hatchery origin

between February 28 and March 7, 2013. These efforts resulted in the collection of 371,959 green eggs from the spawning of 70 females. The expected release at Meadow Creek in 2014 is 139,195 ad-clipped and 147,805 unmarked SF-CLWR stock smolts with CWTs in addition to 120,680 ad-clipped and 67,320 unmarked DWOR stock smolts with no tags.

RESEARCH

Estimating a Correction Factor for PIT Tag Expansions in Steelhead Returning to Sawtooth Fish Hatchery Trap

Recent research has shown that PIT-tagged adult Chinook salmon return at lower rates than non-PIT-tagged fish due to tag loss and/or differential survival (Knudsen et al. 2009). In an effort to estimate PIT tag retention rates and/or differential survival, an evaluation was initiated at Sawtooth Fish Hatchery (SFH) that utilized a PIT tag detection array in the adult ladder at the hatchery trap. The array is comprised of a multiplexing unit that has two antennas on each of two drop structures within the ladder, which assures that a fish ascending each of the drop structures will be detected whether it enters through the orifice in the keyway or over the spillway boards. If the last PIT tag detection for a fish was at one of the two upper antennas, then the fish was assumed to have been successfully trapped and retained for processing. Corrected expansion rates are calculated for each cohort returning to SFH by identifying and assigning returning adults to specific release groups to get a total estimated return of fish from a group that are represented by PIT tags. In previous years, age composition of returning adults was based on CWTs and the use of the statistical computer program *R* (R Development Core Team 2010) with the *mixdist* library package (Macdonald 2010). For the 2013 return group, PBT was used to assign essentially every returning adult fish that was used for spawning to a specific release group. This provided a much larger sample size to use in the *mixdist* library package. The total number of PIT tags detected with the array, adjusted for efficiency, was used to calculate the corrected expansion rate for each release group. Detection efficiency of the array was estimated by calculating the proportion of PIT tags that were detected by hand scanning with a PIT tag reader that were last detected at one of the two upper trap array antennas. For 2013 the Sawtooth ladder array detection efficiency was 98.3%.

Since the study was initiated with the first year of detecting PIT tag returns in 2011, results have indicated that the rate of tag loss and/or differential survival is highly variable. The results of the 2013 adult return again provide evidence that PIT tag retention/survival rates are highly variable with the recalculated expansion rate being 63.2 for the 2010 brood year, which is actually lower than the expansion rate of 78.2 at the smolt release group stage. The corrected expansion rate for the 2009 brood year increased from 84.6 at release to 117.7 as one-ocean fish in 2012 then to 253.2 as returning two-ocean fish in 2013 (Table 17). The high level of variation in the corrections to expansion rates are based on 36 run-at-large (sort-by-code) PIT tag detections for the 2010 brood year fish and six for the 2009 brood year fish. There may be an increase in PIT tag shed rates correlated with age, which would explain the reduced proportion of PIT tagged fish returning to the rack from the 2009 brood year. The small sample sizes of PIT tag detections significantly increases the sensitivity of the expansion adjustments. For the purposes of this report, adjustments to the escapement of two-ocean steelhead (BY2009) at LGD was based on the adjusted expansion factor calculated from the 2012 run year due to the small sample size of PIT tagged fish returning to the weir in SY2013.

Table 17. PIT tag expansion rates, adult detections, and expanded adult return estimates for Brood Year 2010 (one-ocean) and 2009 (two-ocean) steelhead returning to Sawtooth Fish Hatchery in 2013. Detections have been corrected for PIT array efficiency. Actual return estimates were generated using PBT and trapping information.

| Brood Year | Juvenile Expansion Rate At Release | Corrected Juvenile Expansion Rate 2011-12 Run | Run At Large PIT Tags at Trap Array | Return to River PIT Tags at Trap Array | Estimated Expanded Return | Actual Return | Corrected Expansion Rate 2012-13 Run |
|-------------------|---|--|--|---|----------------------------------|----------------------|---|
| 2010 | 78.2 | | 36 | 22 | 2,837 | 2,312 | 63.2 |
| 2009 | 84.6 | 117.7 | 6 | 2 | 510 | 1,521 | 253.2 |

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APPENDIX A

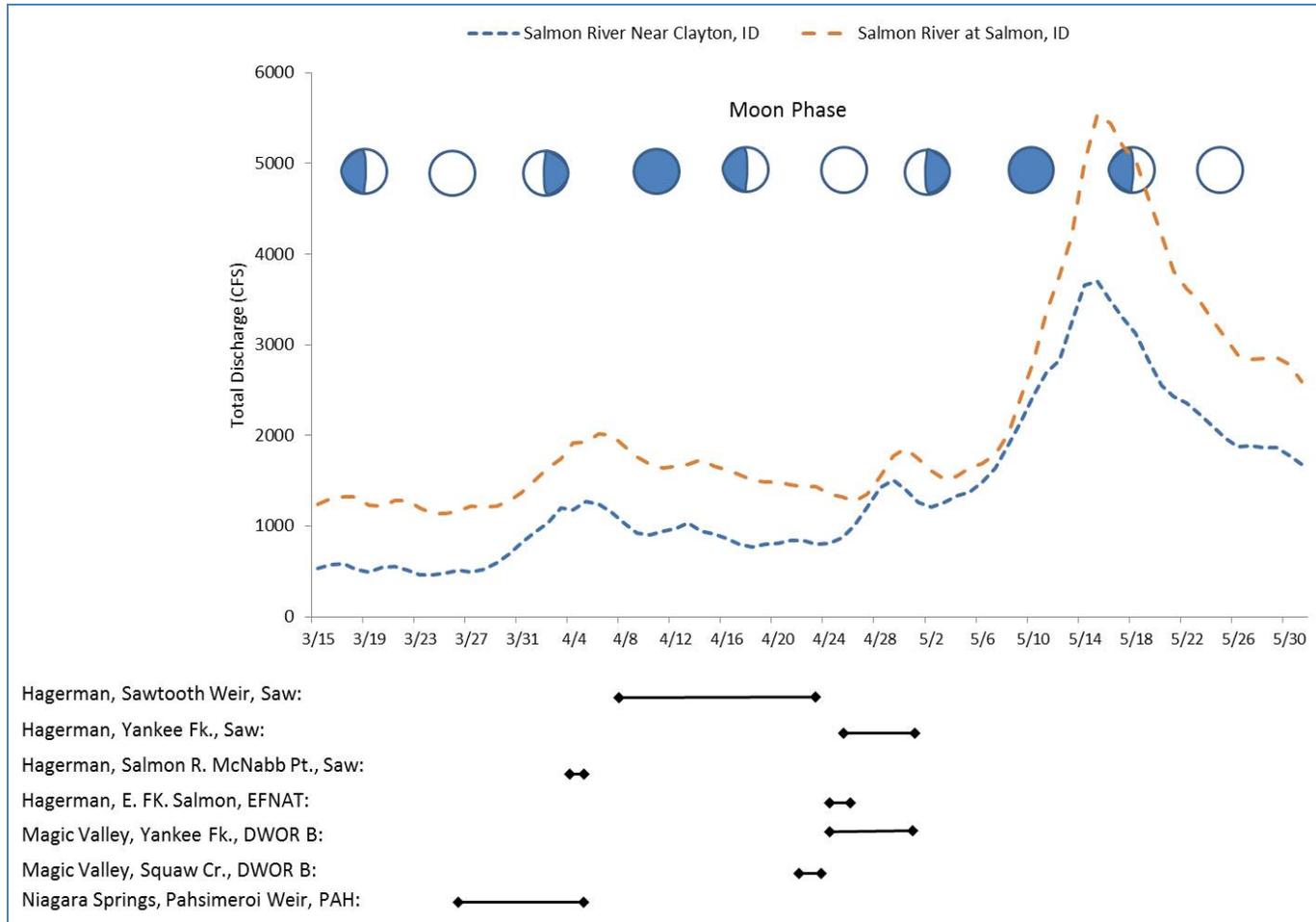


Figure A1. Release timing of Sawtooth, East Fk. Natural, PAH, and Dworshak B stock smolts into the upper Salmon River, East Fk. Salmon River, and Yankee Fork in 2013 vs moon phase and flow.

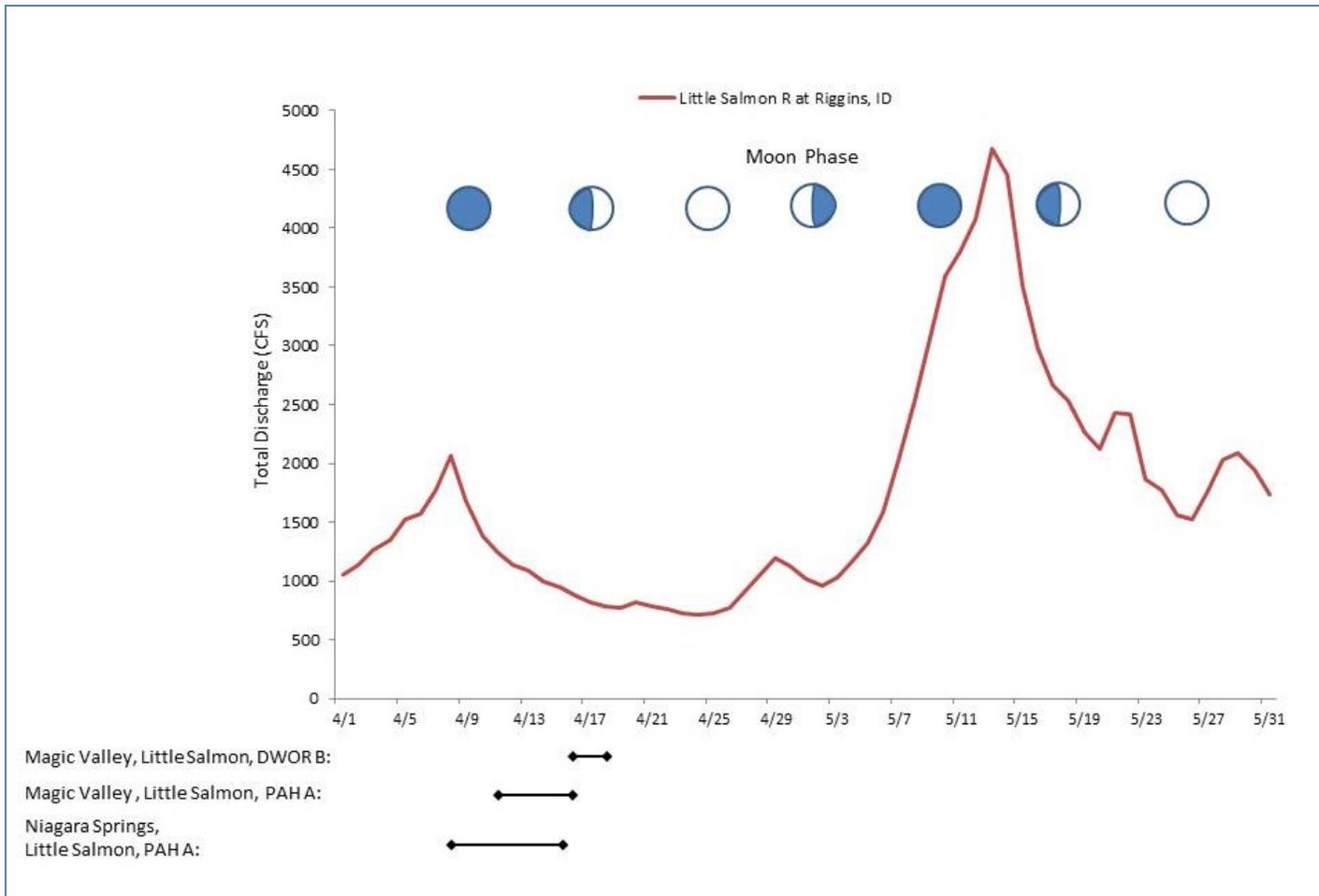


Figure A2. Release timing of Dworshak B and Pahsimeroi A stock smolts into the Little Salmon River in 2013 vs moon phase and flow.

