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Productivity of Spring Chinook Salmon and Summer Steelhead in the John Day River Basin

Annual Technical Report

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EXECUTIVE SUMMARY

Objective

Estimate smolt-to-adult survival rates (SAR) and out-migrant abundance for spring Chinook *Oncorhynchus tshawytscha* and summer steelhead *O. mykiss* and life history characteristics of summer steelhead.

Accomplishments and Findings

To estimate spring (stream-type) Chinook *Oncorhynchus tshawytscha* and summer steelhead *O. mykiss* smolt-to-adult return (SAR) we PIT tagged 3,998 juvenile spring Chinook and 4,076 juvenile steelhead during the spring of 2008. We estimate 70,319 (95% CL's 60,597 – 83,201) juvenile spring Chinook emigrated from the upper John Day subbasin past our seining area (river kilometers 274 – 296) between 1 February and 29 May 2008. We also estimate 22,176 (95% CL's 19,674 and 25,014) juvenile spring Chinook and 12,861 (95% CL's 10,328 and 15,787) juvenile steelhead migrated past our Mainstem rotary screw trap (RST) at river kilometer (rkm) 326 between 10 October 2007 and 20 June 2008. We estimate 2,986 (95% CL's 2,476 and 3,643) juvenile spring Chinook and 2,913 (95% CL's 1,710 and 4,964) steelhead migrated past our Middle Fork RST (rkm 24) between 12 February and 20 June 2008. For the 2006 brood year, we estimate 67 smolts/redd for spring Chinook throughout the John Day River basin, 51 smolts/redd for the Upper Mainstem, and 15 smolts/redd for the Middle Fork watersheds. The age structure of steelhead emigrants was 74.8% age-2, 5.1% age-1, and 20.1% age-3. Spring Chinook SAR for the 2003 brood year was 1.36% (67 returns of 5,138 PIT tagged smolts). Summer steelhead SAR for the 2006 migration year was 2.63% (57 returns of 2,167 PIT-tagged migrants). Over 50% of PIT tagged adult summer steelhead that returned during 2007 over wintered outside of the John Day basin through April of 2008 in the Columbia River between Bonneville Dam (rkm 235) and Rock Island Dam (rkm 669), and the Snake River from it's mouth to Lower Granite Dam. Steelhead barged as smolt from Lower Granite Dam to below Bonneville Dam comprised 88% (46 of 52) of stray adult steelhead PIT tag detections at the John Day River McDonald's Ford array.

Acknowledgements

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INTRODUCTION

The John Day River subbasin supports one of the last remaining intact wild populations of spring Chinook salmon and summer steelhead in the Columbia River Basin. These populations remain depressed relative to historic levels and limited information is available for steelhead life history. Numerous habitat protection and rehabilitation projects have been implemented in the basin to improve salmonid freshwater production and survival. However, these projects often lack effectiveness monitoring. While our monitoring efforts outlined here will not specifically measure the effectiveness of any particular project, they will provide much needed programmatic or watershed (status and trend) information to help evaluate project-specific effectiveness monitoring efforts as well as meet some data needs as index stocks. Our continued monitoring efforts to estimate salmonid smolt abundance, age structure, SAR, smolts/redd, freshwater habitat use, and distribution of critical life states will enable managers to assess the long-term effectiveness of habitat projects and to differentiate freshwater and ocean survival.

Because Columbia Basin managers have identified the John Day subbasin spring Chinook population as an index population for assessing the effects of alternative future management actions on salmon stocks in the Columbia Basin (Schaller et al. 1999) we continue our ongoing studies. This project is high priority based on the level of emphasis by the NWPPC Fish and Wildlife Program, Independent Scientific Advisory Board (ISAB), Independent Scientific Review Panel (ISRP), NOAA National Marine Fisheries Service (NMFS), and the Oregon Plan for Salmon and Watersheds (OWEB). Each of these groups have placed priority on monitoring and evaluation to provide the real-time data to guide restoration and adaptive management in the region.

STUDY AREA

The John Day River drains 20,300 km^2 of east central Oregon, the third largest drainage area in the state (Figure 1). From its source in the Strawberry Mountains at an elevation near 1,800 m, the John Day River flows 457 km, to an elevation near 90 m, to the Columbia River. It enters the Columbia River at river kilometer (rkm) 351. The basin is bounded by the Columbia River to the south and the Ochoco Mountains to the west.

Spring Chinook salmon primarily spawn in the upper Mainstem John Day River (hereafter called Mainstem) above the mouth of Indian Creek, in the Middle Fork John Day River (hereafter called Middle Fork) above Armstrong Creek, and the North Fork John Day River (hereafter called North Fork) above the mouth of Camas Creek. Important spawning tributaries of the North Fork include Granite Creek and its tributaries (Clear Creek and Bull Run Creek; hereafter called Granite Creek System) and Desolation Creek. Spawning has also occurred in the South Fork John Day River (hereafter called South Fork), the North Fork Tributaries Camas Creek, Trail Creek, and the Mainstem tributary Deardorff Creek. Fall Chinook are thought to spawn in the Lower Mainstem downstream of Kimberly, OR (rkm 298) but primarily between Cottonwood Bridge (rkm 64) and Tumwater Falls (rkm 16).

Summer steelhead sampled during this study have a spawning and rearing distribution in the Mainstem, South Fork, Middle Fork, and North Fork channels and tributaries of the John Day River upstream of rkm 298 where the North Fork and Mainstem merge. Summer Steelhead also spawn and rear in the lower Mainstem tributaries downstream of rkm 298. When juvenile steelhead are referenced in this document, we acknowledge the presence of alternative life-history forms and that some juveniles of all sizes may be resident (redband trout) or anadromous (steelhead) life-history forms. These alternate life-history forms are typically morphologically indistinguishable when examined as immature parr. We therefore refer to all juvenile *O. mykiss* as juvenile steelhead. Maps of the distribution of both Chinook and steelhead in the John Day River basin can be viewed at: http://www.streamnet.org/online-data/map_catalog.html.

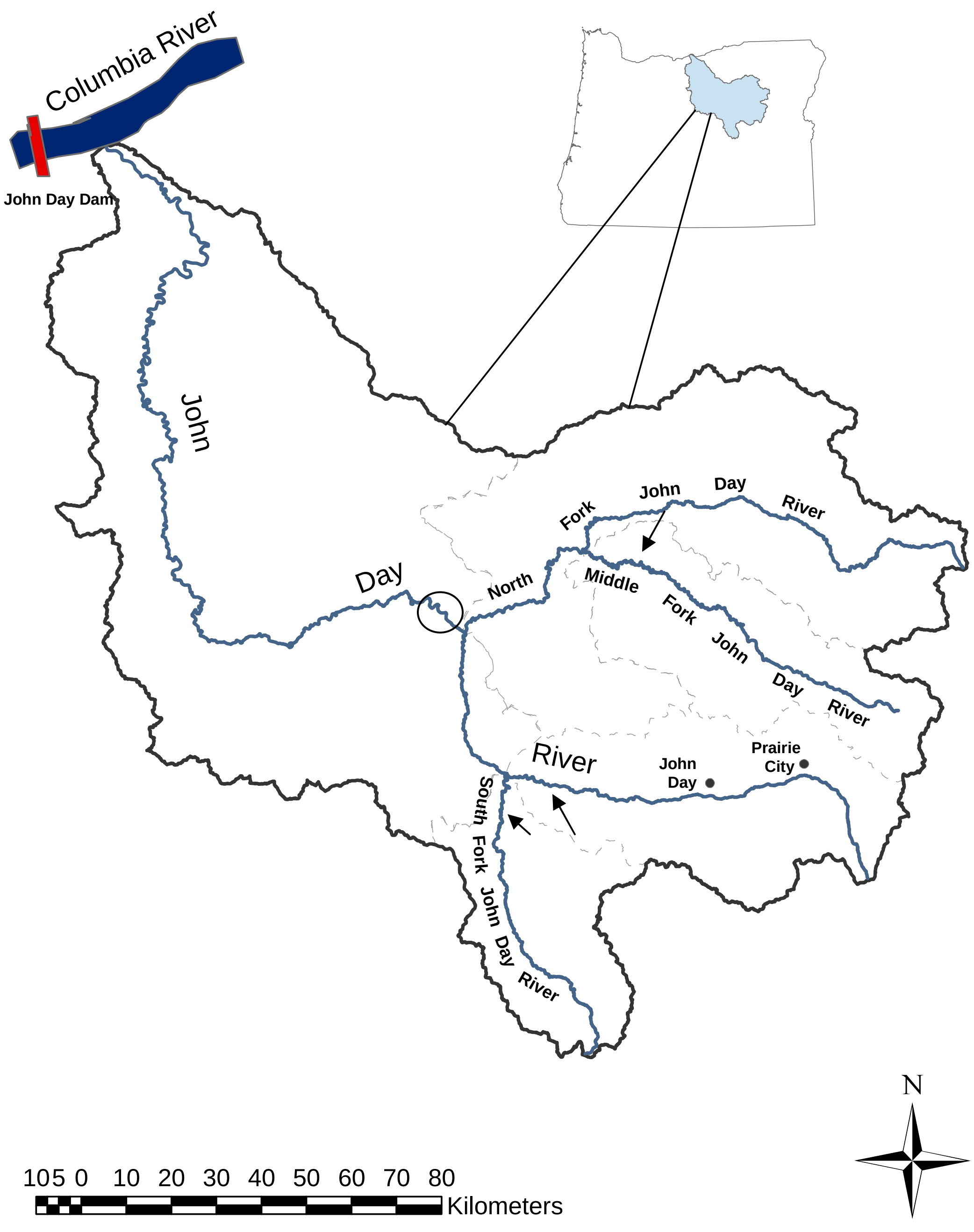

Figure 1. Map of John Day River basin. Dashed line denotes watershed boundary. Arrows indicate approximate locations of rotary screw traps and the circle indicates our Mainstem seining reach between Kimberly and Spray, OR.

METHODS

During 2008, juvenile spring Chinook and steelhead migrants were captured at three rotary screw trap (RST) sites and while seining in the Mainstem John Day River [river kilometer (rkm) 274–296] to estimate abundance, smolt-to-adult return (SAR), and to study life history characteristics of summer steelhead in the John Day River subbasin.

Two RSTs were located in the Upper Mainstem fourth level HUC and are hereafter referred to as the Mainstem trap at rkm 352 and South Fork trap located at rkm 10 of the South Fork John Day River. The Mainstem trap was relocated from its previous site at rkm 326 to the current site near the Flat Creek access road of the Phillip Schneider Wildlife Area upstream of the confluence with the South Fork John Day River. A third RST was located in the Middle Fork John Day River at rkm 24 near Ritter and is hereafter referred to as the Middle Fork trap. The Mainstem seining operation was located just downstream of the confluence of the Mainstem and North Fork (Figure 1).

The Mainstem, South Fork, and Middle Fork traps, and Mainstem seining operation are all located downstream of all known spring Chinook spawning habitat. Some summer rearing does occur in Bridge Creek (Ian Tattam, personal communication) and may occur in other tributaries downstream of our collection sites. The Middle Fork trap site is upstream of four fish bearing tributaries entering the Middle Fork including Six-mile Creek, Three-mile Creek, Long Creek, and Eight-mile Creek. All RSTs are equipped with live boxes, which safely hold juvenile fish for 24–72 h time intervals. At the Mainstem and South Fork trap sites we fished a 1.52 or 2.44 meter diameter RST depending on water conditions to optimize trap efficiency. A 1.52 m diameter RST was fished at the Middle Fork (rkm 24) trap site. Traps were either removed or stopped during times of ice formation, high discharge, and during warm summer months after fish ceased migrating.

All RSTs were typically fished four days/week by lowering cones on Mondays and raising cones on Fridays. Traps were checked daily during these weekly fishing periods. We assumed that all fish captured were migrants. Non-target fish species were identified, enumerated, and returned to the stream. Captured juvenile spring Chinook and steelhead migrants were anesthetized with tricane methane sulfonate (MS-222), interrogated for passive integrated transponder tags (PIT tags) or pan jet paint marks, enumerated, weighed to the nearest 0.1 g, and measured (fork length, FL; mm). We followed PTAGIS marking procedures when handling, PIT tagging, and pan jet marking juvenile migrants (PTAGIS 1999, Keefe et al. 1998, Hart and Pitcher 1969).

