B O N N E V I L L E   P O W E R   A D M I N I S T R A T I O N

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

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Bonneville Power Administration
P.O. Box 3621
Portland, OR 97208

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

Annual Technical Report

December 1, 2004–November 30, 2005

Prepared by:

Wayne H. Wilson, Assistant Project Leader
Terra Lang Schultz, Assistant Project Leader

Oregon Department of Fish and Wildlife
John Day, Oregon

and

James R. Ruzycki, Project Leader
Richard Carmichael, Program Leader

Oregon Department of Fish and Wildlife
La Grande, Oregon

and

Julie Haire, Project Assistant
Jaym'e Schricker, Project Assistant

Oregon Department of Fish and Wildlife
John Day, Oregon

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EXECUTIVE SUMMARY

Objectives

1. Estimate number and distribution of spring Chinook salmon *Oncorhynchus tshawytscha* redds and spawners in the John Day River subbasin.
2. Estimate smolt-to-adult survival rates (SAR) and out-migrant abundance for spring Chinook and summer steelhead *O. mykiss* and life history characteristics of summer steelhead.

Accomplishments and Findings

Spawning ground surveys for spring (stream-type) Chinook salmon were conducted in four main spawning areas (Mainstem, Middle Fork, North Fork, and Granite Creek System) and seven minor spawning areas (South Fork, Camas Creek, Desolation Creek, Trail Creek, Deardorff Creek, Clear Creek, and Big Creek) in the John Day River basin during August and September of 2005. Census surveys included 298.2 river kilometers (88.2 rkm within index, 192.4 rkm additional within census, and 17.6 rkm within random survey areas) of spawning habitat. We observed 902 redds and 701 carcasses including 227 redds in the Mainstem, 178 redds in the Middle Fork, 420 redds in the North Fork, 62 redds in the Granite Creek System, and 15 redds in Desolation Creek. Age composition of carcasses sampled for the entire basin was 1.6% age 3, 91.2% age 4, and 7.1% age 5. The sex ratio was 57.4% female and 42.6% male. Significantly more females than males were observed in the Granite Creek System. During 2005, 82.3% of female carcasses sampled had released all of their eggs. Significantly more pre-spawn mortalities were observed in Granite Creek. Nine (1.3%) of 701 carcasses were of hatchery origin. Of 298 carcasses examined, 4.0% were positive for the presence of lesions. A significantly higher incidence of gill lesions was found in the Granite Creek System when compared to the rest of the basin. Of 114 kidney samples tested, two (1.8%) had clinical BKD levels. Both infected fish were age-4 females in the Middle Fork. All samples tested for IHNV were negative.

To estimate spring Chinook and summer steelhead smolt-to-adult survival (SAR) we PIT tagged 5,138 juvenile Chinook and 4,913 steelhead during the spring of 2005. We estimated that 130,144 (95% CL's 97,133–168,409) Chinook emigrated from the upper John Day subbasin past our seining area in the Mainstem John Day River (river kilometers 274–296) between February 4 and June 16, 2005. We also estimated that 32,601 (95% CL's 29,651 and 36,264) Chinook and 47,921 (95% CL's 35,025 and 67,366) steelhead migrated past our Mainstem rotary screw trap at river kilometer (rkm) 326 between October 4, 2004 and July 6, 2005. We estimated that 20,193 (95% CL's 17,699 and 22,983) Chinook and 28,980 (95% CL's 19,914 and 43,705) steelhead migrated past our Middle Fork trap (rkm 24) between October 6, 2004 and June 17, 2005. Seventy three percent of PIT tagged steelhead migrants were age-2 fish, 13.8% were age-3, 12.7% were age-2, and 0.3% were age 4. Spring Chinook SAR for the 2002 brood year was estimated at 2.5% (100 returns of 4,000 PIT tagged smolts). Preliminary steelhead SAR (excluding 2-ocean fish) for the 2004 tagging year was estimated at 1.61% (60 returns of 3,732 PIT-tagged migrants).

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We would like to acknowledge the assistance and cooperation of many private landowners throughout the John Day River basin who allowed us to survey on their property. The cooperation of private landowners and The Confederated Tribes of the Warm Springs Reservation was essential in meeting our project objectives. Additionally, we would also like to thank Tim Unterwegner and Jeff Neal for providing much needed guidance and advice. We would also like to thank all those who volunteered to assist us with our spawning ground surveys. This project was funded by the U. S. Department of Energy, Bonneville Power Administration, Environment, Fish, and Wildlife. Project Number: 1998-016-00. Contract Number: 20364.

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, however, remain depressed relative to historic levels. Between the completion of the life history and natural escapement study in 1984 and the start of this project in 1998, spring Chinook spawning surveys did not provide adequate information to assess age structure, progeny-to-parent production values, smolt-to-adult survival (SAR), or natural spawning escapement. Further, only very limited information is available for steelhead life history, escapement, and productivity measures in the John Day subbasin. Numerous habitat protection and rehabilitation projects to improve salmonid freshwater production and survival have also been implemented in the basin and are in need of effectiveness monitoring. While our monitoring efforts outlined here will not specifically measure the effectiveness of any particular project, they will provide much needed background information for developing context for project-specific effectiveness monitoring efforts. To meet the data needs as index stocks, to assess the long-term effectiveness of habitat projects, and to differentiate freshwater and ocean survival, sufficient annual estimates of spawner escapement, age structure, SAR, egg-to-smolt survival, smolt-per-redd ratio, and freshwater habitat use are essential. We have begun to meet this need through spawning ground surveys initiated for spring Chinook salmon in 1998 and smolt PIT-tagging efforts initiated in 1999. Additional sampling and analyses to meet these goals include an estimate of smolt abundance and SAR rates, and an updated measure of the freshwater distribution of critical life stages.

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 high level of emphasis the NWPPC Fish and Wildlife Program, Subbasin Summaries, NMFS, and the Oregon Plan for Salmon and Watersheds have placed on monitoring and evaluation to provide the real-time data to guide restoration and adaptive management in the region.

By implementing the proposed program we have been able to address many of the goals for population status monitoring, such as defining areas currently used by spring Chinook for holding and spawning habitats and determining range expansion or contraction of summer rearing and spawning populations. The BiOp describes these goals as defining population growth rates (adult monitoring), detecting changes in those growth rates or relative abundance in a reasonable time (adult/juvenile monitoring), estimating juvenile abundance and survival rates (juvenile/smolt monitoring), and identifying stage-specific survival (adult-to-smolt, smolt-to-adult).