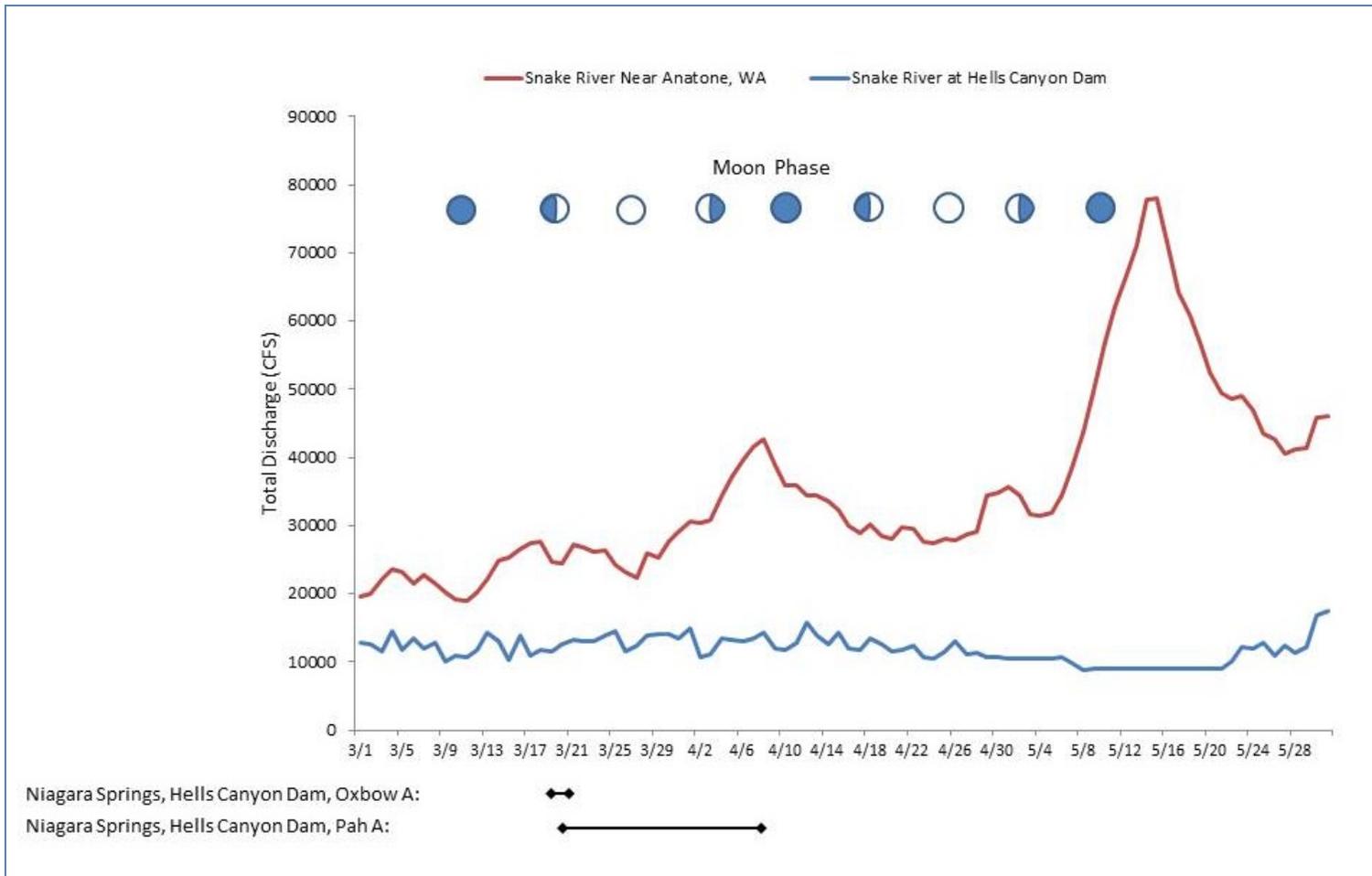


Figure A3. Release timing of Oxbow A and Pahsimeroi A stock smolts into the Snake River at Hells Canyon in 2013 vs moon phase and flow.

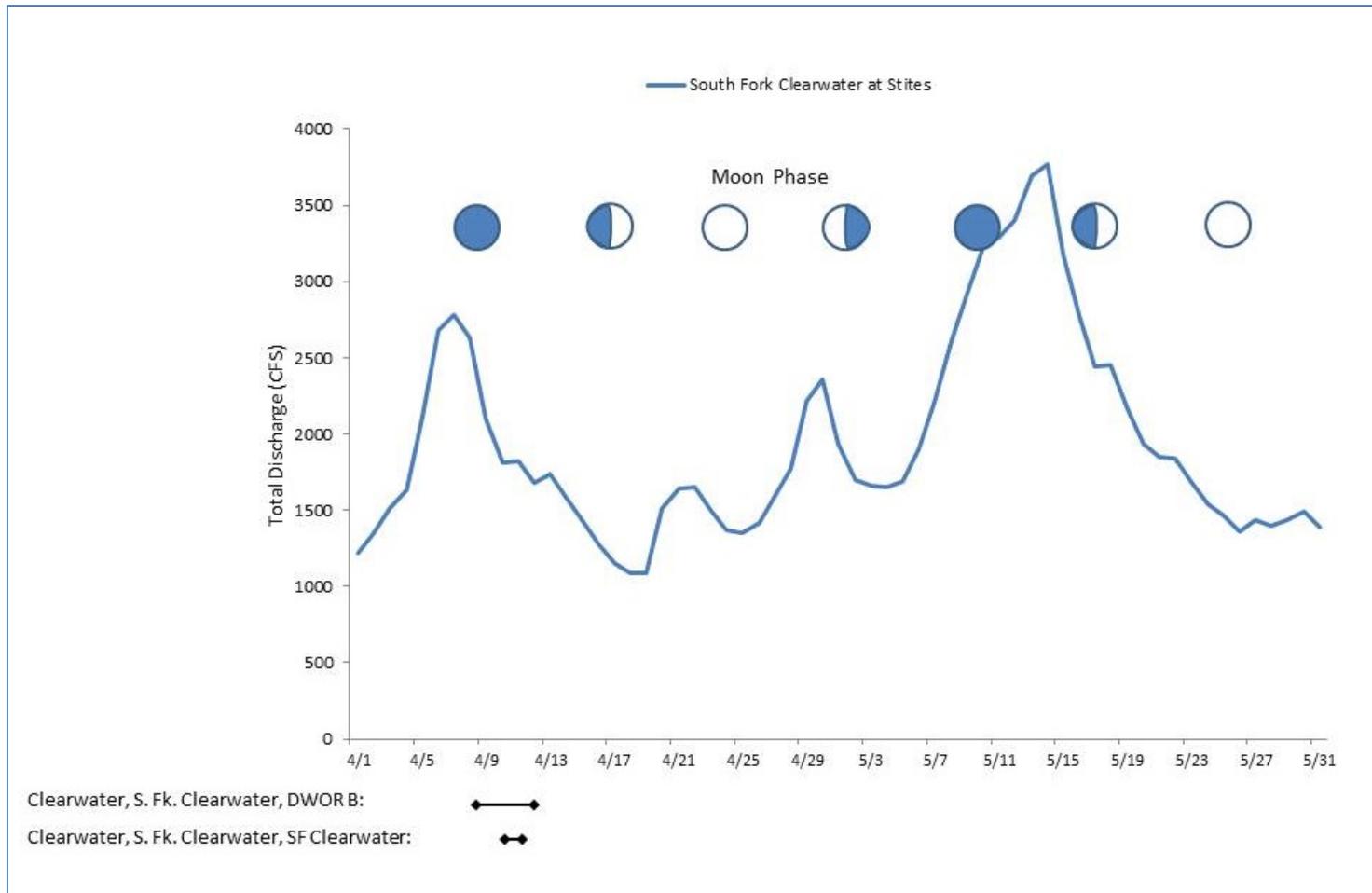


Figure A4. Release timing of Dworshak B and S. Fk. Clearwater stock smolts into the South Fork Clearwater River in 2013 vs moon phase and flow.