Juvenile spring Chinook and steelhead were captured by beach and boat seining in the Mainstem John Day River between rkm 274 and 296 from 5 February to 29 May 2008 in order to supplement trapping efforts when traps were not operational due to high water discharge. Eddies, riffles, and river margins were sampled with a seine constructed of 12.7 mm mesh netting that measured 30.5 m long by 2.4 m deep with a 1.2 x 1.2 m bag constructed of 9.5 mm mesh netting in the middle. Locations for sampling within our study reach varied on a daily basis depending on discharge and success during previous sampling days (see Appendix Table A-1 for a list of sample sites). Captured spring Chinook and steelhead emigrants were handled similar as at RST sites except all newly PIT-tagged or pan-jet emigrants were released at rkm 298, two kilometers upstream of our most upstream seining site. Recaptured smolts were released seven kilometers downstream of Spray, OR at rkm 267. Mean weekly catch-per-seine estimates were determined to assess smolt migration timing through the lower Mainstem (rkm

268–296) during the months of February–June. All PIT-tag information was submitted to the PIT tag Information System (PTAGIS).

Day and night release trapping efficiency (TE) estimating strategies were evaluated for each trap site. Day release and night release TE were estimated separately for each fish species at each RST site by releasing previously marked fish upstream of the trap and then counting the number of marked fish recaptured (Thedinga et al. 1994). Fish were marked with a pan jet paint mark below the surface of the fish's skin at the cranial (night release) or caudal (day release) insertion of the anal fin (Hart and Pitcher 1969, Keefe et al, 1998) or by PIT tagging. We alternated marking fish for day and night release as they were processed. Up to 20 fish were marked for day release and 20 for night release at the Mainstem and South Fork trap sites. At the Middle Fork trap, we marked up to 30 fish of each species for night release and up to 100 fish of each species for day release.

Day release TE fish were released 4.8 rkm upstream of the South Fork trap, 4 rkm upstream of the Mainstem trap, and 2.5 rkm upstream of the Middle Fork trap immediately after they were marked. Night release TE fish were marked, held in the tubs of a modified timed release device (Miller et al, 2000), and released after dark 1.8 rkm upstream of the South Fork trap, 85 meters upstream of the Middle Fork trap, and at three distances, 85, 144, and 210 meters upstream of the Mainstem trap. Trap efficiency intervals varied depending on the number of recaptured fish of each species (Keefe et al, 1998). Trap efficiency was estimated from the equation:

$$TE = R/M \tag{1}$$

where TE is the estimated trap efficiency, M is the number of marked fish released upstream and R is the number of marked fish recaptured. A stratified trap efficiency method, utilizing the Bailey estimator, was used to estimate migrant abundance (Steinhorst et al. 2004) for each species. A bootstrapping procedure was then used to estimate 95% confidence intervals for migrants during both the fall/winter and spring time periods. A similar mark-recapture and bootstrapping method was used to estimate capture efficiency for our seining efforts. Abundances estimated within mark/recapture strata were expanded for days when the traps were not operated.

Additional life history, parasite, and mark information was also collected from captured fish. Scale samples were taken from a subsample of steelhead migrants at all traps and from the seining operation during the spring. Scales were collected from the key scale area and annuli were counted to determine age at capture (Nicholas and Van Dyke, 1982). At each trapping site, scales were taken from the first 25 fish captured in each of four FL intervals, 65–90 mm, 91–120 mm, 121–200 mm, and 201 mm during the fall/winter (October–31 January) and spring (1 February–15 April and 16 April – June). The age structure of all steelhead measured for fork length was estimated by assigning ages based on the relationship between FL and age of fish in our aged subsampled. The presence of trematode cysts (black spot disease; *Neascus sp.*) on captured smolts was noted. We identified fin clips on adult steelhead and spring Chinook captured to determine if they were of hatchery origin. Sex, MEPS length, FL, and scale samples were taken when steelhead carcasses were observed. Snouts of carcasses and captured steelhead with adipose and left ventral fin clips were collected for coded wire tag identification.

Mean, standard error, and range of fork length (L; mm), weight (W; g), and coefficient of condition (K) were reported for both fall/winter 3 October 2007 to 31 January 2008) and spring

(1 February to 20 June 2008) migrating juvenile spring Chinook and steelhead. Coefficient of condition was calculated as:

$$K = 100\ W/L_F^{\,b} \qquad (2)$$

Where b = 3—the ratio of specific growth rates for length (L_F) and weight (W) (Saltzman 1977).

Travel times for fall/winter and spring tagged emigrants to reach John Day and Bonneville Dams from the release sites were summarized for each tagging location. In addition, first and last detection dates and mean, standard error, and range of travel time to John Day Dam, Bonneville Dam, and the Columbia Estuary were estimated. Detection rates for each seasonal tag group were calculated by dividing the number of first time detections at dams by the number PIT tagged and released at collection sites. Detection rates represent a minimum survival rate because they are not adjusted to account for fish that pass undetected through the hydrosystem.

Smolt-to-adult return (SAR; marine survival) was estimated as the ratio of smolts PIT tagged in our trapping and seining efforts to the number of returning PIT-tagged adults detected at dams as they ascended the Columbia River using DART and PTAGIS databases (DART, PTAGIS). Spring Chinook adults return at three ages (ages 3–5) so return rate of any cohort requires three years of adult data detection. Summer steelhead typically spend 1-2 years in the ocean requiring two years of adult data detection for a single smolt cohort. We also reported adult detection histories of returning native PIT tagged John Day spring Chinook and summer steelhead and the detection histories of known stray PIT tagged fish detected at McDonald's Ford on the John Day River (rkm 33). Detection histories included all known adult detections in the Columbia Basin. Freshwater survival (smolt-per-redd estimates) for the 2006 brood year of spring Chinook was estimated using the number of smolts estimated to pass individual trap sites (Mainstem, Middle Fork) and the seining reach (representing the entire basin) during 2008 and the number of redds estimated during 2006 (Schultz et al, 2007).

RESULTS

Juvenile Chinook Smolt Capture and Tagging

Collectively, we PIT tagged 3,998 juvenile spring Chinook at our three trap sites and in the Mainstem seining operation during the spring migration from 1 February to 20 June 2008 (Table 1). Peak movements were recorded during the month of April at all three trap sites (Figure 2). Mean FL at capture for spring migrants from all trapping sites was 104.2 mm (range 69–149 mm; Table 2). Also see Table 2 for mass and K values of all smolts captured. Of the 6,616 juvenile spring Chinook examined for *Neascus sp.* infestation, 390 (5.9%) showed visible signs of black spot. Based on basin-wide adult spring Chinook redd counts, and juvenile abundance estimates from our seining operation in the Mainstem between Kimberly and Spray, we estimate freshwater production at 67 smolts per redd (95% CL's 58, 79) for the 2006 brood year (Table 3, Schultz et al, 2007).

Trap efficiency varied by site, release period, and season (see Appendix C). Trap efficiency at the Mainstem site for Chinook migrants was greater for day vs. night release when the trap was 85, 144, and 210 meters from the release device (Appendix Table C-1). Night TE did improve at the Mainstem trap as the distance between trap and release site increased. At the South Fork trap site, overall TE during the fall was 78.5% for night release fish and 54.5% for day release fish. Overall TE during the spring was 47.1% for night release fish and 46.9% for fish released during the day (Appendix Table C-3). Low numbers of marked fish and high water and debris levels prevented an adequate evaluation of TE release strategy at the Middle Fork trap site (Appendix Table C-5). Day release TE was used to estimate abundance at the Mainstem and Middle Fork Trap sites. Night release TE was used to estimate abundance at the South Fork Trap site.

At our Mainstem trap (rkm 352) we captured 1,134 juvenile spring Chinook during the fall (10 October 2007–31 January 2008). We captured 2,119 and PIT tagged 1,682 juvenile spring Chinook during the spring migration from February 1 to June 20, 2008 (Table 1). We estimated that 22,176 (95% CL's 19,674–25,014) juveniles migrated past the Mainstem trap site during our trapping period (Table 4). Mean FL during the fall migration was 94.5 mm (range 73–130 mm FL; Table 2). Mean FL during the spring migration was 100.7 mm (± 0.4 SE, range 69–132 mm FL; Table 2). Of 2,407 juvenile spring Chinook examined for *Neascus sp.* infestation, 148 (6.1%) showed visible signs of black spot. Based on adult spring Chinook upper Mainstem redd counts and abundance estimates from our Mainstem trap we estimated freshwater production to be 51 smolts per redd ± 95% CL's 45–57 smolts per redd for the 2006 brood year (Table 4, Schultz et al, 2007).

We recaptured 16 juvenile spring Chinook during 2008 that had been PIT tagged at the Mainstem Trap during the 2007 migration. These 16 delayed migrants were captured between 25 May and 27 June 2007 and all ranged between 71–103 mm FL when they were tagged. To examine the presence of large parr, we collected scales from 43 juvenile spring Chinook ranging from 69–128 mm FL at the Mainstem trap between 28 May and 17 June 2008. We also collected scales from 33 juvenile spring Chinook in the Mainstem upstream of Prairie City between rkm 423 and 426 on 17 June. Scales were also collected from five spring Chinook rearing in Black Canyon Creek, a tributary to the South Fork on 17 July 2008 (Ian Tattam, personal communication). Eleven of the 43 fish sampled at the Mainstem Trap were age 1 and 32 were age 0. Age-1 fish ranged from 93–125 mm FL and age-0 fish ranged from 69–98 mm FL. Mean fork length of the 33 fish collected between rkm 423–426 was 49.2 mm (range 39–69 mm) and all were age 0. All fish sampled in Black Canyon Creek were age 0 and ranged 76–92 mm FL.

At our South Fork trap we captured 364 juvenile spring Chinook between 4 October 2007 and 20 June 2008. We estimated that 737 (95% CL's 636–858) juveniles migrated past the South Fork trap site (Table 2). Only 287 spring Chinook were PIT tagged for the spring tag group (Table 1). Mean FL of spring migrants was 102.6 mm (range 83–131 mm, Table 2).

At our Middle Fork trap we captured 615 and PIT tagged 611 juvenile spring Chinook during the spring migration from 12 February to 20 June 2008 (Table 1). We estimated that 2,986 (95% CL's 2,476–3,643) juvenile spring Chinook migrated past the Middle Fork trap site during our trapping period (Table 1). Mean FL was 99.2 mm (range 74–140 mm) during the spring (Table 2). Of 611 juvenile Chinook examined for *Neascus sp.* infestation, 21 (3.4%) showed visible signs of black spot. Based on Middle Fork Chinook redd counts and abundance estimates from our Middle Fork trap, we estimated freshwater production in the Middle Fork to be 15 smolts per redd (95% CL's 12–18) for the 2006 brood year (Table 5, Schultz et al, 2007).

We PIT tagged 1,418 of the 3,364 juvenile spring Chinook captured in 546 seine hauls in the Mainstem John Day River between rkm 274–296 from 5 February to 29 May 2008 (Table 1). One hundred fifty-six juveniles were recaptured of 3,275 fish released upstream of the seining reach during our mark-recapture efforts indicating a capture efficiency of 4.7% which peaked during April (Figure 3). We estimated that 70,319 (95% CL's 60,597, 83,201) juveniles migrated past the seining area during our seining period (Table 4). Mean FL was 107.1 mm (range 77–149mm; Table 2). Of 3,281 smolts examined for *Neascus sp*. infestation, 218 (6.6%) showed visible signs of black spots.

Table 1. Collection period, number captured (n), number PIT tagged, percent capture efficiency, and mark-recapture abundance estimates (± 95% confidence limits) for juvenile spring Chinook migrants captured at three rotary screw trap sites and while seining in the John Day River from 4 October 2007 to 20 June 2008.

Trap Location	Collection Period	n	PIT tagged	Capture Efficiency	Abundance	95% CI
South Fork	10/4/07–6/20/08	364	287	49.3	1,321	1,140–1,538
Mainstem	10/10/07–6/20/08	3,253	1,682	14.5	43,367	38,578–48,979
Middle Fork	2/12/08–6/20/08	615	611	20.0	7,382	5,553–9,990
Mainstem Seining	2/5/08–5/29/08	3,364	1,418	4.8	138,957	118,178–167,737

Table 2. Number (N), mean, and range of fork length (mm), mass (g), and coefficient of condition for spring Chinook migrants captured in three rotary screw traps and while seining on the Mainstem John Day River during two periods (Fall/Winter, 4 October 2007 to 31 January 2008; Spring, 1 February to 20 June 2008).