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 (Figure 2), in the Middle Fork John Day River (hereafter called Middle Fork) above Armstrong Creek (Figure 3), and in the North Fork John Day River (hereafter called North Fork: Figure 4) 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), and the North Fork Tributaries Camas Creek, and Trail 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 lower Mainstem tributaries downstream of rkm 298. When juvenile steelhead are referenced in this document, we acknowledge the presence of alternate 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.

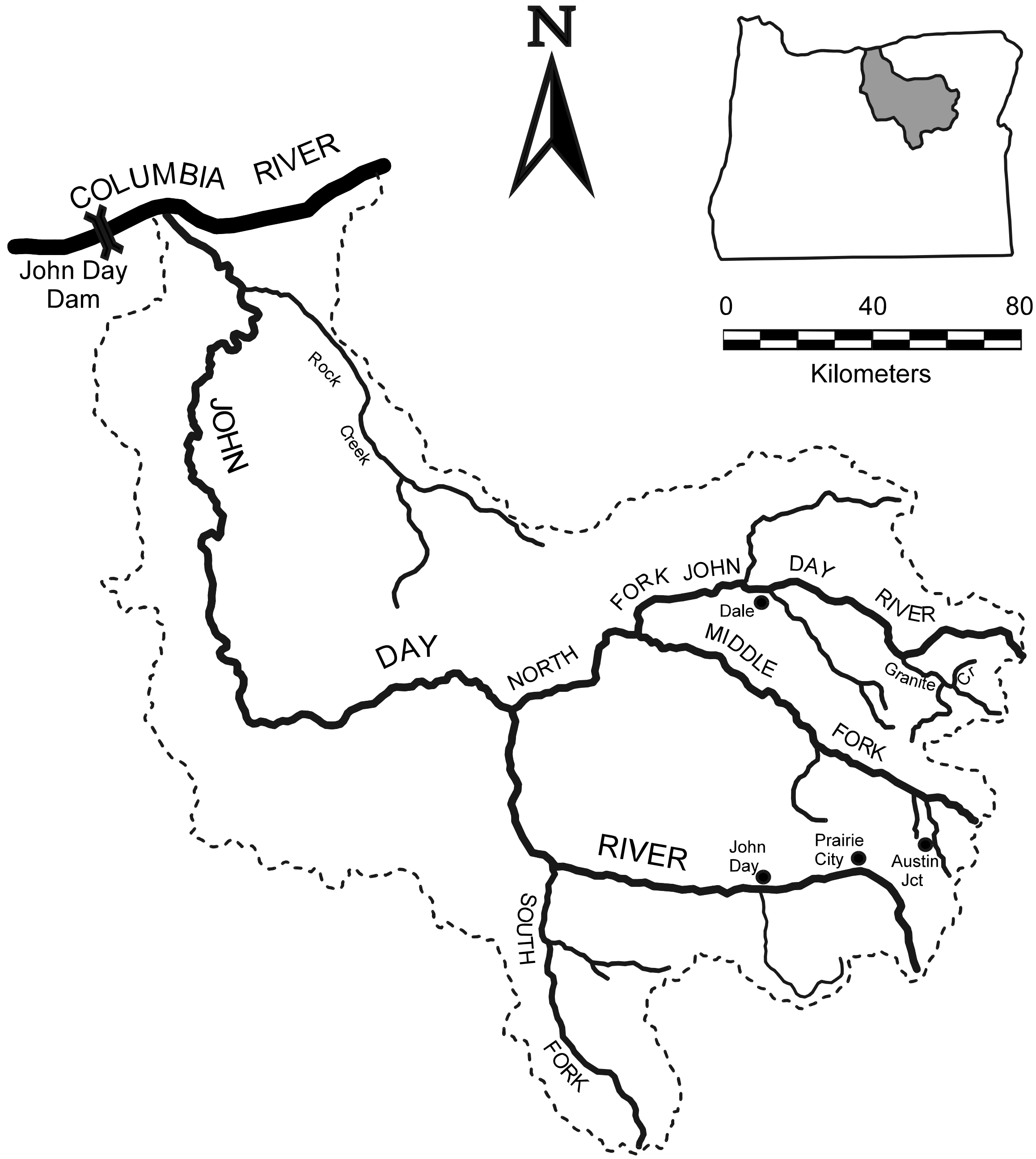

Figure 1. Map of John Day River basin. Dashed line denotes watershed boundary. Arrows indicate approximate locations of rotary screw traps.