APPENDIX B

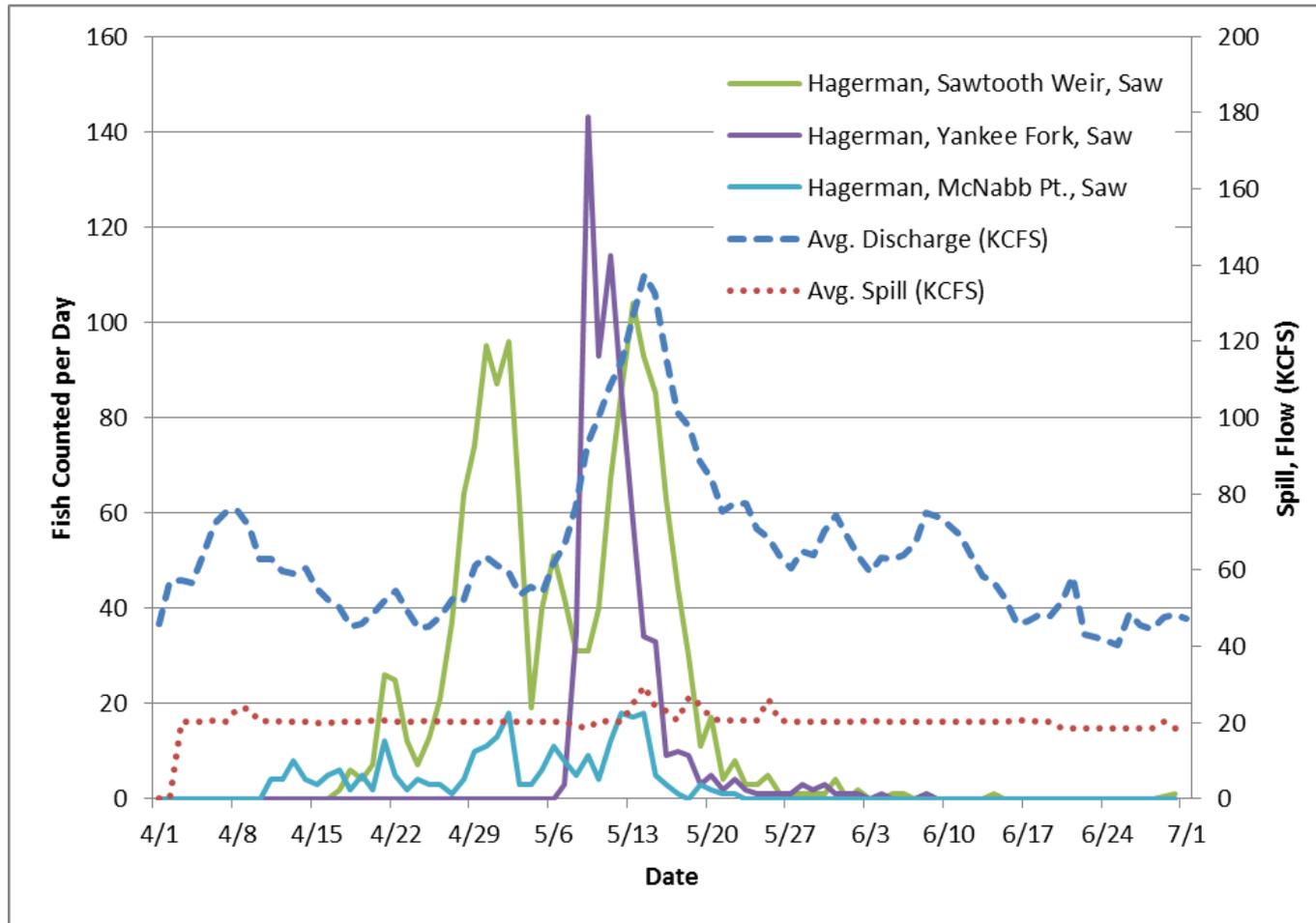


Figure B1. Smolt arrival timing at Lower Granite Dam of Sawtooth stock smolts released from the upper Salmon River and Yankee Fork vs. dam outflow and spill.

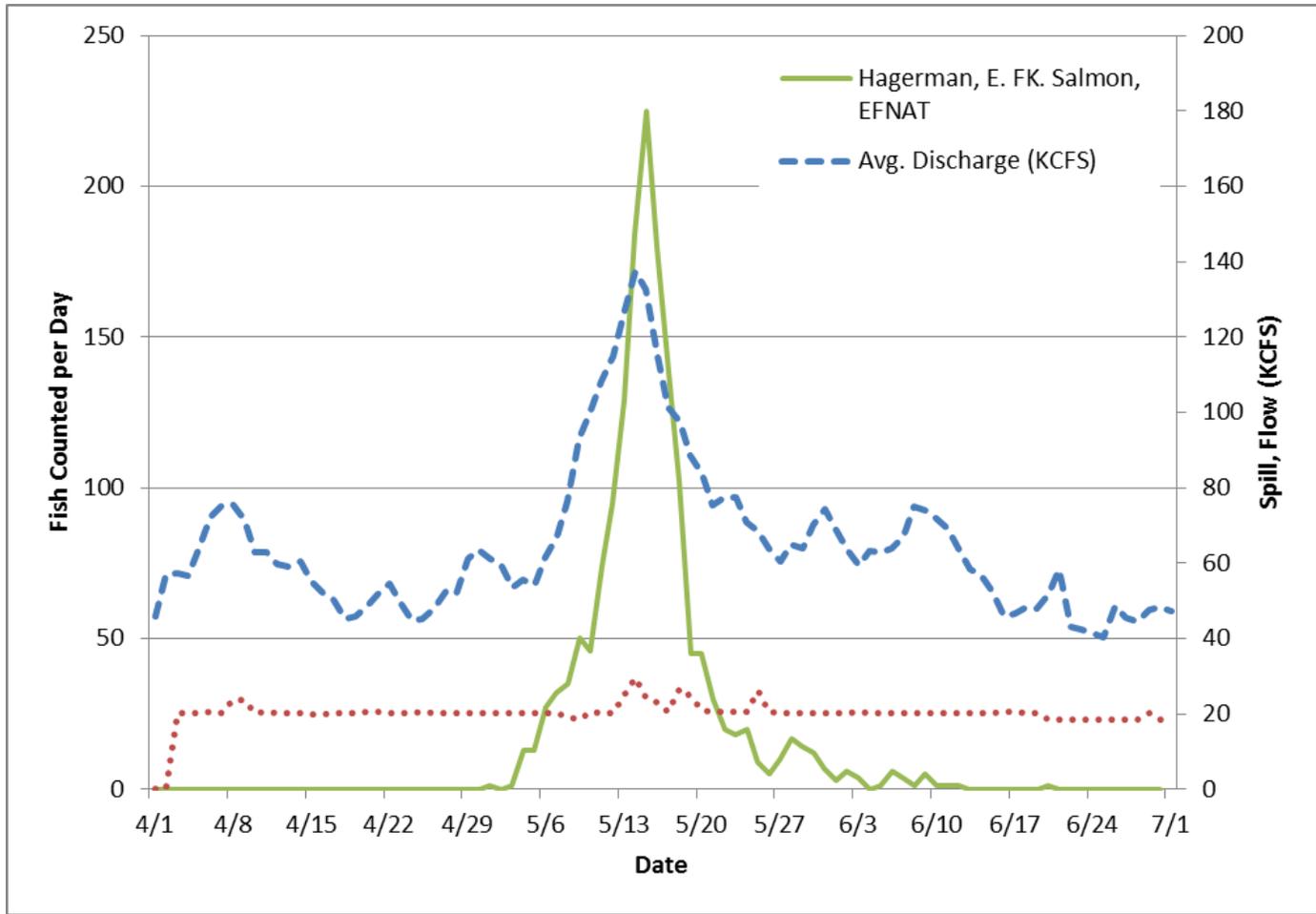


Figure B2. Smolt arrival timing at Lower Granite Dam of E. Fk. Natural stock smolts released from the East Fk. Salmon River vs. dam outflow and spill.

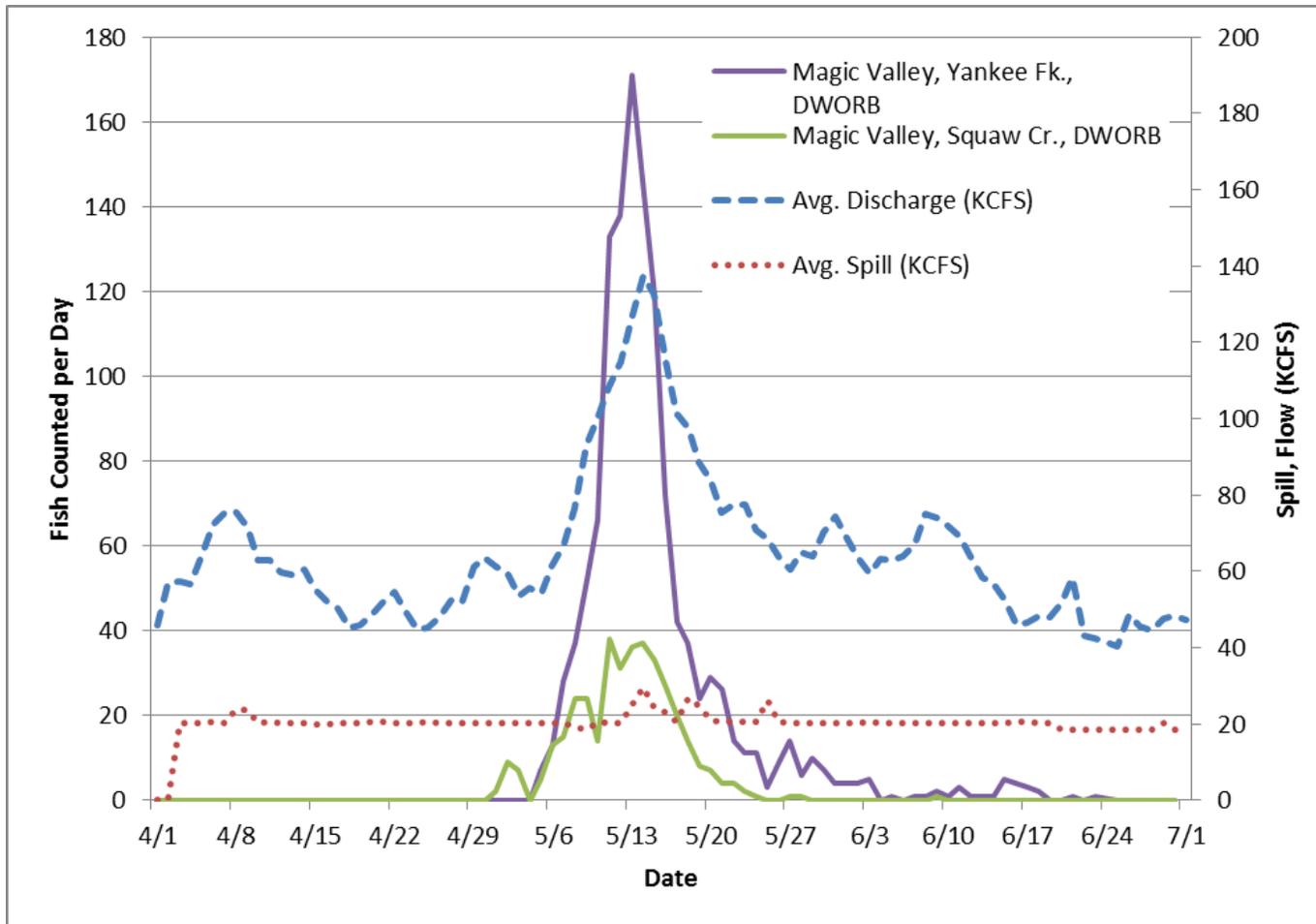


Figure B3. Smolt arrival timing at Lower Granite Dam of DWOR B stock smolts released from the Yankee Fk. and Squaw Creek vs. dam outflow and spill.