		Fork Length (mm)			Mass (g)			Coefficient of condition		
Location	Period	N	Mean	Range	N	Mean	Range	N	Mean	Range
South Fork	Fall/Winter	30	101.0	88–121	30	11.9	7.2–21.6	30	1.13	0.9–1.28
Mainstem	Fall/Winter	716	94.5	73–130	695	10.2	4.5–27.3	695	1.18	0.79–1.72
All sites	Fall/Winter	746	94.8	73–130	725	10.3	4.5–27.3	725	1.17	0.79–1.72
South Fork	Spring	287	102.6	83–131	273	12.4	6.4–28.2	273	1.13	0.78–1.39
Mainstem	Spring	1,690	100.7	69–132	1,567	12.4	3.5–28.5	1,566	1.19	0.82–1.94
Middle Fork	Spring	611	99.2	74–140	580	11.9	4.1–31.2	580	1.17	0.90–1.58
Seining	Spring	3,281	107.1	77–149	1,647	15.5	5.3–146	1,647	1.19	0.72–1.83
All sites	Spring	5,869	104.2	69–149	4,067	13.6	3.5–146	4,066	1.19	0.72–1.94

Table 3. Smolt/redd ratios based on recent and historic estimates of smolt abundance (95% CLs) and census redd counts for spring Chinook salmon for the John Day River basin. Historic estimates from the 1978–1982 brood years are from Lindsay et al. (1986).

Brood Year	Redds	Smolt migration Year	Smolts	95% CI	Smolts/redd
1978	611	1980	169,000	80,000–257,000	277
1979	641	1981	83,000	52,000–113,000	129
1980	306	1982	94,000	1,000–211,000	307
1981	401	1983	64,000	40,000–89,000	160
1982	498	1984	78,000	64,000–93,000	157
1998	450	2000	141,540	84,103–254,656	315
1999	478	2001	131,142	109,794–159,947	274
2000	1,869	2002	120,438	104,149–139,902	64
2001	1,863	2003	109,537	94,077–132,958	59
2002	1,959	2004	181,589	145,617–234,061	93
2003	1,417	2005	180,933	162,651–287,911	128
2004	1,656	2006	185,733	98,768–373,825	112
2005	902	2007	89,336	66,844–129,702	105
2006	1,044	2008	138,957	118,178–167,736	133

Table 4. Upper mainstem John Day River smolt/redd ratios based on trap estimates of smolt abundance and census redd counts for spring Chinook salmon, 2002–2006 brood years.

Brood Year	Number of redds	Migration Year	Trapping period	Smolt abundance	95% CI	Smolts/redd
2002	549	2004	10/23/03–6/24/04	57,075	43,176–76,610	104
2003	323	2005	10/4/04–7/6/05	33,787	30,342–37,769	105
2004	368	2006	2/10/06–6/26/06	33,642	21,006–61,272	91
2005	227	2007[a]	10/12/06–6/22/07	54,261	42,524–70,768	239
2006	451	2008	10/10/07–6/20/08	43,367	38,578–48,979	96

[a] Mainstem trap was moved upstream of the confluence with the South Fork. Estimated abundance from Mainstem and South Fork traps were added together.

Table 5. Middle Fork John Day River smolt/redd ratios based on trap estimates of smolt abundance and census redd counts for spring Chinook salmon, 2002–2006 brood years.

Brood Year	Number of redds	Migration Year	Trapping period	Smolt abundance	95% CI	Smolt/redd
2002	389	2004	10/29/03–6/23/04	23,901	19,449–30,188	61
2003	236	2005	10/6/04–6/17/05	21,957	18,747–25,489	93
2004	319	2006	3/6/06–6/22/06	18,465	14,423–24,186	58
2005	178	2007	10/31/06–6/14/07	16,901	14,279–20,755	95
2006	199	2008	2/12/08–6/20/08	7,382	5,553–9,990	37

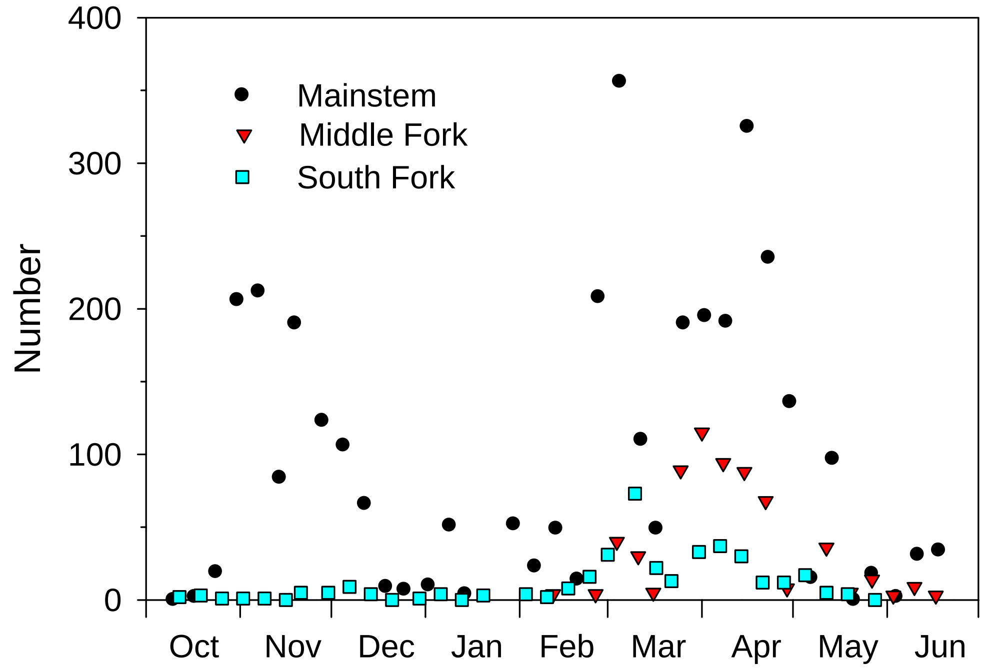

Figure 2. Weekly number of juvenile spring Chinook captured at three rotary screw traps operated in the John Day River basin during autumn 2007 and spring 2008.

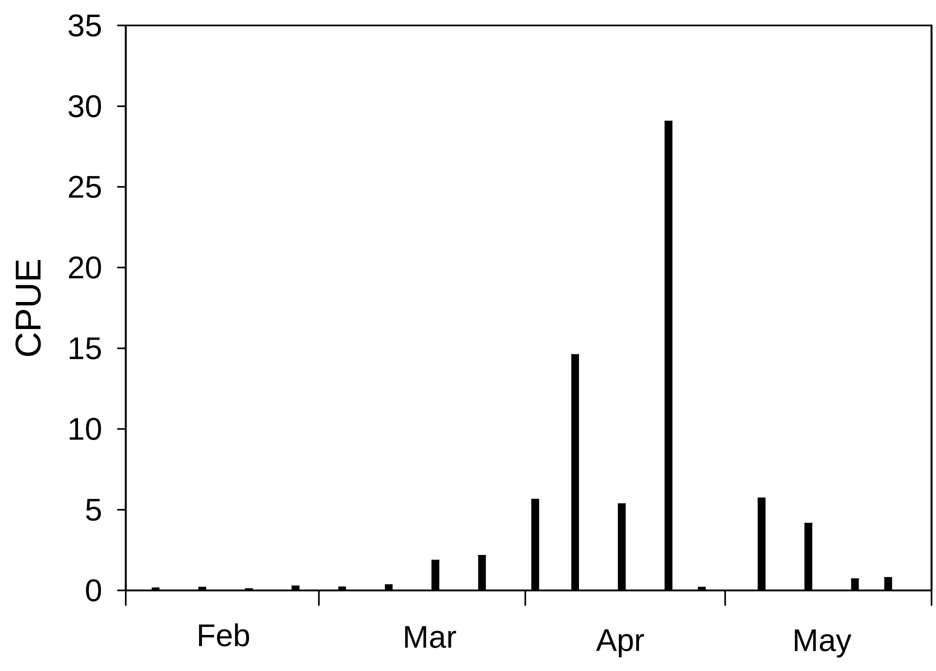

Figure 3. Weekly catch per unit effort (CPUE, number/seine haul) of spring Chinook smolts captured while seining the John Day River between river kilometers 274 and 296 from 5 February to 20 May 2008.

Juvenile Steelhead Smolt Capture and Tagging

Collectively, we PIT tagged 4,076 juvenile summer steelhead at our three trap sites and in the Mainstem seining operation during the spring migration from 1 February to 20 June 2008 (Table 6). Migration timing peaked during the month of May at all three trapping sites (Figure 4). Mean fork length of migrants captured during the spring period was 162.6 mm (range 65–257 mm). The estimated age structure of all 4,867 steelhead migrants measured for FL was 20.1% age 1, 74.8% age 2, 5.1% age 3 (Tables 8 and 9). Of 4,870 juvenile steelhead examined for *Neascus sp.* infestation, 59 (1.2%) showed visible signs of black spot.

Trap efficiency varied by site, release period, and season (see Appendix C). Trapping efficiency at the Mainstem site tended to be higher for day release fish than fish released during the night when the trap was 85 and 144 m from the release device. At 210 m, night TE (12.1%) tended to be greater than day TE (5.4%, Appendix Table C-2). At the South Fork trap site, TE tended to be higher for night release fish than day release fish during both the fall and spring trapping periods (Appendix Table C-4). Low numbers of marked fish and high water and debris levels prevented an adequate evaluation of TE release strategy at the Middle Fork trap site (Appendix Table C-6).

At our Mainstem trap, we captured 204 summer steelhead during the fall/winter (10 October 2007–31 January 2008). We captured 1,073 and PIT tagged 1,013 juvenile steelhead during the spring period (Table 6). We estimate that 24,664 juvenile steelhead migrated past the Mainstem trap site during our spring trapping period. Mean FL of spring migrants was 157 mm (range 65–257 mm). The estimated age structure of 1,195 steelhead migrants measured for FL was 25.5% age 1, 72.8% age 2, and 1.8% age 3 (Tables 8 and 9). Of 1,198 juvenile steelhead examined for *Neascus sp.* infestation at the Mainstem trap, 46 (3.8%) showed visible signs of black spot.

At our South Fork trap, we captured 3,698 and PIT tagged 2,774 juvenile steelhead during the 2008 migration from 4 October 2007 to 20 June 2008 (Table 6). We estimate that 19,901 juveniles migrated past the trap site during our trapping period. Mean FL of fall/winter migrants was 131.1 mm (range 67–233 mm; Table 7). Mean FL of spring migrants was 164.9 mm (± 0.6 SE, range 68–255 mm). The estimated age structure of 3,361 steelhead migrants measured for fork length was 19.4% age 1, 74.4% age 2, and 6.2% age 3. Of 3,361 juvenile steelhead examined for *Neascus sp.* infestation at the South Fork trap, four (0.1%) showed visible signs of black spot.

At our Middle Fork trap we captured 230 and PIT tagged 204 juvenile steelhead from 12 February to 20 June 2008. High spring runoff and debris made it impossible to operate the Middle Fork trap during the usual May peak movement of steelhead. We estimate that 6,248 juvenile steelhead migrated past the Middle Fork trap site during our spring trapping period. Spring migrant mean fork length was 160.5 mm (range 70–240 mm; Table 6). The estimated age structure of 226 steelhead migrants examined during the spring was 7.5% age 1, 86.6% age 2, 5.9% age 3 (Tables 8 and 9). Of 226 juvenile steelhead examined for *Neascus sp.* infestation at the Middle Fork trap, five (2.2%) showed visible signs of black spot.

We captured and PIT tagged 85 juvenile steelhead seined in the Mainstem John Day River between rkm 274–296 from 5 February to 29 May 2008. Mean FL was 158.1 mm (range 116–204 mm; Table 7). The estimated age structure of 85 steelhead emigrants PIT tagged during the spring was 5.6% age-1 and 88.0% age-2, and 6.4% age-3 (Tables 8 and 9). Four (4.7%) of the 85 emigrants examined for *Neascus sp.* infestation showed visible signs of black spot.