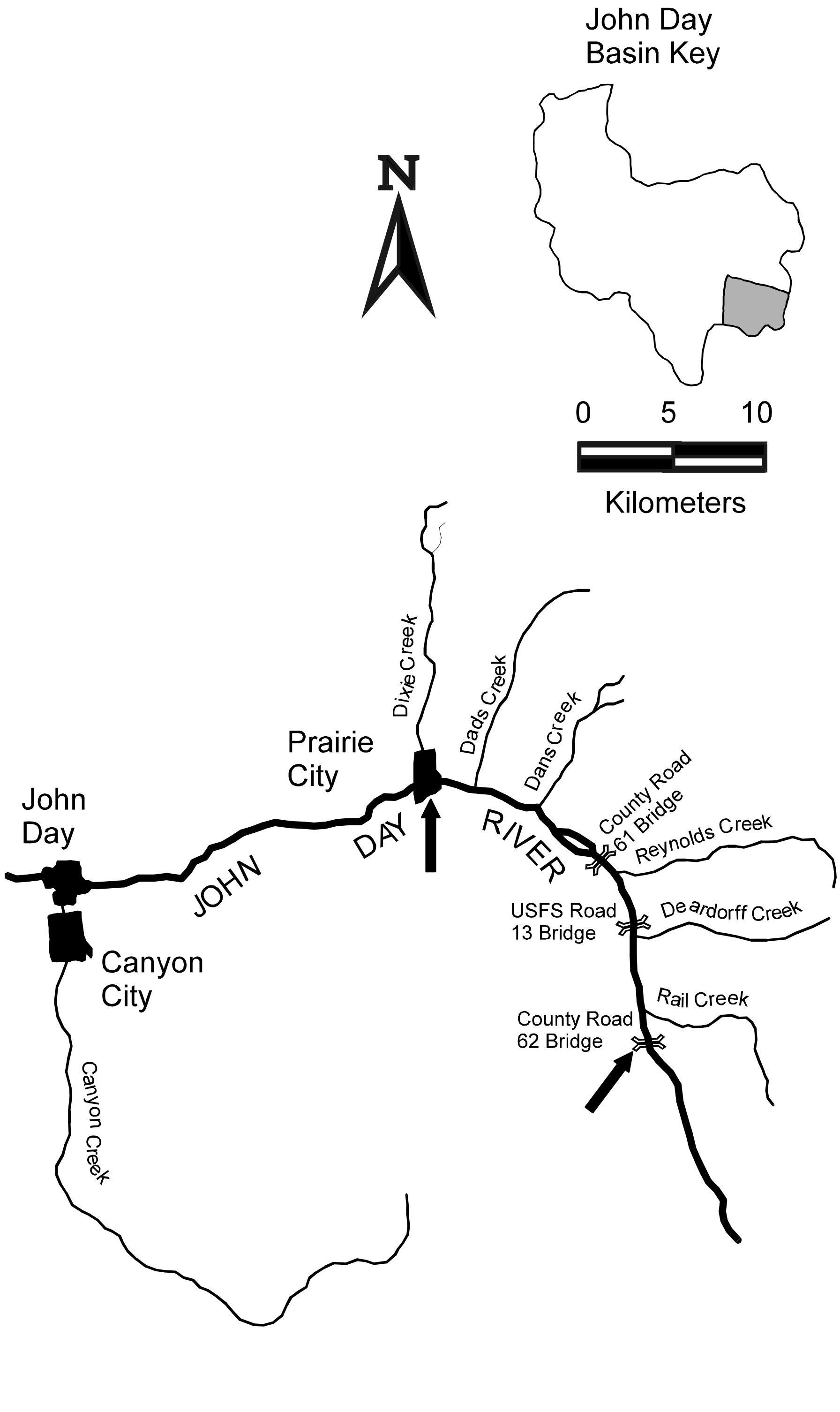

Figure 2. Map of the upper mainstem John Day River. Arrows indicate upstream and downstream limits of census spawning ground surveys.

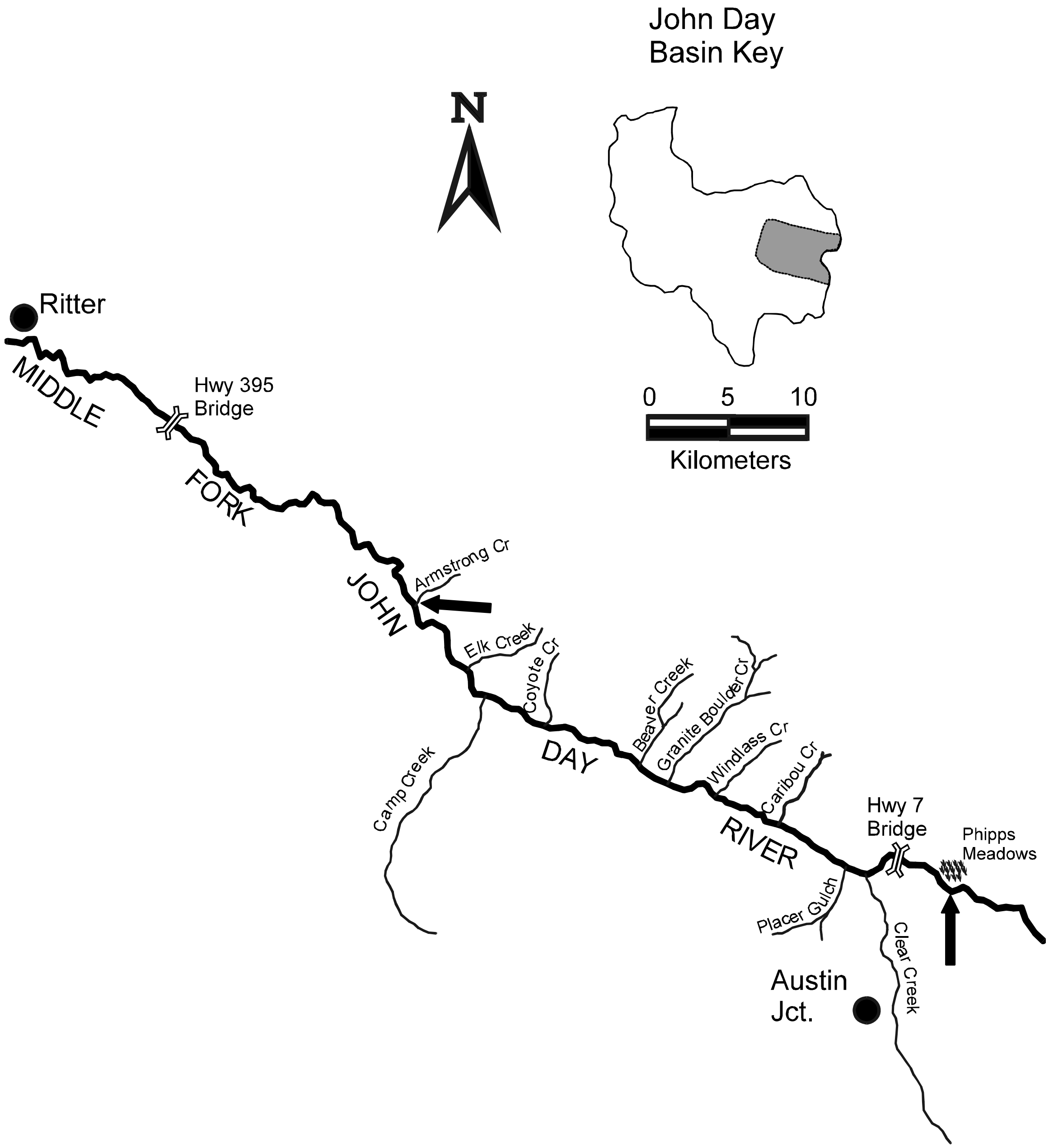

Figure 3. Map of the Middle Fork John Day River. Arrows indicate upstream and downstream limits of census spawning ground surveys.