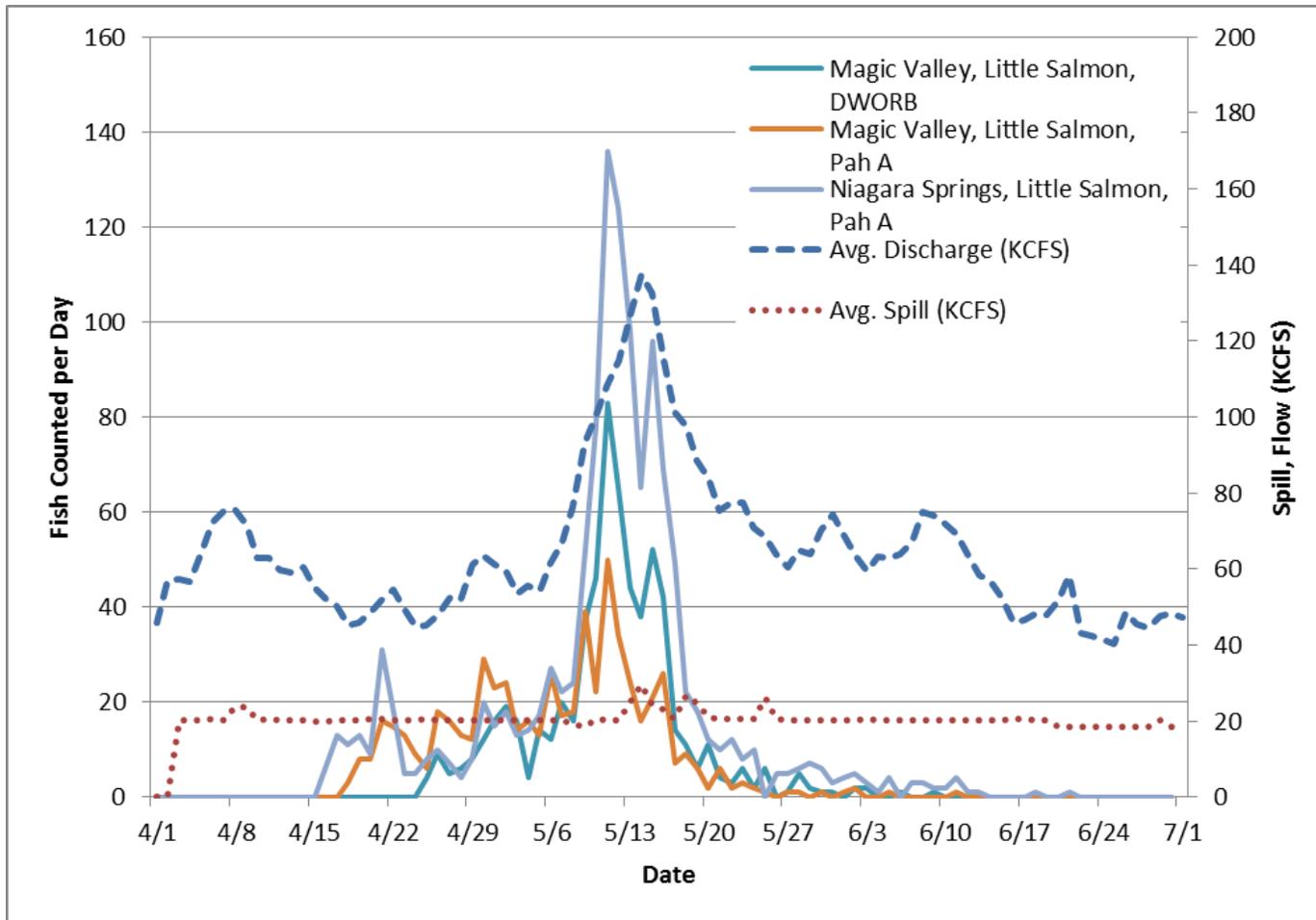


Figure B4. Smolt arrival timing at Lower Granite Dam of DWOR B and Pah A stock smolts released from the Little Salmon River vs. dam outflow and spill.

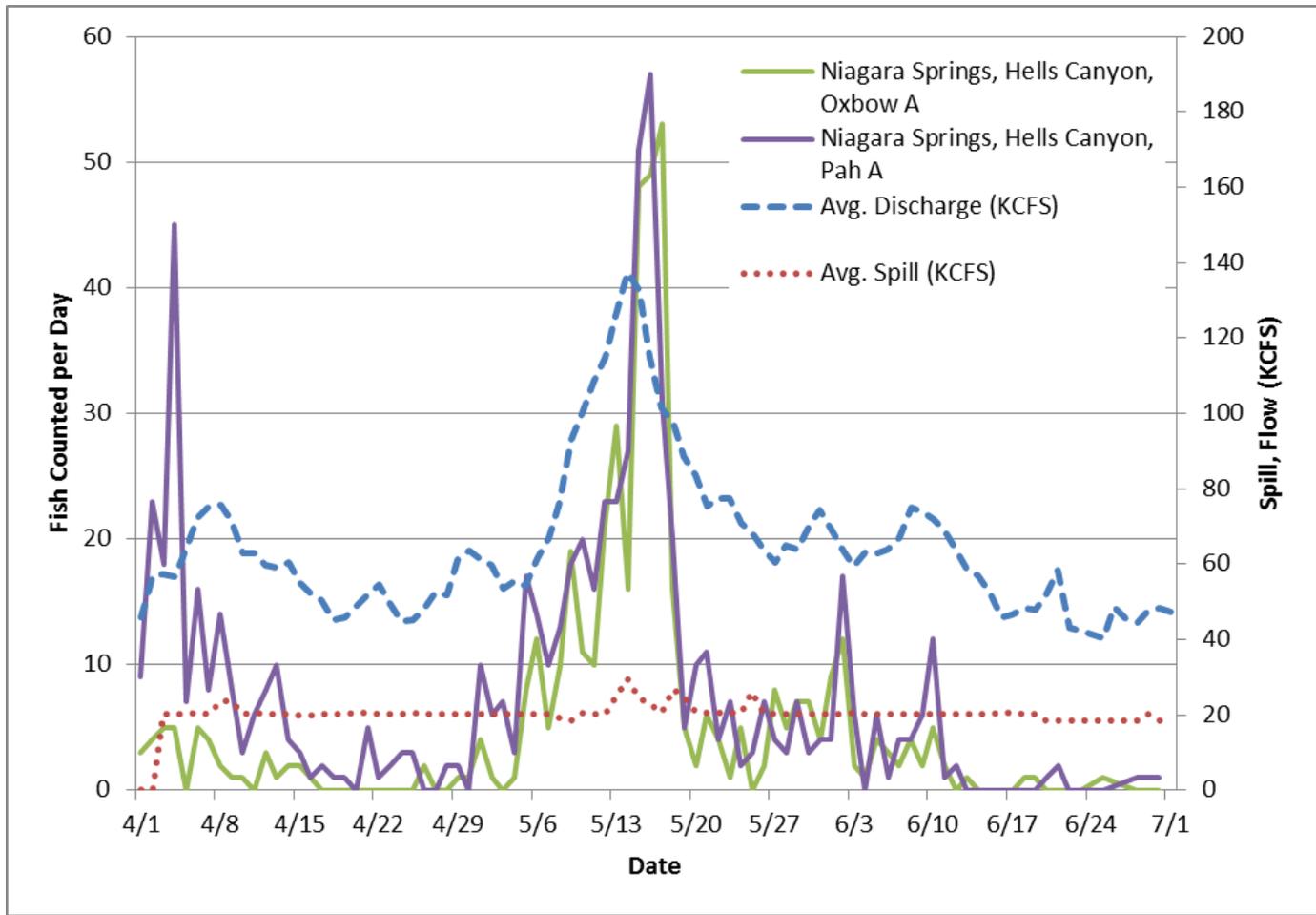


Figure B5. Smolt arrival timing at Lower Granite Dam of Oxbow A and Pah A stock smolts released at Hells Canyon vs. dam outflow and spill.