Table 6. Season, collection period, number captured (n), number PIT tagged, percent capture efficiency, and abundance estimates (95% confidence limits) for juvenile steelhead migrants captured at three rotary screw trap sites and while seining in the John Day River from 4 October 2007 to 20 June 2008.

Trap Location	Season	Collection Period	n	PIT tagged	Capture Efficiency	Abundance	95% CI
South Fork	Fall	10/4/07–12/15/07	552		33.0		
	Winter	12/16/07–1/31/08	46		40.0		
	Spring	2/1/08–6/20/08	3100	2,774	38.3		
	Combined		**3,698**			**19,901**	**18,500–21,344**
Mainstem	Fall/winter	10/10/07–1/31/08	204		15.9		
	Spring	2/1/07–6/20/08	1073	1,013	7.3		
	Combined		**1,277**			**24,664**	**19,806–30,275**
Middle Fork	Spring	2/12/08–6/20/08	230	204	6.3	6,248	3,657–10,970
Mainstem Seining	Spring	2/5/08–5/29/08	85	85			

Table 7. Number (N), mean, and range of fork length (mm), mass (g), and coefficient of condition for steelhead migrants captured in three rotary screw traps and while seining on the Mainstem John Day River during two periods (Fall/Winter, 10 October 2007 to 31 January 2008; Spring, 1 February to 20 June 2008).

		Fork Length (mm)			Mass (g)			Coefficient of condition		
Location	Period	N	Mean	Range	N	Mean	Range	N	Mean	Range
South Fork Trap	Fall/Winter	480	131.1	67–233	459	26.2	2.4–122.5	459	1.02	0.74–1.38
Mainstem Trap	Fall/Winter	145	132.1	52–225	140	31.4	1.5–112.3	140	1.05	0.89–1.37
South Fork Trap	Spring	2,881	164.9	68–255	2,764	49.8	3.7–79.5	2,764	1.05	0.63–1.62
Mainstem Trap	Spring	1,051	157.0	65–257	962	48.5	3.0–171.7	961	1.05	0.77–1.46
Middle Fork Trap	Spring	226	160.5	70–240	226	47.6	3.7–149.7	226	1.06	0.79–1.32
Mainstem Seining	Spring	85	158.1	116–204	76	40.6	19.4–81.4	76	1.01	0.81–1.31

Table 8. Trap location, season, number of scale samples taken (n), and percent age in four fork length (FL) ranges of juvenile summer steelhead subsampled at three rotary screw trap sites and in the Mainstem seining reach during the Fall/winter and spring seasons of the 2008 migration.

Location	Season	FL (mm)	n	Age 1	Age 2	Age 3
Mainstem Trap	Fall/Winter	65–90	19	84.2	15.8	
		90–120	25	24.0	76.0	
		121–200	25		100.0	
		≥ 201	16		100.0	
	Spring	65–90	40	100.0		
		90–120	47	89.4	10.6	
		121–200	50	20.0	78.0	2.0
		≥ 201	19		89.5	10.5
South Fork Trap	Fall/Winter	65–90	26	92.3	7.7	
		90–120	27	25.9	74.1	
		121–200	25	4.0	96.0	
		≥ 201	16		93.8	6.3
	Spring	65–90	35	97.1	2.9	
		90–120	48	68.8	31.3	
		121–200	51	17.7	74.5	7.8
		≥ 201	35		100.0	
Middle Fork Trap	Spring	65–90	12	100.0		
		90–120	6	50.0	50.0	
		121–200	32		93.8	6.3
		≥ 201	10		90.0	10.0
Mainstem Seine	Spring	65–90	0			
		90–120	2	100.0		
		121–200	30	3.3	90.0	6.7
		≥ 201	1	100.0		

Table 9. Number captured and measured for fork length (n) and estimated percent age structure of juvenile steelhead captured at three rotary screw trap sites in the John Day River during two periods (Fall/Winter, October to 31 January; Spring, 1 February to June) from 2005 to 2008 based on trap and season subsample age structure and fork length measurements.

Trap Site	Migration Season	Migration Year	n	Brood Year 2001	2002	2003	2004	2005	2006	2007
South Fork (rkm 10)	Fall/Winter	2005	243		2.9	82.3	14.8			
	Fall/Winter	2007	205			0.5	4.2	90.0	5.4	
	Fall/Winter	2008	480					0.2	82.9	16.8
	Spring	2005	1,925	0.2	5.8	78.0	16.1			
	Spring	2006	656			36	63.9	0.1		
	Spring	2007	1,581				13.7	63.7	22.7	
	Spring	2008	2,881					7.19	73.0	19.8
Mainstem (rkm 326) Downstream of South Fork	Fall/Winter	2005	244		6.1	61.9	32.0			
	Spring	2005	1,408	0.1	11.2	76.7	12.0			
	Spring	2006	425			23.9	58.2	17.9		
Mainstem (rkm 352) Upstream of South Fork	Fall/Winter	2008	144						81.5	18.5
	Spring	2007	1,444				5.7	86.0	8.3	
	Spring	2008	1,051					2.0	71.6	26.4
Middle Fork (rkm 24)	Spring	2005	1,327	0.8	27.7	62.1	8.7			
	Spring	2006	779		0.2	26.9	68.7	4.1		
	Spring	2007	1,295				9.1	84.6	5.6	
	Spring	2008	226					5.9	86.6	7.5
All Sites		2005	4,660	0.3	13.8	73.1	12.8			
		2006	2,167		0.1	30.0	63.2	6.7		
		2007	4.562			0.2	9.3	77.9	12.6	
		2008	4,867					5.1	74.8	20.1

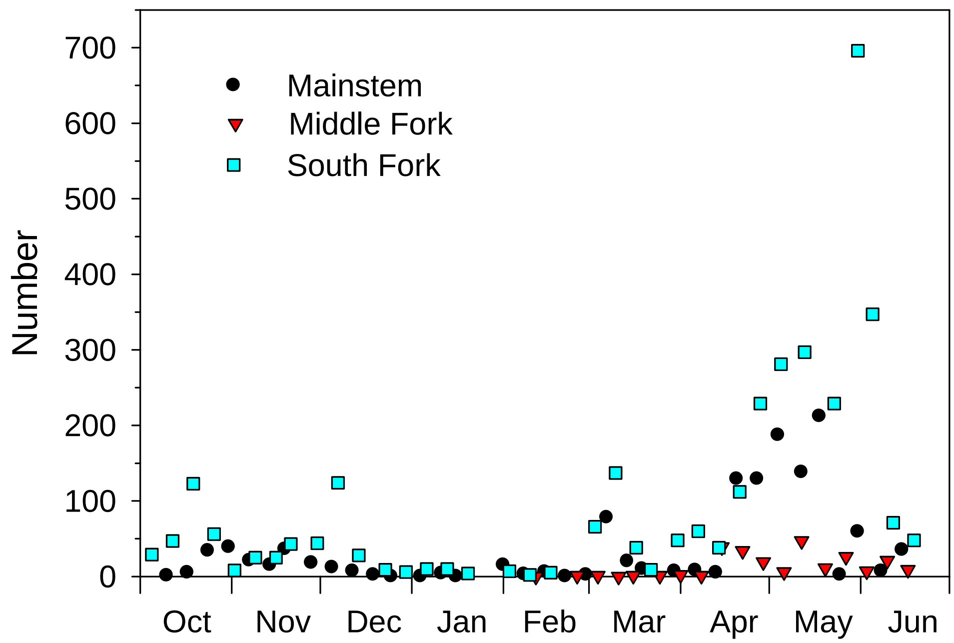

Figure 4. Weekly number of summer steelhead captured at three rotary screw traps operated in the John Day River basin during autumn 2007 and spring 2008.

Incidental Catch and Observations

We captured 13 non-target species of fish in our seining and trapping efforts during the 2008 migration (Table 10). Twenty adult summer steelhead were captured during our trapping and seining efforts. Of these, one (5%) was of hatchery origin (adipose fin clip).

No bull trout were captured this season. One adult pacific lamprey was captured alive at our Mainstem trap on 19 June. Juvenile pacific lamprey of two morphological types; visible eyes, and brown with eye spots were captured at all three rotary screw trap sites (Table 10). The brown with eye spots morph composed the majority of juvenile pacific lamprey observed. We captured a total of 4,007 juvenile pacific lamprey at all three rotary screw trap sites with the majority (2,611 individuals) captured at the Middle Fork trap.

PIT-tag Detections of Juveniles at FCRPS Facilities

Of 3,998 juvenile spring Chinook migrants captured, PIT tagged, and released at our trapping and seining sites between 1 February and 20 June 2008, 0.3% (12) were detected at the John Day River McDonald Ford antenna array, 29.8% (1,192) were detected at John Day Dam, 10.6% (424) were detected at Bonneville Dam, and 1.0% (38) were detected in the Columbia River estuary. Detections at John Day Dam occurred between 16 April and 24 June 2008 and 50% of these occurred by 11 May (Table 11). Mean travel time from all release sites to John Day Dam was 34 days (± 0.5 days SE, range 3–103 days). Detections at Bonneville Dam occurred between 23 April and 30 June 2008 and 50% of these occurred by 12 May (Table 11). Mean travel time to Bonneville Dam was 43 days (± 0.8 days SE, range 5–95 days). Detections in the Columbia River estuary occurred between 10 May and 2 June 2008 and mean travel time was 47 days (± 3 days SE, range 8–84 days).

Of 4,076 juvenile steelhead migrants captured, PIT tagged, and released at our trapping and seining sites between 1 February and 20 June 2008, only 19 (0.5%) were detected at the John Day River McDonald Ford antenna array, 26% (1,074) were detected at John Day Dam, 9.5% (388) at Bonneville Dam, and 2% (81) were detected in the Columbia River estuary (Table 11). Detections at John Day Dam occurred between 16 April and 19 June 2008 with 50% occurring by 21 May 2008 (Table 11). Mean travel time from all release sites to John Day Dam was 15 days (± 0.5 days SE, range 3–140 days). Detections at Bonneville Dam occurred between 20 April and 22 June 2008 and 50% occurred by 18 May 2008. Mean travel time to Bonneville Dam was 16 days (± 0.8 days SE, range 4–87 days). Detections in the Columbia River estuary occurred between 5 May and 16 June 2008 and mean travel time was 18 days (± 1.8 days SE, range 6–91 days).

Table 10. Number of each fish species captured incidentally at the South Fork (SF), Mainstem (MS), and Middle Fork (MF) trap sites, and in the Mainstem seining operation (rkms 274–296, 10 October 2007 to 20 June 2008.

	Trap sites			
Species	SF	MS	MF	Seining
Hatchery adult Summer Steelhead (*O. mykiss*)	1			
Wild adult Summer Steelhead (*O. mykiss*)	4	1	1	13
Spring Chinook fry (*O. tshawytscha*)		14	1	
Summer Steelhead fry (*O. mykiss*)	58	2		
Mountain Whitefish (*Prosopium williamsoni*)		2	2	
Brown Bullhead (*Ameiurus nebulosus*)		1	7	44
Chiselmouth (*Acrocheilus alutaceus*)	54	921	114	23
Bluegill (*Lepomis macrochirus*)		21		
Common Carp (*Cyprinus carpio*)				4
Dace (*Rhinichthys sp.)*	1,731		743	
Northern Pike Minnow (*Ptychocheilus oregonensis*)	777	862	303	172
Sucker Sp. (*Catostomus macrocheilus or C. columbianus*)	3,432	3,059	1,315	635
Smallmouth Bass (*Micropterus dolomieui*)		87	20	56
Red Side Shiner (*Richardsonius balteatus*)	1,367	1,045	430	1
Sculpin sp. (*Cottus sp.*)	328	8	3	
West Slope Cutthroat (*O. clarki lewisi*)		1		
Adult Pacific Lamprey (*Lampetra tridentata*)		1		
Juvenile Pacific Lamprey (*L. tridentata*)				
Developed Eyes	98	370	1,303	
Brown with Eye Spots	114	814	1,308	

Table 11. Number detected (N), first and last detection dates, and mean, standard error (SE) and range of travel time (days) to detection at John Day Dam, Bonneville Dam, and the Columbia River Estuary during 2008 for spring Chinook and summer steelhead smolts PIT tagged in the John Day Basin from 1 February to 20 June 2008.