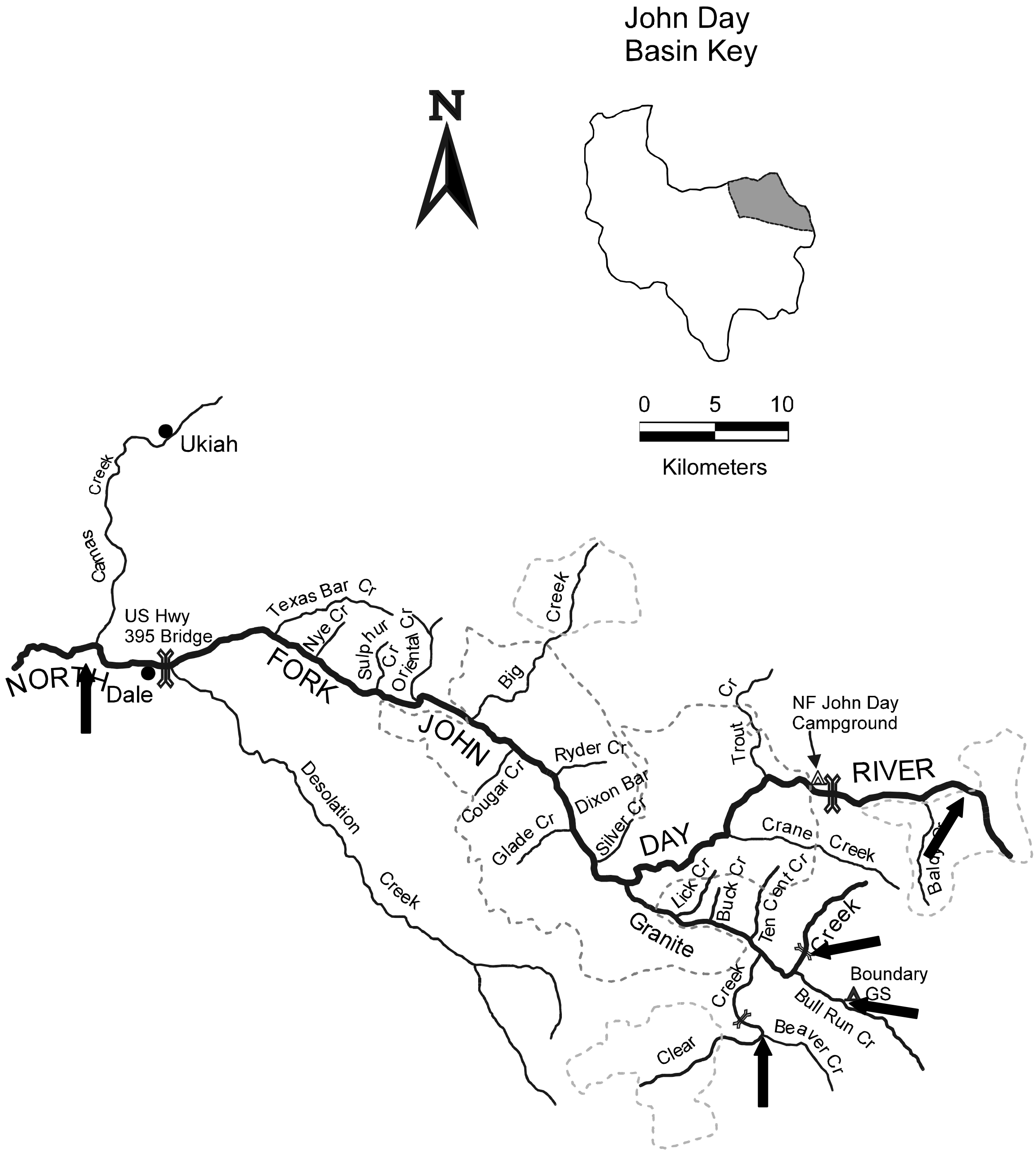

Figure 4. Map of the North Fork John Day River. Survey areas begin at the confluence with Desolation Creek and extend upstream to the confluence with Baldy Creek. Granite creek survey areas extend from the mouth to approximately two kilometers above the confluence with Bull Run Creek, Clear Creek to the confluence with Beaver Creek, and Bull Run Creek upstream to the USFS Boundary guard station. Arrows show limits of census survey area. Not all reaches of stream between arrows were surveyed. Dashed lines denote boundaries of North Fork John Day wilderness.

METHODS

Spring Chinook Spawning Surveys

Spring Chinook salmon spawning surveys including historic index, census, and random survey sections were conducted during the months of August and September to encompass the spatial and temporal distribution of Chinook spawning in the John Day River basin (Table 1). Index sections were surveyed to provide relative abundance comparisons with historic redd count data collected since 1959. Census survey sections are areas where redds have been previously documented, including the index area. Random surveys are conducted outside of the known spawning area to account for range expansion. Collectively, these surveys provide an annual census of spawning spring Chinook salmon and their redds.

Index surveys were scheduled to take place near the peak of spawning in each of the four primary spawning areas (Mainstem, Middle Fork, North Fork, and Granite Creek System). Pre-index surveys, one week prior to the index survey, were conducted in the North Fork. Post-index surveys, one week after the index surveys, were conducted in all index sections (with the exception of the Middle Fork) to account for temporal variation in spawning. A post-index survey was not conducted in the Middle Fork because spawning activity was observed to be completed by the time of the index survey. Additional surveys within the index survey reaches were conducted in the Granite Creek System (GCS) because fish spawned later than usual. Final surveys in the GCS took place on 27 September to ensure spawning completion and to gather as much carcass data as possible. New redds and carcass data were then added to data from the index surveys.

Census surveys were conducted the same day as the index and post-index surveys in all four main spawning areas as well as in the South Fork and various tributaries of the North Fork to ensure that all spawning habitat was observed. If many live fish were observed during the initial surveys, we would return one week later to re-survey and make certain that all spawning was complete. Census surveys were conducted twice in all four primary spawning areas. A pre-census survey was conducted during early August in the upper North Fork (between Trail Crossing and Trout Creek) due to early spawning activity.

Random survey sections, approximately 2 km in length, were drawn from a sampling universe defined as 20 km downstream of our current survey sections or 20 km downstream of the most downstream redd observed in each HUC (4th level HUC; North Fork, Middle Fork, Upper Mainstem), and 4 km upstream of our current survey sections or the most upstream redd observed since 1959. If redds are observed in a random site, that survey section is added to the census survey the following year. Redds were observed in Big Creek (North Fork subbasin) and Deardorff Creek (Mainstem subbasin) in 2004, therefore these sections became census reaches in 2005. Random surveys were conducted when time and personnel allowed.