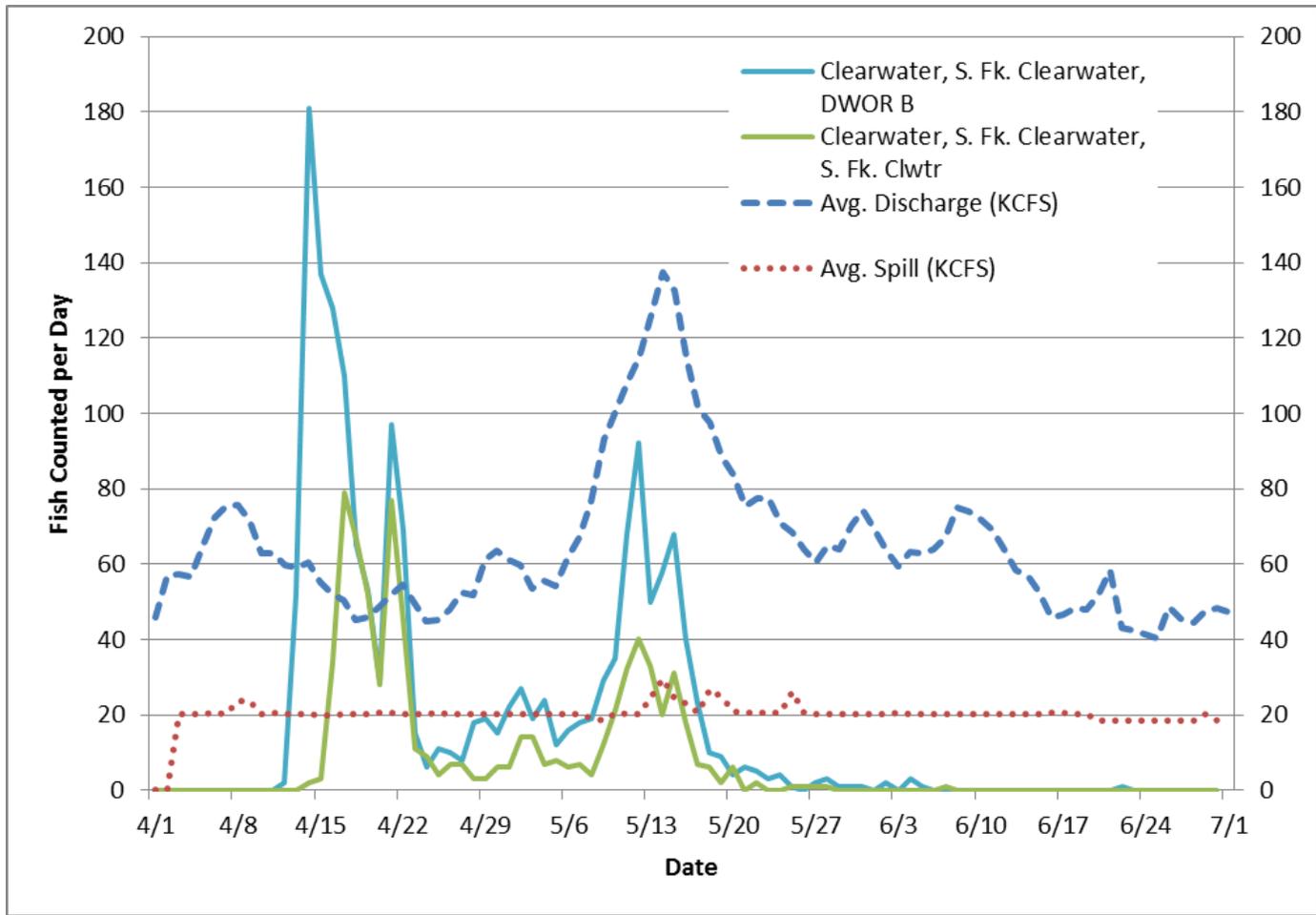


Figure B6. Smolt arrival timing at Lower Granite Dam of DWOR B and S. Fk. Clearwater stock smolts released from the S. Fk. Clearwater River vs. dam outflow and spill.

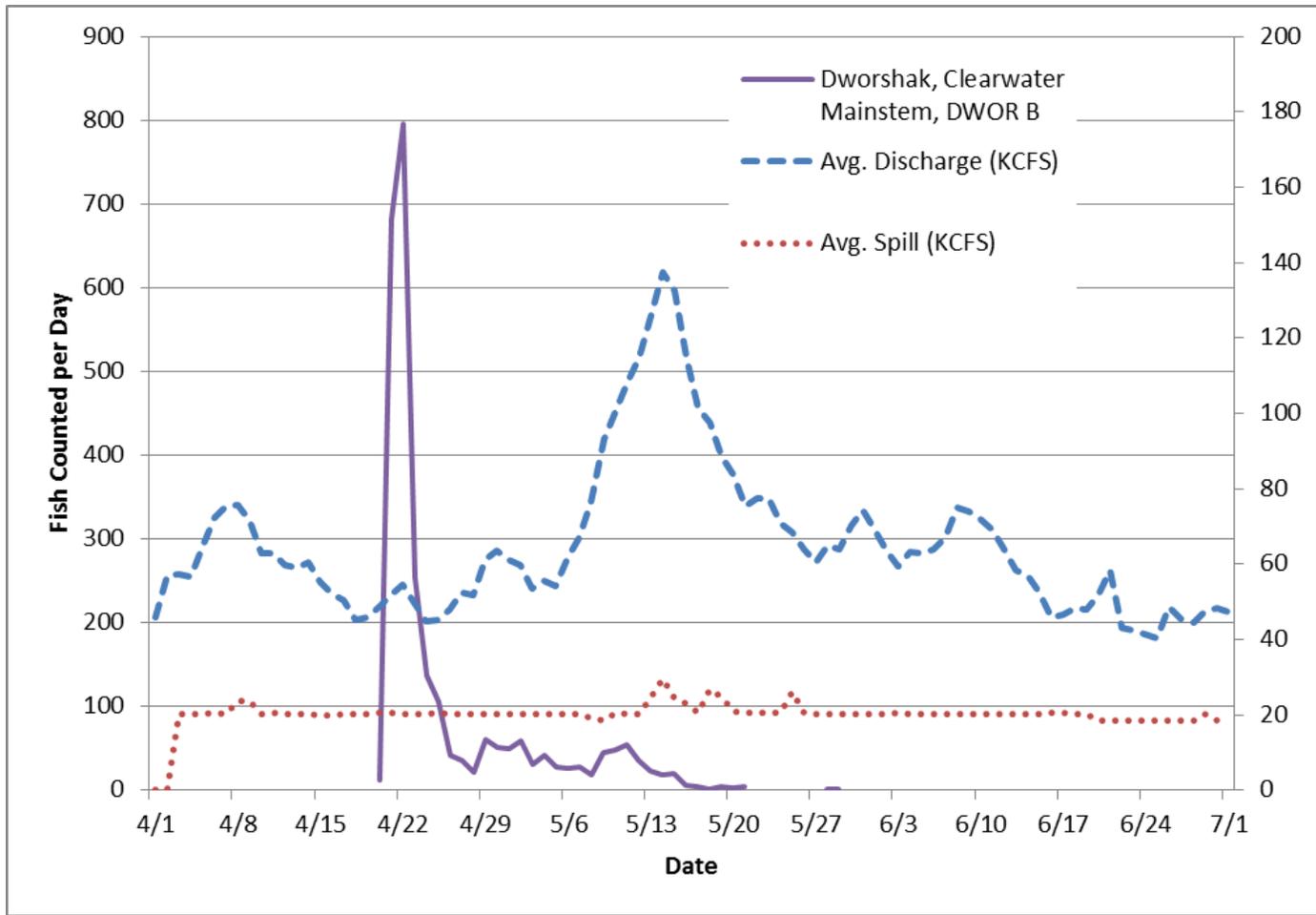


Figure B7. Smolt arrival timing at Lower Granite Dam of DWOR B stock smolts released from the mainstem of the Clearwater River vs. dam outflow and spill.

APPENDIX C

Table C1. Total number of coded wire tags recovered to estimate the stock composition of the adult steelhead harvest from the fall of 2012 angler fishery.

| Smolt Release Group (BY-Hatchery-Stock-Release Site) | Snake Sect. 1 | Snake Sect. 2 | Clearwater Sect. 3-4 | N. Fk. Clearwater Sect. 5 | Salmon Sect. 10- 12 | Salmon Sect. 13-17 | Little Salmon Sect. 20 |
|---|--------------------------|--------------------------|---------------------------------|--|------------------------------------|-------------------------------|---------------------------------------|
| 2009-Clearwater-DWOR-Lower SF Clearwater R. | 1 | 0 | 106 | 0 | 0 | 0 | 0 |
| 2010-Clearwater-DWOR/SFCLW-Lower SF Clearwater R. | 0 | 1 | 2 | 0 | 0 | 0 | 0 |
| 2009-Hagerman-SAW-Sawtooth | 1 | 1 | 0 | 0 | 0 | 10 | 0 |
| 2009-Hagerman-SAW-Upper Salmon R. (19) | 0 | 0 | 0 | 0 | 0 | 13 | 0 |
| 2010-Hagerman-SAW-Sawtooth | 6 | 1 | 0 | 0 | 2 | 23 | 0 |
| 2010-Hagerman-SAW-Upper Salmon R. (19) | 4 | 0 | 1 | 0 | 1 | 16 | 0 |
| 2008-Hagerman -DWORB-Little Salmon R. | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2008-Magic Valley-PAHA-Upper Salmon R. (15 & 16) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2008-Magic Valley-DWORB-Upper Salmon R. (18 & 19) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2008-Magic Valley-USALB-Upper Salmon R. (18 & 19) | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2009-Magic Valley-DWOR-Little Salmon R. | 6 | 1 | 0 | 0 | 9 | 1 | 0 |
| 2009-Magic Valley-PAH-Little Salmon R. | 0 | 0 | 0 | 0 | 3 | 0 | 0 |
| 2009-Magic Valley-PAH-Upper Salmon R. (16) | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| 2009-Magic Valley-PAH-Upper Salmon R. (17) | 2 | 0 | 0 | 0 | 1 | 7 | 0 |
| 2009-Magic Valley-DWOR-Upper Salmon R. (18 & 19) | 3 | 1 | 0 | 0 | 3 | 4 | 0 |
| 2009-Magic Valley-SAW-Upper Salmon R. (18) | 4 | 0 | 0 | 0 | 1 | 4 | 0 |
| 2010-Magic Valley-DWOR-Little Salmon R. | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-Magic Valley-PAH-Little Salmon R. | 3 | 0 | 1 | 0 | 8 | 1 | 0 |
| 2010-Magic Valley-SAW-McNabb Pt. | 5 | 1 | 0 | 0 | 3 | 17 | 0 |
| 2010-Magic Valley-PAH-Upper Salmon R. (16) | 6 | 0 | 0 | 0 | 4 | 16 | 0 |
| 2010-Magic Valley-PAH-Upper Salmon R. (17) | 6 | 0 | 1 | 0 | 9 | 20 | 0 |
| 2010-Magic Valley-DWOR-Upper Salmon R. (18 & 19) | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2008-Niagara-OX-Snake R. | 0 | 1 | 0 | 0 | 0 | 0 | 0 |