Species	Detection Location	N	Detection Dates	Travel Time Mean	SE	Range
Spring Chinook	McDonald Ford	12	4/15–5/18	33	4.6	2–58
	John Day Dam	1,192	4/16–6/24	34	0.5	3–103
	Bonneville Dam	424	4/23–6/30	43	0.8	5–95
	Estuary	38	5/10–6/2	47	3.0	8–84
Summer steelhead	McDonald Ford	19	4/21–5/30	14	3.5	2–53
	John Day Dam	1,074	4/16–6/19	15	0.5	3–140
	Bonneville Dam	388	4/20–6/22	16	0.8	4–87
	Estuary	81	5/5–6/17	18	1.8	6–90

PIT Tag Detection of Adults at FCRPS Facilities

Estimated smolt-to-adult return (SAR) for spring Chinook from the trap sites in the John Day basin to the ocean and back to Bonneville Dam for the 2003 brood year was 1.36% for the spring tag group and 1.37% for the fall/winter tag group (Table 12). Return data for subsequent cohorts is not yet complete. There were 64 detections of returning adult spring Chinook salmon at Bonneville Dam between 11 April and 26 June 2008. Six (9%) of the 64 Bonneville Dam detections occurred during April with 77% (49 fish) detected during May and 14% (9 fish) detected during June. Thirty-one percent (20 fish) of the 64 detected at Bonneville Dam were age-3 fish, 34 (52.3%) were age-4 and 10 (15.4%) were age-5. Only two adult spring Chinook strayed past McNary, Ice Harbor, and Lower Granite Dams (Table 14). One of the two strays was also detected in the Tucannon River.

Of the 247 returning adult summer steelhead, 209 were part of our effort to estimate summer steelhead SAR and 38 were from Oregon State University's tagging efforts. Estimated SAR for summer steelhead from the 2006 juvenile migration year was 0.86 % for the Fall/winter tag group and 2.63% for the spring tag group (Table 13). Preliminary summer steelhead SAR for the 2007 juvenile migration was estimated at 2.93% for Fall/winter migrants and 4.44% for spring migrants (Table 13). Of the 66 adult summer steelhead that returned during 2007 and 2008 that were PIT tagged as smolts in 2006, 65% (43 fish) returned as one-ocean fish and 35% (23 fish) returned as two-ocean fish. We will be unable to reconstruct cohort SARs for summer steelhead until we collect sufficient data on smolt age structure.

The recently installed PIT tag antenna array on the John Day River near McDonald's Ford detected 14 of the 62 PIT tagged John Day River Chinook observed as adults at Bonneville Dam. This array also detected 10 hatchery and 10 wild Chinook PIT tagged outside of the John Day basin (Table 15). Three hatchery Chinook were PIT tagged as adults at Bonneville Dam, one was from Looking glass hatchery, four were from McCall Hatchery, and two were Fall Chinook from Lions Ferry hatchery (Table 15). Six of the 10 wild fish were tagged as adults at Bonneville Dam. The other three wild adults were out-of-basin fish PIT tagged at Lower Granite Dam and either barged or trucked downstream of Bonneville Dam as juveniles.

A total of 247 adult summer steelhead PIT tagged as juveniles in the John Day Basin were detected returning at Bonneville Dam from 19 June to 5 September 2008 (PTAGIS). Of these, 1.6% (four) were detected in June, 81% (200) in July, 17% (42) in August, and one was observed in September. As of 13 November 2008, only 84 (34%) of the 247 fish have been observed in the John Day River at the McDonald Ford array and 110 (44%) have been observed at McNary Dam. More detections are expected during 2009. Bonneville Dam PIT tag detections of the 114 John Day steelhead that returned during the summer of 2007 are summarized in Table 16 and Appendix D. Out-of-basin adult summer steelhead were also observed at the McDonald Ford array between September of 2007 and April of 2008 (Table 16). One wild fish was from Chamberlain Creek, a tributary to the Middle Salmon River, 16 wild fish had been PIT tagged and barged from Lower Granite Dam, 29 hatchery fish had also been barged from Lower Granite Dam, two hatchery fish were from the Tucannon River, and one was from Wallowa Hatchery. An unknown origin steelhead PIT tagged as an adult at Priest Rapids Dam was also detected. Not all of these stray fish apparently spawned in the John Day basin. At least two wild and three hatchery fish were detected outside of the John Day basin after being observed at the McDonald Ford array (Table 16).

Table 12. Brood year, migration year, number of smolts PIT tagged, adult PIT tag return years, number and age of PIT tagged adults detected at Bonneville Dam, and estimated smolt-to-adult survival (SAR) of John Day spring Chinook salmon PIT tagged from 2000–2008.

Brood Year	Migration Year	# Smolts Tagged	Return Years	Adult Detections					SAR
				Age-3	Age-4	Age-5	Age-6	Total	
1998	2000	1,852	2001–2003	4	112	28		144	7.78 %
1999	2001	3,893	2002–2005	7	80	15	1	103	2.65 %
2000	2002	4,000	2003–2005	5	86	9		100	2.50 %
2001	2003	6,147	2004–2006	5	110	13		128	2.08 %
2002	2004								
	Fall/winter [a]	399	2005–2007	0	6	3		9	2.26 %
	Spring [b]	4,036		5	62	17		84	2.08 %
2003	2005								
	Fall/winter [a]	656	2006–2008	2	6	1		9	1.37 %
	Spring [b]	5,138		6	55	9		67	1.36 %
2004	2006								
	Spring	3,418	2007–2009	2	34			34	
2005	2007								
	Spring	4,055	2008–2010	20					

[a] Fall/winter tag group: juvenile spring Chinook captured and PIT tagged between September and January 31.
[b] Spring tag group: juvenile spring Chinook captured and PIT tagged between February 1 and July.

Table 13. Juvenile tag year, number PIT tagged as juveniles, adult return years, number returning by ocean residence, and number of delayed migrants (juveniles that did not emigrate the year they were PIT tagged) that were detected at Bonneville Dam, and estimated smolt-to-adult return (SAR) of John Day summer steelhead from 2000–2008.

		Bonneville Dam PIT Tag Detection					
			Age at return by Ocean year				
Tag Year	Number Tagged	Return Years	One- Ocean	Two-Ocean	Delayed migrants	Total	SAR
2001	435	2002–2004	1	5	1	7	1.61 %
2002	0						
2003	144	2004–2005	1	1		2	1.39 %
2004							
Fall/Winter[a]	898	2005–2006	6	1		7	0.78 %
Spring[b]	3,732		60	46[c]	3	109	2.92 %
2005							
Fall/Winter	573	2006–2007	8	5		13	2.27 %
Spring	4,913		49	30		79	1.61 %
2006							
Fall/Winter	1,048	2007–2008	8	1		9	0.86 %
Spring	2,167		35	22		57	2.63 %
2007							
Fall/winter	205	2008–2009	6				
Spring	4,053		180				

[a] Fall/winter tag group: juvenile summer steelhead captured and PIT tagged between September and January 31.
[b] Spring tag group: juvenile summer steelhead captured and PIT tagged between February 1 and July.
[c] two adults detected at McNary Dam were not detected at Bonneville Dam.

Table 14. Detection histories of 114 adult summer steelhead returning during the summer of 2007 and 64 adult spring Chinook returning during the spring of 2008. All fish were PIT tagged as juveniles in the John Day River basin. Detection locations include Bonneville Dam, Sherars Falls at rkm 71 on the Deschutes River, McNary Dam, Priest Rapids Dam, Rock Island Dam, Ice Harbor Dam on the Snake River, Lower Granite Dam, McDonald Ford at rkm 32 on the John Day River (McDonald), and the South Fork John Day River near Dayville (South Fork).

Detection History	Steelhead	Chinook
Bonneville only	27	48
Bonneville → Sherars	1	
Bonneville → McNary	21	
Bonneville → McNary → Ice Harbor	6	
Bonneville → McNary → Priest Rapids → Rock Island	1	
Bonneville → McDonald	8	14
Bonneville → South Fork	2	
Bonneville → McNary → McDonald	11	
Bonneville → McNary → South Fork	12	
Bonneville → McDonald → South Fork	8	
Bonneville → McNary → McDonald → South Fork	13	
Bonneville → McNary → Ice Harbor → South Fork	3	
Bonneville → McNary → Ice Harbor → Lower Granite		1
Bonneville → McNary → Ice Harbor → Lower Granite → Tucannon River → Lower Granite		1
Total detected at Bonneville	114	64
Total detected at McNary	68	2
Number detected at McNary known to have returned to the John Day River	39	0
Number of fish detected at Bonneville and later detected in the John Day	57	14

Table 15. Run, PIT tagging location, release location, adult detection history, and source (wild/hatchery) of PIT tagged adult Spring, Summer, and Fall Chinook that originated outside of the John Day basin and were observed at McDonald Ford in the John Day River during 2008. See Table 14 for descriptions of detection sites.

Run	Tag Location	Release Location	Detection History	Source	
				Wild	Hatchery
Unknown Chinook	Bonneville Dam	Bonneville Dam	Bonneville tagged as adult → McDonald	6	2
	Bonneville Dam	Bonneville Dam	Bonneville tagged as adult → McNary → McDonald	1	1
Spring Chinook	Lookingglass Hatchery	Catherine Creek (Grande Ronde R.)	Bonneville → McNary → Ice Harbor → McDonald		1
Summer Chinook	McCall Hatchery	Knox Bridge (South Fork Salmon R.)	Bonneville → McDonald		1
			Bonneville → McDonald → McNary Dam		1
			Bonneville → McDonald → McNary → Ice Harbor → Lower Granite		1
			Bonneville → McNary → Ice Harvbor → McDonald		1
Unknown Chinook	Lower Granite	Trucked to below Bonneville Dam	Bonneville → McNary → McDonald	1	
		Barged from Lower Granite Dam and released below Bonneville Dam	Bonneville → McDonald → McNary	1	
			Bonneville → McDonald → McNary → Ice Harbor → Lower Granite	1	
Fall Chinook	Lions Ferry Hatchery	Big Creek (Clearwater R.)	Bonneville → McNary → McDonald		1
		Pittsburg Landing, (Snake R.)	Bonneville → McDonald		1
			Totals	**10**	**10**

Table 16. Juvenile steelhead PIT tag tagging and release locations, detection history, and source (wild or hatchery) of adult summer steelhead observed at the McDonald Ford array in the John Day River from September 2007 to April 2008. See Table 14 for descriptions of detection sites except Prosser Dam near Prosser WA on the Yakima River (Prosser).

Tag Location	Release Location	Adult Detection History	Source	
			Wild	Hatchery
Priest Rapids Dam (tagged as adult)	Priest Rapids Dam	Priest Rapids → McNary → McDonald	1	
Irrigon Hatchery	Wallowa River	Bonneville → McNary → McDonald		1
Tucannon River Hatchery	Tucannon River	Bonneville → McDonald		1
Tucannon River Hatchery	Tucannon River	Bonneville → McNary → McDonald		1
Lower Granite Dam	Lower Granite Dam	Bonneville → McDonald		1
Chamberlain Creek (M.F. Salmon R.)	Chamberlain Creek	Bonneville → McNary → McDonald	1	
Lower Ganite Dam	Barged from Lower Granite Dam and released below Bonneville Dam	Bonneville → Sherars → McDonald	1	2
		Bonneville → Sherars → McNary → McDonald		1
		Bonneville → McDonald	1	4
		Bonneville → McNary → McDonald	9	17
		Bonneville → McNary → Ice Harbor → McDonald	1	2
		Bonneville → McNary → Ice Harbor → Prosser → McDonald		1
		Bonneville → McNary → Walla Walla River → McDonald	1	
		Bonneville → McNary → Priest Rapids → McDonald	1	
		Bonneville → McNary → McDonald → Warm Springs River	1	
		Bonneville → McDonald → McNary → Ice Harbor → Lower Granite	1	
		Bonneville → McNary → McDonald r → McNary		1
		Bonneville → McDonald → McNary → Ice Harbor →Lower Granite		2
		Totals	**18**	**34**
		Total barged from Lower Granite Dam to below Bonneville Dam	**16**	**30**

DISCUSSION

The abundance estimate for emigrating juvenile Chinook past our Middle Fork trap was the lowest we have reported for the past eight years. Drought and extreme water temperatures during the summer of 2007 caused significant pre-spawning mortality of adult spring Chinook in the Middle Fork and may have resulted in the loss off parr rearing in the Mainstem and Middle Fork (Ruzycki et al 2008). We also estimated a low smolt/redd from the 2006 brood in the Upper Mainstem where we observed a 50% drop from the 2005 brood year. Our estimate of emigrating steelhead smolts may be distorted because high discharge prevented us from operating the trap during the usual peak of steelhead movement

Analysis of scales from spring Chinook captured at the Mainstem Trap, in the South Fork and in the upper Mainstem near Prairie City between May and July confirms that some spring Chinook parr are capable of growing to between 75 and 100 mm FL by mid May and June. Many of these fish are migrating into the South Fork watershed. The presence of large parr mistakenly recorded as smolts during the trapping period could reduce SAR estimates when parr are PIT tagged and assigned to the wrong smolt migration year.