Spawning surveys were conducted by walking in an upstream direction on the Mainstem, Middle Fork, South Fork, Big Creek, Trail Creek, and Clear Creek and in a downstream direction on the North Fork, Camas Creek, Desolation Creek, Granite Creek, and Bull Run Creek. Where we were denied access to one side of the river on the Mainstem, the crew only walked on the permissible side. Survey sections ranged in length

Table 1. Description, length, date of index, census, and random spawning survey sections in the John Day Basin for 2005. Sections are listed in upstream order for Mainstem and Middle Fork subbasins, and downstream order for South Fork and North Fork subbasins.

Stream	Survey type	Survey Boundaries	Distance Km	Distance Mile	Survey Dates
Mainstem	Random	0.2 km below Deep Gulch to 0.2 km below Fisk Cr.	2.1	1.3	Sep 22
	Census	Indian Creek to PWP Lower Boundary	7.1	4.4	Access Denied
	Census	PWP Lower Boundary to Dad's Creek	4.9	3.1	Sep 6, 14
	Index	Dad's Creek to Smith Upper Fence	3.4	2.1	Access Denied
	Index	Smith Upper Fence to Jacobs Upper Fence[a]	8.8	5.5	Sep 6, 14
	Index	Jacobs Upper Fence to Road 13 Bridge	1.9	1.2	Access Denied
	Census	Mouth of Deardorff Creek to 2.3 km upstream	2.3	1.4	Sep 6
	Index	Road 13 Bridge to Lower Klondike Fence	2.3	1.4	Sep 6, 14
	Index	Lower Klondike Fence to Ricco Upper Fence	4.5	2.8	Access Denied
	Census	Ricco Upper Fence to Call Creek	3.2	2.0	Sep 6
	Random	Call Creek to 2.3 km upstream	2.3	1.4	Sep 22
South Fork	Census	Izee Falls to Cougar Gulch	5.2	3.2	Sep 29
	Census	Cougar Gulch to Rock Pile Ranch Bridge	4.5	2.8	Sep 29
	Census	Rock Pile Ranch Bridge to Murderer's Creek	5.5	3.4	Sep 29
	Random	0.9 km upstream to 1.3 km downstream of Black Canyon Creek	2.1	1.3	Sep 29
Middle Fork	Random	1.6 km downstream to 0.6 km upstream of Slide Cr.	2.1	1.3	Sep 28
	Random	0.4 km downstream to 1.9 km upstream of Big Creek	2.3	1.4	Sep 28
	Census	Armstrong Creek to Beaver Creek	23.5	14.6	Sep 21
	Index	Beaver Creek to Highway 7 Culvert	21.4	13.3	Sep 20
	Census	Highway 7 Culvert to Phipps Meadow	7.1	4.4	Sep 20, 30
Clear Creek[b]	Census	Mouth to Highway 26 Bridge	2.1	1.3	Sep 20
	Census	Highway 26 Bridge to 1.6 km upstream	1.6	1.0	Sep 20
North Fork	Census	North Fork Trail Crossing to Cunningham Creek	3.5	2.2	Aug 10, Sep 13
	Census	Cunningham Creek to Trout Creek	18.2	11.3	Aug 10, 23, Sep 13
	Census	Trout Creek to Granite Creek	20.4	12.7	Sep 13, 14
	Index	Granite Creek to Cougar Creek	13.4	8.3	Sep 7, 8, 15, 16, 21, 22
	Census	Cougar Creek to Big Creek	3.9	2.4	Sep 16
	Index	Big Creek to Nye Creek	15.1	9.4	Sep 9, 16, 23
	Census	Nye Creek to Camas Creek	16.6	10.3	Sep 16, 23
	Random	2.1 km downstream of Sulphur Gulch to 1.0 km downstream of Hunter Creek	2.3	1.4	Sep 26
Big Creek	Census	Mouth to Winom Creek	2.6	1.6	Sep 9
Trail Creek	Census	Mouth to confluence of North and South Forks	3.1	1.9	Aug 23, Sep 13
	Random	2.2 km on North Fork upstream from confluence with South Fork to South Fork	2.1	1.3	Sep 13
Granite Creek	Index	73 Road Culvert to Buck Creek	9.5	5.9	Sep 8, 15
	Census	Buck Creek to mouth	7.9	4.9	Sep 15
Clear Creek[c]	Census	Ruby Creek Trailhead to Alamo Road	1.8	1.1	Sep 8
	Census	Alamo Road to Smith Lower Boundary	1.3	0.8	Access Denied
	Census	Smith Lower Boundary to Beaver Creek	1.4	0.9	Sep 8
	Census	Beaver Creek to Old Road Crossing	1.6	1.0	Sep 8
	Index	Old Road Crossing to Mouth	4.8	3.0	Sep 8, 15
Bull Run	Census	Deep Creek to Guard Station	2.4	1.5	Sep 8
Creek	Index	Guard Station to Mouth	5.0	3.1	Sep 8, 15
Camas Creek	Census	0.4 km upstream to 0.4 km downstream of Fivemile Creek	0.8	0.5	Sep 26
	Random	2.3 km upstream of Mouth to Mouth	2.3	1.4	Sep 26
Desolation Creek	Census	Impassable waterfall on south fork to Mouth	37.7	23.4	Sep 12, 19

[a] Includes mileage of North Channel, 0.8 km surveyed section in South Channel, and 2.1 km denied section in South Channel. Only reaches or river banks where permission was granted were surveyed.

[b] Tributary of the Middle Fork.

[c] Tributary of Granite Creek in the North Fork subbasin.

from 0.2 to 9.7 rkm depending on accessibility and difficulty. Start and stop GPS coordinates were located on topographical maps using Maptech software (2004) and are listed in Appendix Tables D-1 to D-9. Typically teams of two would stream walk for safety reasons and to ensure the most accuracy possible when distinguishing redds. In each section, surveyors recorded the number of new redds, number of live adult fish (on/near and off dig), and number of carcasses. On reaches surveyed more than once (i.e. index and census), the first team of surveyors marked redds with numbered colored flagging placed near each redd or group of redds. During subsequent surveys, surveyors re-identified flagged redds and recorded any new redds. During the last survey of each reach, surveyors marked GPS coordinates (NAD 27 conus datum) of each redd or group of redds with a GPS receiver and topographic map. Flagging was removed during the final surveys.