| Smolt Release Group (BY-Hatchery-Stock-Release Site) | Snake Sect. 1 | Snake Sect. 2 | Clearwater Sect. 3-4 | N. Fk. Clearwater Sect. 5 | Salmon Sect. 10- 12 | Salmon Sect. 13-17 | Little Salmon Sect. 20 |
|---|--------------------------|--------------------------|---------------------------------|--|------------------------------------|-------------------------------|---------------------------------------|
| 2009-Niagara-OX-Little Salmon R. | 0 | 0 | 1 | 0 | 15 | 9 | 1 |
| 2009-Niagara-PAH-Little Salmon R. | 3 | 0 | 0 | 0 | 13 | 2 | 1 |
| 2009-Niagara-PAH-Pahsimeroi River | 0 | 1 | 1 | 0 | 3 | 9 | 0 |
| 2009-Niagara-OX-Snake R. | 5 | 4 | 1 | 0 | 0 | 0 | 0 |
| 2010-Niagara-PAH-Little Salmon R. | 2 | 0 | 0 | 0 | 2 | 0 | 0 |
| 2010-Niagara-PAH-Pahsimeroi River | 11 | 0 | 0 | 0 | 6 | 4 | 0 |
| 2010-Niagara-OX-Snake R. | 2 | 2 | 0 | 0 | 0 | 0 | 0 |
| 2009-Dworshak-Dworshak Hatchery-DWORB | 2 | 0 | 36 | 0 | 0 | 0 | 0 |
| 2010-Dworshak-Dworshak Hatchery-DWORB | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 2010-Dworshak-SF Clearwater-DWORB | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 2008-OR-Cottonweed Cr-Wallowa | 3 | 1 | 0 | 0 | 1 | 0 | 0 |
| 2010-OR-Cottonweed Cr-Wallowa | 4 | 0 | 0 | 0 | 1 | 0 | 0 |
| 2009-OR-Irrigon-Wallowa-Spring Cr | 20 | 2 | 3 | 0 | 1 | 0 | 0 |
| 2010-OR-Irrigon-Wallowa-Spring Cr | 3 | 2 | 1 | 0 | 3 | 0 | 0 |
| 2009-OR-Lookinglass-Imnaha -Ltl Sheep Cr | 4 | 5 | 0 | 0 | 0 | 0 | 0 |
| 2010-OR-Lookinglass-Imnaha -Ltl Sheep Cr | 5 | 9 | 0 | 0 | 0 | 0 | 0 |
| 2008-OR-Ltl Sheep Cr-Imnaha -Ltl Sheep Cr | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-OR-Wallowa-Deer Cr | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2008-OR-Wallowa-Spring Cr | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2009-OR-Wallowa-Wallowa | 3 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2010-OR-Wallowa-Wallowa | 3 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2009-WA-Lyon's Ferry-Lyon's Ferry | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 2010-WA-Lyon's Ferry-Lyon's Ferry | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-WA-Tucannon-Tucannon | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Grand Total: | 127 | 38 | 159 | 0 | 89 | 157 | 2 |

Table C2. Total number of coded wire tags recovered to estimate the stock composition of the adult steelhead harvest from the spring of 2013 angler fishery.

| Smolt Release Group (BY-Hatchery-Stock-Release Site) | Snake Sect. 1 | Snake Sect. 2 | Clearwater Sect. 3-4 | N. Fk. Clearwater Sect. 5 | S. Fk. Clearwater Sect. 7 | Salmon Sect. 10- 12 | Salmon Sect. 13- 17 | Salmon Sect. 18-19 | Little Salmon Sect. 20 |
|---|--------------------------|--------------------------|---------------------------------|--|--|------------------------------------|------------------------------------|-----------------------------------|---------------------------------------|
| 2009-Clearwater-DWOR-Clearwater R. Lower SF Clearwater R. | 0 | 0 | 52 | 0 | 32 | 0 | 0 | 0 | 0 |
| 2010-Clearwater-DWOR/SFCLW-Lower SF Clearwater R. | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 |
| 2009-Hagerman-SAW-Sawtooth | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 3 | 0 |
| 2009-Hagerman-SAW-Upper Salmon R. (19) | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 7 | 0 |
| 2010-Hagerman-SAW-Sawtooth | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 10 | 0 |
| 2010-Hagerman-SAW-Upper Salmon R. (19) | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 11 | 0 |
| 2008-Hagerman -DWORB-Little Salmon R. | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 2008-Magic Valley-DWORB-Upper Salmon R. (18 & 19) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 2008-Magic Valley-PAHA-Upper Salmon R. (15 & 16) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 2008-Magic Valley-USALB-Upper Salmon R. (18 & 19) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-Magic Valley-DWOR-Little Salmon R. | 0 | 1 | 0 | 0 | 0 | 6 | 2 | 0 | 3 |
| 2009-Magic Valley-DWOR-Upper Salmon R. (18 & 19) | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 |
| 2009-Magic Valley-PAH-Upper Salmon R. (16) | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 |
| 2009-Magic Valley-PAH-Upper Salmon R. (17) | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 |
| 2009-Magic Valley-PAH-Little Salmon R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 2009-Magic Valley-SAW-Upper Salmon R. (18) | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 |
| 2010-Magic Valley-DWOR-Little Salmon R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

| Smolt Release Group (BY-Hatchery-Stock-Release Site) | Snake Sect. 1 | Snake Sect. 2 | Clearwater Sect. 3-4 | N. Fk. Clearwater Sect. 5 | S. Fk. Clearwater Sect. 7 | Salmon Sect. 10- 12 | Salmon Sect. 13- 17 | Salmon Sect. 18-19 | Little Salmon Sect. 20 |
|---|--------------------------|--------------------------|---------------------------------|--|--|------------------------------------|------------------------------------|-----------------------------------|---------------------------------------|
| 2010-Magic Valley-DWOR-Upper Salmon R. (18 & 19) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 2010-Magic Valley-PAH-Upper Salmon R. (16) | 0 | 1 | 0 | 0 | 0 | 1 | 18 | 0 | 0 |
| 2010-Magic Valley-PAH-Upper Salmon R. (17) | 0 | 0 | 0 | 0 | 0 | 4 | 14 | 0 | 0 |
| 2010-Magic Valley-PAH-Little Salmon R. | 0 | 1 | 0 | 0 | 0 | 4 | 0 | 0 | 0 |
| 2010-Magic Valley-SAW-McNabb Pt. | 1 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 |
| 2008-Niagara-OXA-Snake R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-Niagara-OX-Snake R. | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-Niagara-OX-Little Salmon R. | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 3 |
| 2009-Niagara-PAH-Pahsimeroi River | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 |
| 2009-Niagara-PAH-Little Salmon R. | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 5 |
| 2010-Niagara-OX-Snake R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-Niagara-PAH-Pahsimeroi River | 0 | 1 | 0 | 0 | 0 | 4 | 16 | 0 | 0 |
| 2010-Niagara-PAH-Little Salmon R. | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 1 |
| 2009-Dworshak-DOWRB-Dworshak Hatchery | 0 | 0 | 9 | 7 | 0 | 0 | 0 | 0 | 0 |
| 2010-Dworshak-DWORB-Dworshak Hatchery | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-Dworshak-DWORB-SF Clearwater | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-OR-Big Canyon-Wallowa-Deer Cr | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2008-OR-Cottonweed Cr-Wallowa-Cottonwood Cr | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-OR-Cottonweed Cr-Wallowa-Cottonwood | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-OR-Irrigon-Wallowa-Spring Cr | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Smolt Release Group (BY-Hatchery-Stock-Release Site) | Snake Sect. 1 | Snake Sect. 2 | Clearwater Sect. 3-4 | N. Fk. Clearwater Sect. 5 | S. Fk. Clearwater Sect. 7 | Salmon Sect. 10- 12 | Salmon Sect. 13- 17 | Salmon Sect. 18-19 | Little Salmon Sect. 20 |
|---|--------------------------|--------------------------|---------------------------------|--|--|------------------------------------|------------------------------------|-----------------------------------|---------------------------------------|
| 2010-OR-Irrigon-Wallowa-Spring Cr | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2008-OR-Wallowa-Spring Cr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-OR-Wallowa-Wallowa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-OR-Wallowa-Wallowa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2008-OR-Ltl Sheep Cr-Imnaha -Ltl Sheep Cr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-OR-Lookinglass-Imnaha-Ltl Sheep Cr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-OR-Lookinglass-Imnaha -Ltl Sheep Cr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-WA-Lyon's Ferry-Lyon's Ferry- Walla Walla | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-WA-Lyon's Ferry-Lyon's Ferry- Walla Walla | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-WA-Tucannon -Tucannon | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Grand Total | 8 | 9 | 63 | 7 | 33 | 23 | 122 | 34 | 14 |

Table C3. Total number of PBT tissue samples analyzed to estimate the stock composition of the adult steelhead harvest from the fall of 2012 recreational fishery. No PBT samples were collected in Section 15-19 on the Upper Salmon River during the fall sampling period.

| Smolt Release Group (BY-Hatchery-Stock) | Snake Sect. 1 | Snake Sect. 2 | Clearwater Sect. 3-4 | N. Fk. Clearwater Sect. 5 | Salmon Sect. 10-12 | Salmon Sect. 13-14 | Little Salmon Sect. 20 |
|--|--------------------------|--------------------------|---------------------------------|--|-------------------------------|-------------------------------|-----------------------------------|
| 2008-Clearwater FH-DWOR | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 2008-Dworshak FH-DWOR | 0 | 0 | 2 | 1 | 0 | 0 | 0 |
| 2008-Niagara-OX | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| 2008-Niagara-PAH | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-Clearwater FH-DWOR | 10 | 0 | 55 | 1 | 0 | 0 | 0 |
| 2009-Dworshak FH-DWOR | 10 | 0 | 66 | 20 | 0 | 0 | 0 |
| 2009-Hagerman-SAW | 3 | 0 | 3 | 0 | 1 | 6 | 0 |
| 2009-Lyons Ferry FH | 9 | 0 | 9 | 0 | 0 | 0 | 0 |
| 2009-Magic Valley-DWOR | 2 | 0 | 2 | 0 | 11 | 3 | 0 |
| 2009-Magic Valley-PAH | 0 | 0 | 1 | 0 | 4 | 3 | 1 |
| 2009-Magic Valley-SAW | 2 | 0 | 1 | 0 | 0 | 0 | 0 |
| 2009-Niagara-OX | 29 | 88 | 17 | 0 | 59 | 10 | 3 |
| 2009-Niagara-PAH | 6 | 0 | 2 | 0 | 29 | 10 | 2 |
| 2009-Oregon-Grand Ronde | 9 | 0 | 4 | 0 | 1 | 0 | 0 |
| 2009-Oregon-Wallowa | 27 | 0 | 2 | 0 | 0 | 0 | 0 |
| 2010-Clearwater FH-DWOR | 1 | 0 | 3 | 0 | 0 | 0 | 0 |

| Smolt Release Group (BY-Hatchery-Stock) | Snake Sect. 1 | Snake Sect. 2 | Clearwater Sect. 3-4 | N. Fk. Clearwater Sect. 5 | Salmon Sect. 10-12 | Salmon Sect. 13-14 | Little Salmon Sect. 20 |
|--|--------------------------|--------------------------|---------------------------------|--|-------------------------------|-------------------------------|-----------------------------------|
| 2010-Clearwater FH-SFCLW | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 2010-Dworshak FH-DWOR | 1 | 0 | 6 | 2 | 0 | 0 | 0 |
| 2010-Hagerman-SAW | 8 | 0 | 1 | 0 | 12 | 7 | 0 |
| 2010-Lyons Ferry FH | 15 | 0 | 10 | 1 | 0 | 0 | 0 |
| 2010-Magic Valley-DWOR | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 2010-Magic Valley-PAH | 3 | 0 | 1 | 0 | 36 | 7 | 1 |
| 2010-Magic Valley-SAW | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| 2010-Niagara-OX | 3 | 8 | 1 | 0 | 2 | 1 | 1 |
| 2010-Niagara-PAH | 12 | 0 | 2 | 0 | 26 | 10 | 2 |
| 2010-Oregon-Grand Ronde | 11 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-Oregon-Wallowa | 11 | 0 | 2 | 0 | 3 | 0 | 0 |
| Unassigned | 11 | 13 | 8 | 2 | 12 | 3 | |
| Grand Total | 185 | 110 | 200 | 27 | 199 | 61 | 10 |