Our estimated spring Chinook SAR for the 2003 brood year (1.36%) was the lowest we have reported for the John Day basin suggesting a large influence from out-of-basin factors either in the migration corridor or the ocean environment. Our summer steelhead SAR from the 2006 migratory year (2.63%) was within the range of previously reported SAR estimates. The preliminary 2007 SAR of 4.44% is already higher than any steelhead SAR we have reported indicating improving ocean conditions (Table 15).

The success of steelhead recovery efforts in the John Day basin may be compromised by both high stray rates and high stray rates of native fish to non-natal habitat. Combined, the John Day River McDonald Ford and South Fork John Day River array's detected only half of the 114 PIT tagged John Day summer steelhead that returned during 2007 (PTAGIS, Ian Tattam, personal communication). Adult PIT tag observations also showed that at least 50% of John Day summer steelhead over winter outside of the John Day basin in the Columbia River between Bonneville Dam (rkm 235) and Rock Island Dam (rkm 669), the Deschutes River, Tucannon River, and the Snake River from it's mouth to Lower Granite Dam. Over wintering behavior outside of the John Day basin subjects John Day steelhead to increased passage and fishing mortality in the Columbia and Snake Rivers. Steelhead barged as juveniles from Lower Granite Dam to below Bonneville Dam composed 88% (30 of 34) of hatchery strays and 89% (16 of 18) of wild stray adult steelhead detected at the John Day River McDonald Ford array between September 2007 and April 2008.

CONCLUSIONS

Our tagging efforts from trap and seine operations provide the only measure of freshwater production of Chinook and steelhead in the John Day River. This tagging also enables us to estimate SAR and out-of-basin survival for the John Day populations. These abundance and survival estimates should continue to detect fish production responses to new and maturing habitat restoration projects implemented in the John Day basin. Real-time data from long term monitoring activities will guide restoration and adaptive management in the region, and aid in evaluating the success of alternative management practices. Continued monitoring of straying by steelhead and Chinook will aid evaluations of Mainstem Columbia River operations.

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APPENDIX

Appendix Table A-1. Geographic location, % of overall smolt captures, number of seines pulled at each site, and catch-per-unit effort (CPUE: #smolts/seine haul) at sites sampled during our 2008 seining effort on the Mainstem John Day River between Kimberly and Spray, OR.

Site Name	Latitude and Longitude (DMS)	Percent of total catch Chinook	Percent of total catch Steelhead	Number of Seines	CPUE Chinook	CPUE Steelhead
Backwater Hole	N 44° 48' 20.73" W 119° 43' 42.79"	141	0	30	5	0
Balogna	N 44° 46' 41.1" W 119° 40' 46.3"	295	0	19	16	0
Bass Hole	N 44° 49' 07.4" W 119° 45' 21.3"	25	0	16	2	0
Bullhead Hole	N 44° 49' 24.3" W 119° 44' 12.9"	505	3	46	11	<1
Bull Trout Hole	N 44˚ 50' 19.3" W 119˚ 48' 10.2"	102	22	28	4	<1
Car Hole	N 44˚ 50' 20.97" W 119˚ 48' 7.2"	56	0	7	8	0
Dam Hole	N 44° 48' 21.7" W 119° 43' 57.7"	462	0	53	9	0
Deadfish	N 44° 48' 26.9" W 119° 43' 28.4"	106	2	25	4	<1
Juniper Hole	N 44° 47' 42.67" W 119° 42' 19.16"	277	1	27	10	<1
Log Hole	N 44° 49' 11.6" W 119° 46' 58.4"	174	14	45	4	<1
Lower House Boat	N 44° 48' 57.12" W 119° 47' 19.40"	114	0	22	5	0
Slippery Shelf	N 44° 46' 9.03" W 119° 40' 16.62"	312	0	27	12	0
Spider Hole	N 44° 48' 18.74" W 119° 43' 42.10"	413	2	52	8	<1
Spray Boat Ramp	N 44° 49' 34.9" W 119° 47' 34.9"	362	37	63	6	<1
Ten Dollar Hole	N 44˚ 47' 45.7" W 119˚ 41' 37.6"	75	0	6	13	0
Other Sites	---	31	1	72	<1	<1

Appendix Table B-1. Trap site, migration year, trapping period, summer steelhead abundance and 95% confidence intervals, 2004–2008.

Trap site	Migration Year	Period	Abundance	95% CI
South Fork (rkm 10)	2004	10/10/03–6/18/04	12,506	10,640–14,700
	2005	9/2/04–6/17/05	25,364	21,952–27,919
	2006	10/8/05–6/23/06	13,185	9,778–16,942
	2007	10/12/06–6/15/07	10,590	9,276–12,311
	2008	10/4/07–6/20/08	11,732	10,906–12,577
Mainstem (rkm 326)	2004	10/23/03–6/24/04	22,539	15,659–32,914
	2005	10/4/04–7/6/05	47,921	35,025–67,366
	2006	2/10–6/26/06	58,490	22,089–90,428
Mainstem (rkm 352)	2007	10/12/06–6/22/07	23,264	18,450–29,507
	2008	10/10/07–6/20/08	12,861	10,328–15,787
Middle Fork (rkm 24)	2004	3/2–6/23/04	12,365	10,015–15,643
	2005	10/6/04–6/17/05	28,980	19,914–43,705
	2006	3/6–6/22/06	20,720	14,401–30,870
	2007	10/31/06–6/14/07	14,784	11,947–18,004
	2008	2/12–6/20/08	2,913	1,710–4,964

Appendix Table C-1. Trap week, trap size, trap position, night release distance to trap, and number of new, marked night, marked day, recaptured night and day, and weekly percent trap efficiency of night and day released Spring Chinook at the Mainstem Trap site, 9 October 2007 to 20 June 2008.

Trap week	Traps size	Trap Position	Night release distance to trap	NEW	Marked		Recaptured		Trap Efficiency	
					Night	Day	Night	Day	Night	Day
10/9–10/13	5'	Upstream of bridge	85 m	0	0	0	0	0	0.00%	0.00%
10/14–10/20	5'	Upstream of bridge	85 m	2	1	1	0	1	0.00%	100.00%
10/21–10/27	5'	Upstream of bridge	85 m	19	5	4	2	0	40.00%	0.00%
10/28–11/3	5'	Upstream of bridge	85 m	206	57	57	9	10	15.79%	17.54%
11/4–11/10	5'	Upstream of bridge	85 m	212	60	60	9	13	15.00%	21.67%
11/11–11/17	5'	Upstream of bridge	85 m	84	30	31	6	6	20.00%	19.35%
11/18–11/24	5'	Upstream of bridge	85 m	190	20	20	2	8	10.00%	40.00%
11/25–12/1	5'	Upstream of bridge	85 m	123	50	47	1	10	2.00%	21.28%
12/2–12/8	5'	Upstream of bridge	85 m	106	39	38	1	7	2.56%	18.42%
12/9–12/15	5'	Upstream of bridge	85 m	66	15	15	2	2	13.33%	13.33%
12/16–12/22	5'	Upstream of bridge	85 m	9	2	3	0	1	0.00%	33.33%
12/23–12/29	5'	Upstream of bridge	85 m	7	0	0	0	0	0.00%	0.00%
12/30–1/5	5'	Upstream of bridge	144 m	10	0	0	0	0	0.00%	0.00%
1/6–1/12	5'	Upstream of bridge	144 m	51	21	24	3	3	14.29%	12.50%
1/13–1/19	5'	Upstream of bridge	144 m	4	2	2	1	0	50.00%	0.00%
1/20–1/26	5'	Upstream of bridge	144 m	0	0	0	0	0		
1/27–2/2	5'	Upstream of bridge	144 m	52	23	21	1	5	4.35%	23.81%
2/3–2/9	5'	Upstream of bridge	144 m	23	9	8	0	1	0.00%	12.50%
2/10–2/16	5'	Upstream of bridge	144 m	49	15	15	0	3	0.00%	20.00%
2/17–2/23	5'	Upstream of bridge	144 m	14	7	7	0	1	0.00%	14.29%
2/24–3/1	8'	Upstream of bridge	144 m	5	0	0	0	0	0.00%	0.00%
3/2–3/8	8'	Upstream of bridge	144 m	356	20	20	1	14	5.00%	70.00%
3/9–3/15	8'	Upstream of bridge	144 m	110	20	20	0	3	0.00%	15.00%
3/16–3/22	8'	Upstream of bridge	144 m	49	16	15	0	6	0.00%	40.00%
3/23–3/29	5 & 8'	Downstream of bridge	210 m	190	53	53	6	11	11.32%	20.75%
3/30–4/5	5 & 8'	Downstream of bridge	210 m	195	55	56	9	7	16.36%	12.50%
4/6–4/12	5 & 8'	Downstream of bridge	210 m	191	68	67	14	11	20.59%	16.42%
4/13–4/19	5 & 8'	Downstream of bridge	210 m	325	50	50	6	6	12.00%	12.00%
4/20–4/26	5 & 8'	Downstream of bridge	210 m	235	47	95	6	15	12.77%	15.79%
4/27–5/3	5 & 8'	Downstream of bridge	210 m	136	38	37	0	3	0.00%	8.11%
5/4–5/10	5 & 8'	Downstream of bridge	210 m	33	13	12	0	0	0.00%	0.00%
5/11–5/17	5 & 8'	Downstream of bridge	210 m	116	56	53	9	6	16.07%	11.32%
5/18–5/24	8'	Downstream of bridge	210 m	0	0	0	0	0	0.00%	0.00%
5/25–5/31	8'	Downstream of bridge	210 m	18	9	8	0	0	0.00%	0.00%
6/1–6/7	8'	Downstream of bridge	210 m	2	1	1	0	0	0.00%	0.00%
6/8–6/14	5 & 8'	Downstream of bridge	210 m	31	14	13	1	1	7.14%	7.69%
6/15–6/20	5 & 8'	Downstream of bridge	210 m	34	13	11	2	1	15.38%	9.09%
Total				**3,253**	**829**	**864**	**91**	**155**	**10.90%**	**17.94%**

Appendix Table C-2. Trap week, trap operated, trap position, night release distance to trap, and number of new, marked night, marked day, recaptured night and day, and weekly percent trap efficiency of night and day released summer steelhead at the Mainstem Trap site, 9 October 2007 to 20 June 2008.