Each observed carcass was examined and sampled in the Mainstem (except on the Forrest Conservation Area property due to time constraints), Desolation Creek, upper North Fork (Cunningham Creek to Trout Creek), lower North Fork (below Desolation Creek), and the GCS due to typically smaller numbers of fish and the need for disease surveillance. Every second carcass (1/2 of all carcasses encountered) was sampled in the Mainstem Forrest Conservation Area, Middle Fork and North Fork due to the typical number of carcasses encountered on these reaches. However, each carcass encountered was recorded as a hash mark according to sex (male, female, jack or 3-year old, or precocious) and origin (hatchery or wild). Sampled carcasses were measured for fork length (FL, mm) and MEPS (middle of the eye to posterior scale) length (mm), and dissected to verify sex. Females were checked for egg retention, to the nearest 25%. Trained surveyors recorded gill lesion presence or absence on fresh carcasses. Differences in the proportions of female and male carcasses, incompletely spawned females, and prevalence of gill lesions on carcasses among survey areas were tested using the z-test (SigmaStat 2004). Genetic samples (consisting of a small piece of rayed fin or skeletal muscle tissue on fresh carcasses) were collected and placed in vials containing 100% denatured ethanol at the request of the National Oceanic and Atmospheric Administration (NOAA) Fisheries Department.

Kidney samples were collected from fresh spring Chinook carcasses in each of the main spawning areas to determine concentration and prevalence of *Renibacterium salmoninarum* (Rs) antigen, the causative agent of bacterial kidney disease (BKD), in the spawning population. Trained surveyors selected carcasses with intact organs and membranes and non-glazed eyes, indicative of recent mortality. Wooden craft sticks and plastic spoons were used to scrape a 1–2 gram sample of kidney from each carcass. Samples were placed in sterile 1-ounce whirl-pack bags and stored in a cooler with ice until transported to a freezer. The enzyme-linked immunosorbent assay (ELISA) was used to obtain optical density (OD) values according to methodology adapted from Pascho and Mulcahy (1987). The Rs antigen level is an indication of bacterial infection load of *R. salmoninarum*. Table 2 summarizes the optical density value ranges and standard infection level categories used for BKD. Some samples were also examined for the presence of infectious hematopoietic necrosis virus (IHNV) by standard cell culture techniques using a portion of the collected kidney tissue. Viral samples were plated on *Epithelioma papillosum cyprini* and Chinook salmon embryo cell lines, then incubated 10 to 14 days, respectively.

Table 2. Summary of ELISA optical density value (OD_{405}) ranges, designated Rs antigen category, and significance of result with respect to adult Chinook salmon.

(OD_{405})	Rs antigen	Significance to adult Chinook[b]
≤ 0.100	Negative or Very Low	Infection not detected by ELISA
0.100–0.299	Low Positive	Low level of Rs antigen detected, not a factor in death, did not have BKD.
0.300–0.699	Moderate Positive	Moderate level of Rs antigen detected, beginning of significant infection with Rs in this range, signs of disease absent, rarely factor in death.
0.700–0.999	High Positive	Infection with Rs at high level, gross signs rare, could be factor in death.
≥ 1.000	Clinical[a]	Grossly infected with Rs, signs of disease usually, death probable, fish had BKD.

[a] By the ELISA, an optical density (OD) equal to or greater than 1.000 is considered to be clinical BKD.
[b] Generally, the significance to the maternal progeny is that there is a greater probability of vertical transmission (female parent to progeny) of Rs (BKD) from females with higher ELISA values.

The seven-day moving average of daily maximum and minimum temperatures from each subbasin was calculated by computing the sum of the first seven daily maximum or minimum temperatures divided by seven. The calculated average was then plotted on the date of the seventh day of measurement for that period. Then starting with day 2, the next seven days were averaged and the calculated value was plotted on the eighth day of measurement and so forth. This process was completed for temperatures from July through September to see if any correlations existed between temperature and gill lesion incidence on examined carcasses. Some temperature data was also obtained from the USFS and DART. Results were compared to data from previous years. Stream flow in each subbasin was accessed using the USGS website http://waterdata.usgs.gov.

Due to time constraints, we sub-sampled carcasses. Surveyors collected scale samples from wild and hatchery carcasses encountered with a MEPS length of ≤ 550 mm (likely age-3 adults) and ≥ 650 mm (likely age-5 adults). Carcasses from 551 to 649 mm were assumed to be 4-year old fish, based on the size-at-age distribution of carcasses examined during previous years. Scales were mounted on gummed cards, impressions were made in acetate and viewed using a microfiche reader, and annuli were counted to determine age by two different readers. We calculated age structure for spawning populations separately for the Mainstem, Middle Fork, North Fork, GCS, and Desolation Creek. Tails were removed from all carcasses to prevent re-sampling. Carcasses were returned near their original position in the stream.

Carcasses of hatchery fish were identified by an adipose fin clip and subsequently had their snout removed to detect the presence of a coded wire tag (CWT). Snouts were bagged with a numbered identification card and frozen. Later in the lab, snouts were halved and scanned for a CWT using a v-box tag detector. Any CWTs found were cleaned and examined for a tag code (binary or numerical) using a microscope. Tag codes were entered into the CWT database for ODFW and hatchery of origin was queried using the Pacific States Marine Fish Commission Regional Mark Information System database.

All spring Chinook redds in the basin were visually counted with the exception of areas in the Mainstem where landowners denied access. Where we were denied access, we multiplied the number of index kilometers not surveyed (11.9) by the redds/kilometer ratio (8.45) of index sections that were surveyed. Where we were denied access to a Mainstem census survey section, we multiplied the number of denied census kilometers (7.1) by the ratio of known redds/kilometer (4.4) of those census sections surveyed in 2005. If we were denied access to a random survey section, we drew the next random site.

A lack of weir counts in the basin prevents basin-specific fish/redd estimates. We therefore estimated spawner escapement conservatively by multiplying the number of redds counted by the standard ratio of three fish/redd. We also estimated spawner escapement by multiplying the number of redds by 6.9 fish/redd estimated above the Warm Springs River weir and 3.96 fish/redd at the upper Grande Ronde River weir in 2005 (FitzGerald 2005; Fred Monzyk, ODFW, unpublished data).