Table C4. Total number of PBT tissue samples analyzed to estimate the stock composition of the adult steelhead harvest from the spring of 2013 angler fishery.

| Smolt Release Group (BY-Hatchery-Stock) | Snake Sect. 1 | Snake Sect. 2 | Clearwater Sect. 3-4 | N. Fk. Clearwater Sect. 5 | S. Fk. Clearwater Sect. 7 | Salmon Sect. 10- 12 | Salmon Sect. 13- 17 | Upper Salmon 18-19 | Little Salmon Sect. 20 |
|--|--------------------------|--------------------------|---------------------------------|--|--|------------------------------------|------------------------------------|-----------------------------------|---------------------------------------|
| 2008-Clearwater FH-DWOR | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| 2009-Clearwater FH-DWOR | 0 | 0 | 84 | 4 | 117 | 0 | 0 | 0 | 0 |
| 2010-Clearwater FH-DWOR | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| 2010-Clearwater FH-SFCLW | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 2009-Hagerman-SAW | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 48 | 0 |
| 2010-Hagerman-SAW | 0 | 0 | 0 | 0 | 0 | 9 | 59 | 120 | 0 |
| 2009-Magic Valley-DWOR | 0 | 0 | 0 | 0 | 0 | 11 | 1 | 7 | 9 |
| 2009-Magic Valley-PAH | 0 | 0 | 0 | 0 | 0 | 5 | 3 | 0 | 8 |
| 2009-Magic Valley-SAW | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 0 |
| 2010-Magic Valley-DWOR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 |
| 2010-Magic Valley-PAH | 0 | 0 | 0 | 0 | 0 | 20 | 18 | 0 | 29 |
| 2010-Magic Valley-SAW | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 |
| 2009-Niagara-OX | 0 | 19 | 0 | 0 | 0 | 15 | 0 | 0 | 33 |
| 2009-Niagara-PAH | 0 | 0 | 0 | 0 | 0 | 6 | 36 | 0 | 19 |
| 2010-Niagara-OX | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 2010-Niagara-PAH | 0 | 0 | 0 | 0 | 0 | 24 | | 0 | 20 |

| Smolt Release Group (BY-Hatchery-Stock) | Snake Sect. 1 | Snake Sect. 2 | Clearwater Sect. 3-4 | N. Fk. Clearwater Sect. 5 | S. Fk. Clearwater Sect. 7 | Salmon Sect. 10- 12 | Salmon Sect. 13- 17 | Upper Salmon 18-19 | Little Salmon Sect. 20 |
|--|--------------------------|--------------------------|---------------------------------|--|--|------------------------------------|------------------------------------|-----------------------------------|---------------------------------------|
| 2008-Dworshak FH-DWOR | 0 | 0 | 2 | 3 | 0 | 0 | 0 | 0 | 0 |
| 2009-Dworshak FH-DWOR | 0 | 0 | 101 | 90 | 0 | 0 | 0 | 0 | 0 |
| 2010-Dworshak FH-DWOR | 0 | 0 | 6 | 1 | 3 | 0 | 0 | 0 | 0 |
| 2009-Lyons Ferry FH | 0 | 0 | 1 | 0 | | 0 | | 0 | 0 |
| Unassigned | 0 | 2 | 6 | 3 | 11 | 9 | 6 | 1 | 6 |
| Grand Total | 0 | 22 | 200 | 101 | 136 | 100 | 200 | 178 | 131 |

Table C5. A comparison of angler harvest estimates of the steelhead stock composition between CWT recoveries and PBT analysis from fish harvested in the fall of 2012, broken down by brood year, hatchery, and stock.

| BY-Rearing Hatchery-Stock Tag Type | Snake R. Sect. 1 | Snake R. Sect. 2 ¹ | Clearwater R. Sect. 3-4 | N. Fk. Clearwater R. Sect. 5 | Salmon R. Sect. 10-12 | Salmon R. Sect. 13-14 | Little Salmon R. Sect. 20 | Sum by Tag Type |
|---------------------------------------|---------------------|----------------------------------|----------------------------|------------------------------------|--------------------------|--------------------------|---------------------------------|--------------------|
| 2008-Clearwater-DWOR | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 0 | 0 | 63 | 0 | 0 | 0 | 0 | 63 |
| 2009-Clearwater-DWOR | | | | | | | | |
| CWT | 19 | 0 | 5,783 | 0 | 0 | 0 | 0 | 5,801 |
| PBT | 122 | 0 | 2,665 | 19 | 0 | 0 | 0 | 2,806 |
| 2010-Clearwater-DWOR/SFCR | | | | | | | | |
| CWT | 0 | 20 | 98 | 0 | 0 | 0 | 0 | 117 |
| PBT | 12 | 0 | 188 | 0 | 0 | 0 | 0 | 200 |
| 2008-Hagerman-DWOR | | | | | | | | |
| CWT | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 7 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-Hagerman-SAW | | | | | | | | |
| CWT | 44 | 52 | 0 | 0 | 0 | 42 | 0 | 139 |
| PBT | 36 | 0 | 141 | 0 | 24 | 148 | 0 | 349 |
| 2010-Hagerman-SAW | | | | | | | | |
| CWT | 294 | 49 | 33 | 0 | 219 | 202 | 0 | 797 |
| PBT | 95 | 0 | 47 | 0 | 284 | 173 | 0 | 599 |
| 2010-Magic Valley-PAH | | | | | | | | |
| CWT | 177 | 0 | 108 | 0 | 765 | 269 | 0 | 1,319 |
| PBT | 36 | 0 | 48 | 0 | 861 | 175 | 42 | 1,162 |
| 2010-Magic Valley-SAW | | | | | | | | |
| CWT | 30 | 7 | 0 | 0 | 41 | 29 | 0 | 107 |
| PBT | 12 | 0 | 0 | 0 | 24 | 25 | 0 | 60 |
| 2008-Magic Valley-USAL | | | | | | | | |

| BY-Rearing Hatchery-Stock Tag Type | Snake R. Sect. 1 | Snake R. Sect. 2 ¹ | Clearwater R. Sect. 3-4 | N. Fk. Clearwater R. Sect. 5 | Salmon R. Sect. 10-12 | Salmon R. Sect. 13-14 | Little Salmon R. Sect. 20 | Sum by Tag Type |
|---------------------------------------|---------------------|----------------------------------|----------------------------|------------------------------------|--------------------------|--------------------------|---------------------------------|--------------------|
| CWT | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 5 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-Magic Valley-DWOR | | | | | | | | |
| CWT | 28 | 0 | 0 | 0 | 0 | 0 | 0 | 28 |
| PBT | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 24 |
| 2009-Magic Valley-DWOR | | | | | | | | |
| CWT | 127 | 36 | 0 | 0 | 381 | 122 | 0 | 666 |
| PBT | 24 | 0 | 96 | 0 | 265 | 75 | 0 | 460 |
| 2009-Magic Valley-PAH | | | | | | | | |
| CWT | 32 | 0 | 21 | 0 | 329 | 40 | 0 | 421 |
| PBT | 0 | 0 | 51 | 0 | 103 | 81 | 45 | 281 |
| 2009-Magic Valley-SAW | | | | | | | | |
| CWT | 36 | 0 | 0 | 0 | 21 | 0 | 0 | 57 |
| PBT | 24 | 0 | 47 | 0 | 0 | 0 | 0 | 71 |
| 2008-Niagara-OX | | | | | | | | |
| CWT | 0 | 134 | 0 | 0 | 0 | 0 | 0 | 134 |
| PBT | 0 | 10 | 0 | 0 | 26 | 0 | 0 | 35 |
| 2008-Niagara-PAH | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 12 |
| 2009-Niagara-OX | | | | | | | | |
| CWT | 132 | 124 | 196 | 0 | 1413 | 590 | 287 | 2,742 |
| PBT | 391 | 888 | 907 | 0 | 1576 | 279 | 141 | 4,182 |
| 2009-Niagara-PAH | | | | | | | | |
| CWT | 66 | 49 | 123 | 0 | 960 | 207 | 156 | 1,562 |
| PBT | 73 | 0 | 97 | 0 | 704 | 254 | 85 | 1,213 |
| 2010-Niagara-OX | | | | | | | | |
| CWT | 54 | 64 | 0 | 0 | 0 | 0 | 0 | 118 |
| PBT | 37 | 75 | 49 | 0 | 49 | 26 | 43 | 280 |

| BY-Rearing Hatchery-Stock Tag Type | Snake R. Sect. 1 | Snake R. Sect. 2 ¹ | Clearwater R. Sect. 3-4 | N. Fk. Clearwater R. Sect. 5 | Salmon R. Sect. 10-12 | Salmon R. Sect. 13-14 | Little Salmon R. Sect. 20 | Sum by Tag Type |
|---------------------------------------|---------------------|----------------------------------|----------------------------|------------------------------------|--------------------------|--------------------------|---------------------------------|--------------------|
| 2010-Niagara-PAH | | | | | | | | |
| CWT | 490 | 0 | 0 | 0 | 672 | 65 | 0 | 1,227 |
| PBT | 148 | 0 | 98 | 0 | 636 | 256 | 86 | 1,224 |
| 2008-Dworshak-DWOR | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 0 | 0 | 109 | 21 | 0 | 0 | 0 | 130 |
| 2009-Dworshak-DWOR | | | | | | | | |
| CWT | 57 | 0 | 3,003 | 0 | 0 | 0 | 0 | 3,060 |
| PBT | 122 | 0 | 3,183 | 372 | 0 | 0 | 0 | 3,677 |
| 2010-Dworshak-DWOR | | | | | | | | |
| CWT | 0 | 0 | 207 | 0 | 0 | 0 | 0 | 207 |
| PBT | 12 | 0 | 294 | 38 | 0 | 0 | 0 | 344 |
| 2009-OR-Grand Ronde | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 107 | 0 | 188 | 0 | 24 | 0 | 0 | 319 |
| 2010-OR-Grand Ronde | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 131 | 0 | 0 | 0 | 0 | 0 | 0 | 131 |
| 2008-OR-Imnaha | | | | | | | | |
| CWT | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 26 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-OR-Imnaha | | | | | | | | |
| CWT | 111 | 164 | 0 | 0 | 0 | 0 | 0 | 276 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-OR-Imnaha | | | | | | | | |
| CWT | 133 | 282 | 0 | 0 | 0 | 0 | 0 | 415 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2008-OR-Wallowa | | | | | | | | |
| CWT | 64 | 35 | 0 | 0 | 49 | 0 | 0 | 148 |