Trap week	Traps size	Trap Position	Night release distance to trap	NEW	Marked		Recaptured		Trap Efficiency	
					Night	Day	Night	Day	Night	Day
10/9–10/13	5'	Upstream of bridge	85 m	1	1	0	0	0	0.00%	
10/14–10/20	5'	Upstream of bridge	85 m	5	1	1	0	0	0.00%	0.00%
10/21–10/27	5'	Upstream of bridge	85 m	34	13	14	2	4	15.38%	28.57%
10/28–11/3	5'	Upstream of bridge	85 m	39	16	14	1	3	6.25%	21.43%
11/4–11/10	5'	Upstream of bridge	85 m	21	8	9	1	0	12.50%	0.00%
11/11–11/17	5'	Upstream of bridge	85 m	15	2	4	0	0	0.00%	0.00%
11/18–11/24	5'	Upstream of bridge	85 m	36	6	7	1	4	16.67%	57.14%
11/25–12/1	5'	Upstream of bridge	85 m	18	6	6	0	0	0.00%	0.00%
12/2–12/8	5'	Upstream of bridge	85 m	12	5	5	1	0	20.00%	0.00%
12/9–12/15	5'	Upstream of bridge	85 m	7	3	3	0	0	0.00%	0.00%
12/16–12/22	5'	Upstream of bridge	85 m	2	1	0	0	0	0.00%	
12/23–12/29	5'	Upstream of bridge	85 m	0	0	0	0	0		
12/30–1/5	5'	Upstream of bridge	144 m	0	0	0	0	0		
1/6–1/12	5'	Upstream of bridge	144 m	4	2	2	0	0	0.00%	0.00%
1/13–1/19	5'	Upstream of bridge	144 m	0	0	0	0	0		
1/20–1/26	5'	Upstream of bridge	144 m	0	0	0	0	0		
1/27–2/2	5'	Upstream of bridge	144 m	15	4	4	0	1	0.00%	25.00%
2/3–2/9	5'	Upstream of bridge	144 m	3	0	0	0	0		
2/10–2/16	5'	Upstream of bridge	144 m	6	2	3	1	1	50.00%	33.33%
2/17–2/23	5'	Upstream of bridge	144 m	0	0	0	0	0		
2/24–3/1	8'	Upstream of bridge	144 m	2	0	0	0	0		
3/2–3/8	8'	Upstream of bridge	144 m	78	16	16	6	6	37.50%	37.50%
3/9–3/15	8'	Upstream of bridge	144 m	20	7	6	0	1	0.00%	16.67%
3/16–3/22	8'	Upstream of bridge	144 m	10	5	4	0	0	0.00%	0.00%
3/23–3/29	5 & 8'	Downstream of bridge	210 m	7	2	3	0	0	0.00%	0.00%
3/30–4/5	5 & 8'	Downstream of bridge	210 m	8	3	3	0	0	0.00%	0.00%
4/6–4/12	5 & 8'	Downstream of bridge	210 m	5	2	1	0	0	0.00%	0.00%
4/13–4/19	5 & 8'	Downstream of bridge	210 m	129	50	50	5	4	10.00%	8.00%
4/20–4/26	5 & 8'	Downstream of bridge	210 m	129	31	71	6	4	19.35%	5.63%
4/27–5/3	5 & 8'	Downstream of bridge	210 m	187	32	34	3	2	9.38%	5.88%
5/4–5/10	5 & 8'	Downstream of bridge	210 m	138	44	44	0	0	0.00%	0.00%
5/11–5/17	5 & 8'	Downstream of bridge	210 m	235	104	103	21	9	20.19%	8.74%
5/18–5/24	8'	Downstream of bridge	210 m	2	0	0	0	0		
5/25–5/31	8'	Downstream of bridge	210 m	59	28	27	0	0	0.00%	0.00%
6/1–6/7	8'	Downstream of bridge	210 m	7	0	3	0	0		0.00%
6/8–6/14	5 & 8'	Downstream of bridge	210 m	35	14	12	3	0	21.43%	0.00%
6/15–6/20	5 & 8'	Downstream of bridge	210 m	8	4	3	0	0	0.00%	0.00%
Total				**1,277**	**412**	**452**	**51**	**39**	**12.4%**	**8.6%**

Appendix Table C-3. Trap week, traps operated, and number of new, marked night, marked day, recaptured night and day, and weekly percent trap efficiency of night and day released Spring Chinook at the South Fork Trap site, 3 October 2007–20 June 2008.

Trap week	Trap Size	New	Marked Night	Marked Day	Recaptured Night	Recaptured Day	Percent Trap Efficiency Night	Percent Trap Efficiency Day
10/3–10/6	5'	0	0	0	0	0		
10/7–10/13	5'	2	1	0	1	0	100.00%	
10/14–10/20	5'	3	1	1	0	0	0.00%	0.00%
10/21–10/27	5'	1	1	0	0	0	0.00%	
10/28–11/3	5'	1	0	0	0	0		
11/4–11/10	5'	1	0	0	0	0		
11/11–11/17	5'	0	0	0	0	0		
11/18–11/24	5'	5	0	0	0	0		
11/25–12/1	5'	5	3	1	3	2[a]	100.00%	200.00%
12/2–12/8	5'	9	4	4	4	1	100.00%	25.00%
12/9–12/15	5'	4	1	2	1	1	100.00%	50.00%
12/16–12/22	5'	0	0	0	0	0		
12/23–12/29	5'	1	0	0	0	1[a]		
12/30–1/5	5'	4	2	2	1	1	50.00%	50.00%
1/6–1/12	5'	0	0	0	0	0		
1/13–1/19	5'	3	1	1	1	0	100.00%	0.00%
1/20–1/26	5'	0	0	0	0	0		
1/27–2/2	5'	4	2	2	1	0	50.00%	0.00%
2/3–2/9	5'	2	0	0	0	0		
2/10–2/16	5'	8	4	3	2	0	50.00%	0.00%
2/17–2/23	8'	16	6	5	4	4	66.67%	80.00%
2/24–3/1	8'	31	6	8	2	4	33.33%	50.00%
3/2–3/8	8'	73	24	24	12	9	50.00%	37.50%
3/9–3/15	8'	22	0	0	0	1[a]		
3/16–3/22	8'	13	5	4	0	0	0.00%	0.00%
3/23–3/29	8'	33	12	10	4	4	33.33%	40.00%
3/30–4/5	8'	37	13	11	6	7	46.15%	63.60%
4/6–4/12	8'	30	7	7	5	5	71.43%	71.43%
4/13–4/19	8'	12	5	5	3	2	60.00%	40.00%
4/20–4/26	8'	12	5	5	2	2	40.00%	40.00%
4/27–5/3	8'	17	8	7	4	5	50.00%	71.43%
5/4–5/10	8'	6	3	3	1	1	33.33%	33.33%
5/11–5/17	5 & 8'	8	3	4	2	2	66.67%	50.00%
5/18–5/24	5 & 8'	1	1	0	1	0	100.00%	
5/25–5/31	5 & 8'	0	0	0	0	0		
6/1–6/7	5 & 8'	0	0	0	0	0		
6/8–6/14	8'	0	0	0	0	0		
6/15–6/20	8'	0	0	0	0	0		
Entire Period		**364**	**118**	**109**	**60**	**52**	**50.8%**	**47.8%**

[a] migrants marked during a previous week were recaptured.

Appendix Table C-4. Trap week, traps operated, and number of new, marked night, marked day, recaptured night and day, and weekly percent trap efficiency of night and day released summer steelhead at the South Fork Trap site, 3 October 2007 to 20 June 2008.

	Trap		Marked		Recaptured		Percent Trap Efficiency	
Trap week	Size	New	Night	Day	Night	Day	Night	Day
10/3–10/6	5'	8	4	4	0	0	0.00%	0.00%
10/7–10/13	5'	47	17	15	0	1	0.00%	6.67%
10/14–10/20	5'	123	40	40	15	11	37.50%	27.50%
10/21–10/27	5'	56	26	25	5	4	19.23%	16.00%
10/28–11/3	5'	8	4	4	0	0	0.00%	0.00%
11/4–11/10	5'	25	9	11	1	5	11.11%	45.45%
11/11–11/17	5'	25	7	7	1	1	14.29%	14.29%
11/18–11/24	5'	43	2	2	0	0	0.00%	0.00%
11/25–12/1	5'	44	18	16	9	6	50.00%	37.50%
12/2–12/8	5'	124	50	49	25	13	50.00%	26.53%
12/9–12/15	5'	28	14	12	7	6	50.00%	50.00%
12/16–12/22	5'	9	3	4	0	2	0.00%	50.00%
12/23–12/29	5'	6	2	1	0	0	0.00%	0.00%
12/30–1/5	5'	10	5	4	4	2	80.00%	50.00%
1/6–1/12	5'	10	2	5	1	2	50.00%	40.00%
1/13–1/19	5'	4	1	2	0	2	0.00%	100.00%
1/20–1/26	5'	0	0	0	0	0		
1/27–2/2	5'	7	2	4	1	2	50.00%	50.00%
2/3–2/9	5'	2	1	1	1	0	100.00%	0.00%
2/10–2/16	5'	5	2	2	2	1	100.00%	50.00%
2/17–2/23	8'	43	8	8	5	5	62.50%	62.50%
2/24–3/1	8'	66	18	18	10	10	55.56%	55.56%
3/2–3/8	8'	137	50	50	23	13	46.00%	26.00%
3/9–3/15	8'	38	0	0	0	0		
3/16–3/22	8'	9	4	4	0	0	0.00%	0.00%
3/23–3/29	8'	48	15	15	4	2	26.67%	7.50%
3/30–4/5	8'	60	19	21	12	4	63.16%	19.05%
4/6–4/12	8'	38	14	14	7	2	50.00%	14.29%
4/13–4/19	8'	112	46	45	18	6	39.13%	13.33%
4/20–4/26	8'	229	69	70	31	22	44.93%	31.43%
4/27–5/3	8'	281	63	63	20	14	31.75%	22.22%
5/4–5/10	8'	297	95	119	19	16	20.00%	13.45%
5/11–5/17	5 & 8'	356	138	140	49	23	35.51%	16.43%
5/18–5/24	5 & 8'	808	144	141	59	44	40.97%	31.21%
5/25–5/31	5 & 8'	447	81	80	32	36	39.51%	45.00%
6/1–6/7	5 & 8'	71	29	28	13	8	44.83%	28.57%
6/8–6/14	8'	48	20	25	8	8	40.00%	32.00%
6/15–6/20	8'	5	2	3	0	0	0.00%	0.00%
Entire Period		**3,677**	**1,024**	**1,052**	**382**	**271**	**37.3%**	**25.8%**

Appendix Table C-5. Trap week and number of new, marked night and day, recaptured night and day, and weekly percent trap efficiency of night and day released spring Chinook at the Middle Fork Trap site, 12 February to 20 June 2008.

		Marked		Recaptured		Percent trap efficiency	
Trap week	**New**	**Night**	**Day**	**Night**	**Day**	**Night**	**Day**
2/10–2/16	4	0	4	0	1	0.00%	25.00%
2/17–2/23	0	0	0	0	0		
2/24–3/1	4	1	1	1	1	100.00%	100.00%
3/2–3/8	40	6	6	1	2	16.67%	33.33%
3/9–3/15	30	10	9	2	3	20.00%	33.33%
3/16–3/22	5	2	3	1	1	50.00%	33.33%
3/23–3/29	89	28	28	7	9	25.00%	32.14%
3/30–4/5	115	43	42	12	19	27.91%	45.24%
4/6–4/12	94	38	38	4	12	10.53%	31.58%
4/13–4/19	88	42	41	4	4	9.52%	9.76%
4/20–4/26	68	29	29	4	2	13.79%	6.90%
4/27–5/3	8	4	3	0	1	0.00%	33.33%
5/4–5/10	3	1	2	0	0	0.00%	0.00%
5/11–5/17	33	18	15	2	1	11.11%	6.67%
5/18–5/24	5	0	0	0	0		
5/25–5/31	14	0	14	0	0		0.00%
6/1–6/7	3	0	1	0	0		0.00%
6/8–6/14	9	1	8	0	2	0.00%	25.00%
6/15–6/20	3	2	1	0	0	0.00%	0.00%
Totals	**615**	**225**	**245**	**38**	**58**	**16.89%**	**23.67%**

Appendix Table C-6. Trap week and number of new, marked and day, recaptured night and day, and weekly percent trap efficiency of night and day released summer steelhead at the Middle Fork Trap site, 12 February to 20 June 2008.

		Marked		Recaptured		Percent trap efficiency	
Trap week	**New**	**Night**	**Day**	**Night**	**Day**	**Night**	**Day**
2/10–2/16	0	0	0	0	0		
2/17–2/23	0	0	0	0	0		
2/24–3/1	1	0	0	0	0		
3/2–3/8	1	1	0	0	0	0.00%	
3/9–3/15	0	0	0	1	0		
3/16–3/22	1	1	0	0	0	0.00%	
3/23–3/29	1	0	0	0	0		
3/30–4/5	2	0	1	0	0		0.00%
4/6–4/12	1	0	1	0	0		0.00%
4/13–4/19	39	18	18	2	1	11.11%	5.56%
4/20–4/26	34	14	13	0	3	0.00%	23.08%
4/27–5/3	19	6	6	0	0	0.00%	0.00%
5/4–5/10	10	3	4	0	0	0.00%	0.00%
5/11–5/17	47	23	23	3	0	13.04%	0.00%
5/18–5/24	11	0	2	0	0		0.00%
5/25–5/31	26	0	26	0	0		0.00%
6/1–6/7	7	0	5	0	1		20.00%
6/8–6/14	21	8	9	1	2	12.50%	22.22%
6/15–6/20	9	4	3	0	0	0.00%	0.00%
Totals	**230**	**78**	**111**	**7**	**7**	**8.97%**	**6.31%**

Table D-1. Detection history for 114 summer steelhead previously PIT tagged as juveniles in the John Day River and returning as adults to the Columbia River basin during 2006–07.