Smolt Capture and Tagging

During the 2005 migration, juvenile spring Chinook and steelhead migrants were captured at three rotary screw trap sites and while seining in the Mainstem John Day River to estimate abundance, smolt-to-adult survival (SAR), and to study the life history characteristics of steelhead in the John Day River subbasin. Two rotary screw traps were located in the Upper Mainstem fourth-level HUC. The Mainstem trap at rkm 326 of the Mainstem John Day River and the South Fork trap located at rkm 10 of the South Fork John Day River. The Mainstem trap is located downstream of the confluence of the Mainstem John Day River with the South Fork John Day River. The third rotary screw trap was located on the Middle Fork John Day River at rkm 24 and is hereafter referred to as the Middle Fork trap. The Mainstem seining operation is located downstream of three of four fourth-level HUCs including the Upper Mainstem, Middle Fork, and North Fork. The Mainstem seining operation is located downstream of all known spring Chinook summer rearing habitat. The Middle Fork trap is upstream of five tributaries entering the Middle Fork including Six-mile Creek, Three-mile Creek, Long Creek, Eight-mile Creek, and Fisher Creek. The South Fork trap was operated to supplement Steelhead PIT tagging efforts for SAR estimates. All rotary screw traps were equipped with live boxes, which safely hold juvenile fish over a 24–72 h time interval. At the Mainstem trap site we fished a 2.44 meter diameter rotary screw trap and 1.52 meter diameter rotary screw traps were operated at the South Fork and Middle Fork trap sites. Traps were either removed or stopped during high water events or when ice prevented safe operation.

All rotary screw traps were typically operated Monday through Friday each week and checked daily during this work-week period. We assumed that all fish captured were migrants. Non-target fish species were removed from the traps, enumerated, and released just downstream of the trap location. 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 FL was measured to the nearest millimeter (mm). We followed PTAGIS marking procedures when handling, PIT tagging, and pan jet marking juvenile migrants (PTAGIS 1999, Keefe et al. 1995, Hart and Pitcher 1969).

Juvenile spring Chinook and steelhead were also captured by beach and boat seining in the Mainstem John Day River between rkm 274 and 296 from March 18 to May 24, 2005. 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 in the middle constructed of 9.5 mm mesh netting. Locations for sampling within our study reach varied on a daily basis depending on discharge and success during previous sampling days (see Appendix Table E-1 for a list of sample sites). Captured spring Chinook and steelhead migrants were handled in the same manner as at the rotary screw trap sites except all PIT-tagged smolts were released at Mainstem 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 March, April, May and June. PIT-tag information was submitted to PTAGIS.

Trapping efficiency (TE) was estimated separately for each species at each rotary screw trap site by releasing previously marked fish upstream of the trap and then by counting the number of recaptures of these marked fish (Thedinga et al. 1994). Trap efficiency intervals were one week or until 10 fish of each species were recaptured (Keefe et al, 1998). Fish were marked with either a pan jet paint mark below the surface of the fish's skin at the insertion of the anal fin (Hart and Pitcher 1969, Keefe et al, 1998) or by PIT tagging. Up to 20 fish of each species (spring Chinook and steelhead) were released daily upstream of the trap sites. At the Mainstem trap, TE fish were released 4 km upstream of the trap site and all other fish were released at least 550 m downstream. At the South Fork trap, TE fish were released 4.8 km upstream and all other fish were released 100 m downstream. At the Middle Fork trap site, TE fish were released 2.5 km upstream and all other fish were released 100 m downstream. Trap efficiency was estimated from the equation:

$$TE = R/M \quad (1)$$

where TE is the estimated trap efficiency, R is the number of marked fish released upstream and M 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 springtime periods. A similar mark-recapture and bootstrapping method was used to estimate capture efficiency (CE) for our seining efforts. Linear interpolation was used to estimate catch during time periods when traps or seines did not operate.

Novice crew members were trained prior to assuming full responsibility for trap and tagging operations. All fish handlers participated in a PIT tag retention and tagging mortality trial during the month of April. Each person PIT tagged a minimum of 30 smolts. Tagged smolts were placed in live boxes along the river margin, held overnight, checked for mortality, and interrogated for the presence of PIT tags the following morning.

Additional information was also collected from captured fish. Scale samples were taken from all juvenile steelhead migrants captured and PIT tagged. The presence of trematode cysts (black spot disease; *Neascus spp.*) 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, fork length, 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 FL (mm), mass (weight, g), and coefficient of condition (K) were reported for both fall/winter (September, 2004 to January, 2005) and spring

(February 1 to June 24, 2005) migrating juvenile spring Chinook and steelhead. Coefficient of condition was calculated as:

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

The parameter *b* was set equal to three—the ratio of specific growth rates for length (L) and weight (mass, W) (Saltzman 1977).

The time taken for fall/winter and spring-tagged juveniles to reach John Day and Bonneville Dams from the release sites was 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 River 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. 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 survival rate (SAR; marine survival) was estimated by the ratio of smolts PIT tagged in our trapping and seining efforts to the number of returning PIT-tagged adults detected at Federal Columbia River Power System (FCRPS) facilities as they ascended the Columbia River. Spring Chinook adults return at 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 estimated stray rates of adult spring Chinook and summer steelhead using detections at Columbia River dams upstream of McNary Dam. Freshwater survival (smolt-per-redd estimates) for the 2003 brood year of spring Chinook was also estimated using the ratio of smolts estimated to pass individual trap sites (Mainstsem, Middle Fork) and the seining reach (representing the entire basin) during 2005 by the number of redds estimated during 2003.

RESULTS

Spring Chinook Salmon Redds and Escapement

During the 2005 census spawning survey, we observed 902 spring Chinook salmon redds while surveying 298.2 rkm of the John Day River basin (88.2 rkm within index areas, 192.4 rkm within census survey areas, and 17.6 rkm within random survey areas; Table 3, Appendix Tables A-1 to C-2). The first Chinook redd of the season was observed by Paul Sankovich of the United States Fish and Wildlife Service (USFWS) on 1 August, at the mouth of Baldy Creek in the upper North Fork. The North Fork composed 46.6% of all redds observed (420 of 902), while 25.2% (227 including estimated redds) were observed in the Mainstem, 19.7% (178) in the Middle Fork, 6.9% (62) in the GCS, and 1.7% (15) in Desolation Creek (Tables 3 and 4, Appendix Table C-1). Percentage of redds recorded in each subbasin was similar to that observed in 2004. However, overall numbers declined from last year even though proportions stayed the same (Table 4). Spawning densities within census survey reaches (combined index and census sites) were 3.0

Table 3. Kilometers surveyed, total number of redds observed, and number of new redds observed during spring Chinook salmon spawning surveys in the John Day Basin, 2005.