| BY-Rearing Hatchery-Stock Tag Type | Snake R. Sect. 1 | Snake R. Sect. 2 ¹ | Clearwater R. Sect. 3-4 | N. Fk. Clearwater R. Sect. 5 | Salmon R. Sect. 10-12 | Salmon R. Sect. 13-14 | Little Salmon R. Sect. 20 | Sum by Tag Type |
|--|---------------------|----------------------------------|----------------------------|------------------------------------|--------------------------|--------------------------|---------------------------------|--------------------|
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-OR-Wallowa | | | | | | | | |
| CWT | 158 | 22 | 64 | 0 | 17 | 0 | 0 | 261 |
| PBT | 353 | 0 | 103 | 0 | 0 | 0 | 0 | 456 |
| 2010-OR-Wallowa | | | | | | | | |
| CWT | 217 | 37 | 31 | 0 | 87 | 0 | 0 | 371 |
| PBT | 134 | 0 | 96 | 0 | 72 | 0 | 0 | 303 |
| 2009-WA-Lyon's Ferry | | | | | | | | |
| CWT | 0 | 0 | 67 | 0 | 0 | 0 | 0 | 67 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-WA-Lyon's Ferry | | | | | | | | |
| CWT | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-WA-Tucannon | | | | | | | | |
| CWT | 0 | 0 | 13 | 0 | 0 | 0 | 0 | 13 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-Lyons Ferry | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 108 | 0 | 427 | 0 | 0 | 0 | 0 | 535 |
| 2010-Lyon's Ferry | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 178 | 0 | 470 | 18 | 0 | 0 | 0 | 667 |
| Unassigned | | | | | | | | |
| PBT | 131 | 116 | 376 | 36 | 283 | 74 | 0 | 1,016 |
| Statewide Harvest Survey Estimate | 2,300 | 1,088 | 9,745 | 504 | 4,954 | 1,566 | 443 | |

¹ All PBT samples collected in Section 2 were taken from fish harvested near Hells Canyon Dam.

Table C6. A comparison of angler harvest estimates of the steelhead stock composition between CWT recoveries and PBT analysis from fish harvested in the spring of 2013, broken down by brood year, hatchery, and stock.

| BY-Rearing Hatchery-Stock Tag Type | Snake R. Sect. 1 | Snake R. Sect. 2 ¹ | Clearwater R. Sect. 3-4 | N. Fk. Clearwater R. Sect. 5 | S. Fk. Clearwater R. Sect. 7 | Salmon R. Sect. 10-12 | Salmon R. Sect. 13-17 | Salmon R. Sect. 18-19 | Little Salmon R. Sect. 20 | Total Est. Harvest |
|---------------------------------------|---------------------|----------------------------------|----------------------------|------------------------------------|------------------------------------|--------------------------|-----------------------------|-----------------------------|---------------------------------|-----------------------|
| 2008-Clearwater-DWOR | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 30 |
| 2009-Clearwater-DWOR | | | | | | | | | | |
| CWT | 0 | 0 | 2,530 | 0 | 1,506 | 0 | 0 | 0 | 0 | 4,036 |
| PBT | 0 | 0 | 1,383 | 16 | 1,330 | 0 | 0 | 0 | 0 | 2,728 |
| 2010-Clearwater-DWOR/SFCR | | | | | | | | | | |
| CWT | 0 | 0 | 87 | 0 | 42 | 0 | 0 | 0 | 0 | 129 |
| PBT | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 11 |
| 2008-Hagerman-DWOR | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 21 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2008-Magic Valley-DWOR | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 30 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-Hagerman-SAW | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 416 | 568 | 0 | 985 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 615 | 583 | 0 | 1,198 |
| 2010-Hagerman-SAW | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 951 | 1,457 | 0 | 2,409 |
| PBT | 0 | 0 | 0 | 0 | 0 | 146 | 1,729 | 1,458 | 0 | 3,332 |
| 2008-Magic Valley-PAH | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 31 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-Magic Valley-PAH | | | | | | | | | | |
| CWT | 0 | 57 | 0 | 0 | 0 | 544 | 420 | 0 | 0 | 1,020 |

| BY-Rearing Hatchery-Stock Tag Type | Snake R. Sect. 1 | Snake R. Sect. 2 ¹ | Clearwater R. Sect. 3-4 | N. Fk. Clearwater R. Sect. 5 | S. Fk. Clearwater R. Sect. 7 | Salmon R. Sect. 10-12 | Salmon R. Sect. 13-17 | Salmon R. Sect. 18-19 | Little Salmon R. Sect. 20 | Total Est. Harvest |
|---------------------------------------|---------------------|----------------------------------|----------------------------|------------------------------------|------------------------------------|--------------------------|-----------------------------|-----------------------------|---------------------------------|-----------------------|
| PBT | 0 | 0 | 0 | 0 | 0 | 327 | 533 | 0 | 344 | 1,205 |
| 2010-Magic Valley-SAW | | | | | | | | | | |
| CWT | 13 | 0 | 0 | 0 | 0 | 0 | 100 | 0 | 0 | 113 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 88 | 0 | 0 | 88 |
| 2008-Magic Valley-USAL | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-Magic Valley-DWOR | | | | | | | | | | |
| CWT | 0 | 19 | 0 | 0 | 0 | 229 | 107 | 115 | 154 | 625 |
| PBT | 0 | 0 | 0 | 0 | 0 | 181 | 30 | 87 | 108 | 405 |
| 2009-Magic Valley-PAH | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 160 | 0 | 205 | 365 |
| PBT | 0 | 0 | 0 | 0 | 0 | 88 | 96 | 0 | 102 | 286 |
| 2009-Magic Valley-SAW | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 45 | 24 | 0 | 70 |
| PBT | 0 | 0 | 0 | 0 | 0 | 16 | 88 | 12 | 0 | 116 |
| 2010-Magic Valley-DWOR | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 34 | 0 | 37 | 71 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 48 | 61 |
| 2008-Niagara-OX | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-Niagara-OX | | | | | | | | | | |
| CWT | 0 | 92 | 0 | 0 | 0 | 144 | 136 | 0 | 580 | 952 |
| PBT | 0 | 292 | 0 | 0 | 0 | 274 | 0 | 0 | 438 | 1,004 |
| 2009-Niagara-PAH | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 885 | 0 | 527 | 1,412 |
| PBT | 0 | 0 | 0 | 0 | 0 | 100 | 1082 | 0 | 229 | 1,411 |
| 2010-Niagara-OX | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| BY-Rearing Hatchery-Stock Tag Type | Snake R. Sect. 1 | Snake R. Sect. 2 ¹ | Clearwater R. Sect. 3-4 | N. Fk. Clearwater R. Sect. 5 | S. Fk. Clearwater R. Sect. 7 | Salmon R. Sect. 10-12 | Salmon R. Sect. 13-17 | Salmon R. Sect. 18-19 | Little Salmon R. Sect. 20 | Total Est. Harvest |
|---------------------------------------|---------------------|----------------------------------|----------------------------|------------------------------------|------------------------------------|--------------------------|-----------------------------|-----------------------------|---------------------------------|-----------------------|
| PBT | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 37 | 51 |
| 2010-Niagara-PAH | | | | | | | | | | |
| CWT | 0 | 70 | 0 | 0 | 0 | 741 | 1,119 | 0 | 116 | 2,046 |
| PBT | 0 | 0 | 0 | 0 | 0 | 401 | 0 | 0 | 243 | 645 |
| 2008-Dworshak-DWOR | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 0 | 0 | 37 | 13 | 0 | 0 | 0 | 0 | 0 | 50 |
| 2009-Dworshak-DWOR | | | | | | | | | | |
| CWT | 0 | 0 | 669 | 392 | 0 | 0 | 0 | 0 | 0 | 1,062 |
| PBT | 0 | 0 | 1655 | 348 | 0 | 0 | 0 | 0 | 0 | 2,003 |
| 2010-Dworshak-DWOR | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 0 | 0 | 100 | 4 | 34 | 0 | 0 | 0 | 0 | 138 |
| 2008-OR-Imnaha | | | | | | | | | | |
| CWT | 0 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 46 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-OR-Imnaha | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-OR-Imnaha | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2008-OR-Wallowa | | | | | | | | | | |
| CWT | 93 | 37 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 130 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-OR-Wallowa | | | | | | | | | | |
| CWT | 16 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-OR-Wallowa | | | | | | | | | | |
| CWT | 116 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 116 |

| BY-Rearing Hatchery-Stock Tag Type | Snake R. Sect. 1 | Snake R. Sect. 2 ¹ | Clearwater R. Sect. 3-4 | N. Fk. Clearwater R. Sect. 5 | S. Fk. Clearwater R. Sect. 7 | Salmon R. Sect. 10-12 | Salmon R. Sect. 13-17 | Salmon R. Sect. 18-19 | Little Salmon R. Sect. 20 | Total Est. Harvest |
|---|---------------------|----------------------------------|----------------------------|------------------------------------|------------------------------------|--------------------------|-----------------------------|-----------------------------|---------------------------------|-----------------------|
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-WA-Lyon's Ferry | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-WA-Lyon's Ferry | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010-WA-Tucannon | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009-Lyons Ferry | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 16 |
| 2010-Clearwater-DWOR | | | | | | | | | | |
| CWT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBT | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 22 |
| Unassigned | | | | | | | | | | |
| PBT | 0 | 27 | 96 | 11 | 121 | 145 | 175 | 12 | 70 | 658 |
| State-Wide Harvest Survey Estimate | | | | | | | | | | |
| | 239 | 333 | 3,286 | 392 | 1,548 | 1,678 | 4,435 | 2,165 | 1,620 | |

^{1.} All PBT samples collected in Section 2 were taken from fish harvested near Hells Canyon Dam.

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