	Bonneville Dam						Deschutes River	John Day Dam	John Day River		McNary Dam				Ice Harbor Dam	Priest Rapids Dam	Rock Island Dam
Tag ID	BO1	B02	B03	B04	B04	BCC	Sherar's		McDonald Ford	South Fork	MC1	MC1	MC2	MCJ			
3D9.1BF22ACCB3			6/29/2007	6/29/2007													
3D9.1BF26285AC		7/10/2007		7/11/2007													
3D9.1BF263102D	8/1/2007																
3D9.1BF262D8E2			8/3/2007	8/4/2007													
3D9.1BF262C4F4		8/5/2007		8/5/2007													
3D9.1BF22A456B			8/11/2007	8/11/2007													
3D9.1BF22B67FC		8/11/2007		8/11/2007													
3D9.1BF20EF895	8/16/2007																
3D9.1BF22A37CF	8/18/2007																
3D9.1BF25D09C8	7/9/2007																
3D9.1BF20F0307	7/13/2007																
3D9.1BF26303F3			7/29/2007	7/29/2007													
3D9.1BF200E2A6			8/2/2007	8/2/2007													
3D9.1BF2629CDD	8/4/2007																
3D9.1BF262D825	7/29/2007																
3D9.1BF25868E8			7/4/2007	7/4/2007													
3D9.1BF22A1DE5			7/20/2007	7/20/2007													
3D9.1BF1F75C68			7/23/2007	7/23/2007													
3D9.1BF201DC50			7/24/2007	7/24/2007													
3D9.1BF22A0B0A			7/24/2007	7/24/2007													
3D9.1BF19E834D			8/6/2007	8/6/2007													
3D9.1BF22A3B30	8/9/2007																
3D9.1BF2000750		7/27/2007		7/27/2007													
3D9.1BF1FFF67D			7/31/2007	7/31/2007													
3D9.1BF207D4B6			8/2/2007	8/2/2007													
3D9.1BF2008BCF	8/13/2007																
3D9.1BF207F449			8/14/2007	8/14/2007													
3D9.1BF1F693B6	7/13/2006		9/2/2007	9/2/2007						3/18/2007			10/2/2006				
3D9.1BF20F2FC8		9/7/2007	9/13/2006	9/13/2006	9/7/2007					3/5/2008	10/23/2006						
3D9.1BF25DC62E			7/13/2007	7/13/2007													
3D9.1BF201CE58			7/26/2007	7/26/2007			9/22/2007		9/28/2007								
3D9.1BF1957BBD			8/1/2007	8/1/2007					11/20/2007								

Appendix Table D-1. Continued.

Tag ID	Bonneville Dam						Deschutes River	John Day	John Day River		McNary Dam				Ice Harbor	Priest Rapids	Rock Island
	B01	B02	B03	B04	B04	BCC	Sherar's	Dam	McDonald Ford	South Fork	MC1	MC1	MC2	MCJ	Dam	Dam	Dam
3D9.1BF262D319	8/16/2007					7/2/2008			10/8/2007								
3D9.1BF2590E9D			7/16/2007	7/16/2007					10/6/2007								
3D9.1BF22AE038	8/20/2007								10/9/2007								
3D9.1BF1B084BE			8/9/2007	8/9/2007					10/20/2007								
3D9.1BF1B105B2		8/11/2007	7/24/2005	7/24/2005	8/11/2007				10/9/2007		10/7/2005						
3D9.1BF2584408		7/5/2007		7/6/2007					4/10/2008								
3D9.1BF2000322			7/9/2007	7/9/2007					12/5/2007	4/13/2008							
3D9.1BF25DB163		7/18/2007		7/19/2007					10/7/2007	4/12/2008							
3D9.1BF20011E2	8/2/2007								10/7/2007	4/6/2008							
3D9.1BF25D068E	8/19/2007							5/31/2008	10/3/2007	4/11/2008							
3D9.1BF1FFF98A			7/23/2007	7/23/2007					10/6/2007	4/4/2008							
3D9.1BF2001350			7/27/2007	7/27/2007					12/5/2007	4/26/2008							
3D9.1BF2003DBA		8/2/2007		8/2/2007					10/14/2007	3/19/2008							
3D9.1BF2000D12	8/20/2007								10/7/2007	4/28/2008							
3D9.1BF262C657	7/21/2007										10/20/2007						
3D9.1BF22A51BA		7/22/2007		7/23/2007							9/15/2007		9/5/2007	9/9/2007			
3D9.1BF22A295C	8/7/2007										10/17/2007						
3D9.1BF20EECB0	8/15/2007										8/23/2007						
3D9.1BF201F83E			7/19/2007	7/19/2007							7/25/2007						
3D9.1BF201950E			8/5/2007	8/5/2007									10/24/2007				
3D9.1BF22A63DA	8/16/2007		7/23/2006	7/23/2006		5/14/2007					9/28/2007						
3D9.1BF262B1A3			7/13/2007	7/13/2007							7/20/2007	10/18/2007					
3D9.1BF25DB347			7/13/2007	7/13/2007							7/19/2007						
3D9.1BF1A93586	7/20/2007										7/28/2007						
3D9.1BF2591ED6		8/1/2007		8/1/2007				8/4/2007			8/6/2007		8/7/2007				
3D9.1BF262AE40			8/4/2007	8/4/2007							8/14/2007	8/18/2007					
3D9.1BF26317CF	8/6/2007										8/22/2007						
3D9.1BF1FFF807			8/13/2007	8/13/2007							8/21/2007	9/29/2007	8/20/2007				
3D9.1BF20EEFAB			8/15/2007	8/15/2007									10/10/2007				
3D9.1BF2587813	8/16/2007												8/23/2007				
3D9.1BF200D7B3		7/28/2007		7/28/2007							10/26/2007	11/13/2007					
3D9.1BF1FFFF80				8/6/2007							9/16/2007						
3D9.1BF1FFF8FC	7/26/2007										9/21/2007						

Appendix Table D-1. Continued.

Tag ID	Bonneville Dam B01	B02	B03	B04	B04	BCC	Deschutes River Sherar's	John Day Dam	John Day River McDonald Ford	South Fork	McNary Dam MC1	MC1	MC2	MCJ	Ice Harbor Dam	Priest Rapids Dam	Rock Island Dam
3D9.1BF1FFFBE3	8/6/2007										9/19/2007	10/7/2007		9/26/2007			
3D9.1BF1FFF5F8			8/9/2007	8/9/2007							9/5/2007						
3D9.1BF22A41FA	7/21/2007									4/12/2008	9/13/2007						
3D9.1BF25D97CD	7/24/2007									5/8/2008			7/30/2007				
3D9.1BF22A2043			7/30/2007	7/30/2007						4/17/2008	11/22/2007						
3D9.1BF20005B9			8/1/2007	8/1/2007						2/21/2008	8/9/2007		8/8/2007				
3D9.1BF2630834		8/2/2007		8/3/2007						3/14/2008	9/20/2007						
3D9.1BF20782FD			8/14/2007	8/14/2007						5/5/2008	10/13/2007						
3D9.1BF201D238			8/17/2007	8/17/2007						3/16/2008	9/15/2007	9/23/2007					
3D9.1BF200F1EC			8/20/2007	8/20/2007						4/5/2008	10/26/2007						
3D9.1BF207D36D		8/14/2007		8/14/2007						3/23/2008	9/25/2007						
3D9.1BF207E455			7/22/2007	7/22/2007						4/13/2008	10/7/2007						
3D9.1BF22A25C4	7/24/2007									4/4/2008	8/18/2007						
3D9.1BF19E909E			8/1/2007	8/1/2007						4/13/2008	9/24/2007						
3D9.1BF22A4C56			7/24/2007	7/24/2007		5/5/2008		5/25/2008	12/3/2007		10/24/2007						
3D9.1BF2002891			8/17/2007	8/17/2007					11/8/2007		10/10/2007		9/4/2007				
3D9.1BF2000580				7/27/2007					10/12/2007		8/5/2007	8/8/2007					
3D9.1BF20F09EF	7/22/2007								3/20/2008			3/16/2008	9/16/2007				
3D9.1BF22A349B			10/14/2007	10/14/2007					2/12/2008				10/24/2007				
3D9.1BF2596559			7/18/2007	7/18/2007					3/31/2008		7/25/2007	10/19/2007					
3D9.1BF25868E7	7/20/2007								2/13/2008		7/28/2007	8/2/2007					
3D9.1BF25D3461			7/24/2007	7/24/2007					4/7/2008		9/22/2007						
3D9.1BF263129D			7/24/2007	7/24/2007					2/22/2008		10/16/2007	1/4/2008					
3D9.1BF262A6DC			8/7/2007	8/7/2007					2/13/2008		8/16/2007						
3D9.1BF2007D97			8/20/2007	8/21/2007					2/21/2008		9/22/2007						
3D9.1BF20013B8	7/21/2007								10/23/2007	2/29/2008	7/28/2007						
3D9.1BF1D64B5A			8/24/2007	8/24/2007		4/24/2008			11/5/2007	2/26/2008	9/24/2007						
3D9.1BF20FE95F			7/26/2007	7/26/2007					2/10/2008	4/13/2008	10/23/2007	10/27/2007					
3D9.1BF2005B71	8/1/2007								2/23/2008	5/9/2008			9/6/2007				
3D9.1BF19EAD30	8/2/2007								2/11/2008	3/13/2008	8/18/2007		9/3/2007				
3D9.1BF201098C	8/14/2007								2/22/2008	3/9/2008	8/21/2007						
3D9.1BF1943A21			8/11/2007	8/11/2007					4/13/2008	4/26/2008			9/24/2007				
3D9.1BF19E70E6			8/18/2007	8/18/2007					2/18/2008	3/8/2008	9/18/2007	9/30/2007					

Appendix Table D-1. Continued.

Tag ID	Bonneville Dam detectors B01	B02	B03	B04	B04	BCC	Deschutes River Sherar's	John Day Dam	John Day River McDonad Ford	South Fork	McNary Dam detectors MC1	MC1	MC2	MCJ	Ice Harbor Dam	Priest Rapids Dam	Rock Island Dam
3D9.1BF2000DFA		10/2/2007							4/5/2008	4/17/2008	10/11/2007		10/10/2007				
3D9.1BF2084595		7/7/2007			7/7/2007				3/10/2008	4/7/2008	7/19/2007						
3D9.1BF1989388			7/22/2007	7/22/2007					3/18/2008	3/31/2008	10/24/2007	10/28/2007					
3D9.1BF1FFF7A7			8/1/2007	8/1/2007					2/10/2008	4/11/2008	9/5/2007						
3D9.1BF2000C8C	8/12/2007								2/13/2008	5/19/2008	9/22/2007						
3D9.1BF25D033E			8/12/2007	8/12/2007							9/7/2007				9/23/2007		
3D9.1BF22A171C			7/14/2007	7/14/2007							10/2/2007				10/12/2007		
3D9.1BF2084EE9		8/24/2007		8/25/2007							10/14/2007				10/23/2007		
3D9.1BF1D65EEC			7/9/2007	7/10/2007									7/17/2007		4/9/2008		
3D9.1BF22B526B			7/29/2007	7/29/2007							9/30/2007				3/25/2008		
3D9.1BF2002940			8/2/2007	8/3/2007							9/27/2007	4/12/2008			4/16/2008		
3D9.1BF20141DA			7/26/2007	7/26/2007						4/28/2008	9/26/2007				9/29/2007		
3D9.1BF2005D6E			8/20/2007	8/20/2007						4/19/2008			9/25/2007		11/27/2007		
3D9.1BF2001702			7/30/2007	7/31/2007		5/13/2008				3/25/2008	10/14/2007				10/26/2007		
3D9.1BF22A41CA			7/18/2007	7/19/2007									7/25/2007			8/5/2007	8/16/2007
3D9.1BF19E8ABB	8/2/2007									4/5/2008	9/5/2007		8/9/2007			9/26/2007	10/4/2007