	Kilometers surveyed				New redds observed				
Stream	Index	Census	Random	Total redds	Pre-index	Index	Post-index	Census	Random
Mainstem and Tributary									
Mainstem	19.0[a]	17.5[b]	4.4	227[e]	--	60	111[a]	56[b]	0
Deardorff Creek	--	2.3	--	0	--	--	--	0	--
South Fork	--	15.2	2.1	0	--	--	--	0	0
Middle Fork	21.4	34.3	4.4	178[c]	--	114	--	64	0
North Fork and Tributaries									
North Fork	28.5	62.5	2.3	420	243	28	39	110	0
Desolation Cr.	--	37.7	--	15	--	--	--	15	--
Trail Creek	--	3.1	2.1	0	--	--	--	0	0
Big Creek	--	2.6	--	0	--	--	--	0	--
Camas Creek	--	0.8	2.3	0	--	--	--	0	0
Granite Creek System									
Granite Creek	9.5	7.9	--	43	--	11	20	12	--
Clear Creek	4.8	6.1[d]	--	15	--	12	3	0	--
Bull Run Creek	5.0	2.4	--	4	--	1	3	0	--
Entire Basin	88.2	192.4	17.6	902[e]	243	226	176	257	0

[a] Only 7.1 index kilometers (4.4 miles) were surveyed. We counted 70 redds (60 index, 10 post-index) and added an estimate of the redds in the survey sections that we did not have landowner permission to survey. We estimated 101 redds for 11.9 index kilometers (7.4 miles) that were not surveyed (11.9 index kilometers · 8.45 redds/index kilometer).

[b] Landowner denied access to 7.1 kilometers (4.4 miles) of the lower census survey sections. We counted 22 redds within 5.0 kilometers and estimated 31 redds for 7.1 kilometers that were not surveyed (7.1 · 4.4 redds/census kilometer). This was added to 3 redds seen in upper census reaches.

[c] Includes 10 redds found in Clear Creek.

[d] Landowner denied access to 1.3 kilometers (0.8 miles) of census survey but no estimate was made due to the absence of redds above and below the property.

[e] Total includes estimated redds.

Table 4. Estimated number of spring Chinook salmon redds and spawners and percentage of redds in each survey area compared to all survey areas in the John Day River basin, 2005. To estimate the number of spawners, we multiplied the number of redds counted in each spawning area by 6.9 fish/redd (fish/redd ratio for Warm Springs River above Warm Springs River Weir; FitzGerald 2005), 3.96 fish/redd (from Grande Ronde River weir; Fred Monzyk, ODFW, unpublished data), and by the standard conservative estimate of 3.0 fish/redd.

		Number of spawners estimated			
Stream	Number of redds	3.0 fish/redd	3.96 fish/redd	6.9 fish/redd	Percentage
Mainstem	227	681	899	1,566	25.2
South Fork	0	0	0	0	0
Middle Fork	178	534	705	1,228	19.7
North Fork	420	1,260	1,663	2,898	46.6
Desolation Creek	15	45	59	104	1.7
Granite Creek	43	129	170	297	4.8
Clear Creek	15	45	59	104	1.7
Bull Run Creek	4	12	16	28	0.4
Entire basin	902	2,706	3,572	6,224	

redds/km for the John Day River basin, 5.3 redds/km in the Mainstem (including Deardorff Creek), 4.0 redds/km in the North Fork (including Big, Trail, and Camas Creek tributaries), 3.0 redds/km in the Middle Fork, 1.7 redds/km in the GCS, and 0.4 redds/km in Desolation Creek (Appendix Table C-3). We did not observe any redds in the South Fork and no random sites produced redds in 2005.

This year marks the first year since complete census surveys began five years ago, where redds numbered less than 1,000 in the John Day Basin. Within the historic index spawning survey area, index redd density for the basin in 2005 was 6.5 redds/km—down approximately 50% from 2004 observations. The index redd count (570) and spawning density (6.5 redds/km) for the basin have not been the lowest observed since 1999 (Figure 5). Within the four main historic index spawning survey reaches for 2005, index spawning density was 9.5 redds/km in the North Fork, 8.5 redds/km in the Mainstem, 5.3 redds/km in the Middle Fork, and 1.2 redds/km in the GCS (Appendix Table C-5). Since 2000, when census counts were initiated, index counts have averaged 73% of total (census) redd counts in the basin. Over these six years, this percentage has varied from 63–76%.

We estimate that between 2,706 and 6,224 spring Chinook adults escaped to the John Day River basin this year (Table 4). The escapement estimates are based on our observation of 902 redds and three independent fish per redd ratios calculated in 2005: three fish/redd as the standard conservative estimate, 3.96 fish/redd observed at the Grande Ronde River weir, and 6.9 fish/redd observed above the Warm Springs River weir (Fred Monzyk, ODFW, unpublished data; FitzGerald 2005).

Characteristics of Spring Chinook Spawners

There were several reports of adult Chinook by comanagers in the John Day River basin before our spawning ground surveys were initiated. Eighty-eight live spring Chinook were observed holding in the Middle Fork in July according to the Confederated Tribes of the Warm Springs Reservation (CTWSR). Two live fish were also seen in the Mainstem on the CTWSR Forrest Conservation Area property around the same time period. The first carcasses of the season were observed in August in the North Fork, Mainstem, and Middle Fork. A spawned out carcass was found near a redd in the upper North Fork on 1 August by USFWS. One carcass was observed in the Mainstem on 7 August by CTWSR. Three other pre-spawn mortalities were observed in the Middle Fork during mid-August by the CTWSR: two were observed downstream of Beaver Creek and one was found just upstream from Butte Creek on the Oxbow property (census areas).

We observed 701 carcasses during spawning surveys, representing between 11.3%, 19.6%, and 25.9% of the estimated escapement of 6,224, 3,572, and 2,706 adult spring Chinook respectively (Table 5). We were able to sex 653 carcasses; female and male carcasses were evenly distributed in all subbasins except the GCS where a significantly greater proportion of females (75% females vs. 21% males) occurred compared to the remainder of the John Day River basin ($P < 0.001$; Table 6). Granite Creek itself held more females than males when compared to all other reaches in the basin ($P = 0.022$). Granite Creek and Clear Creek each had similar proportions of females. A 57.4% female and 42.6% male composition was observed throughout the John Day River basin (Table 7).

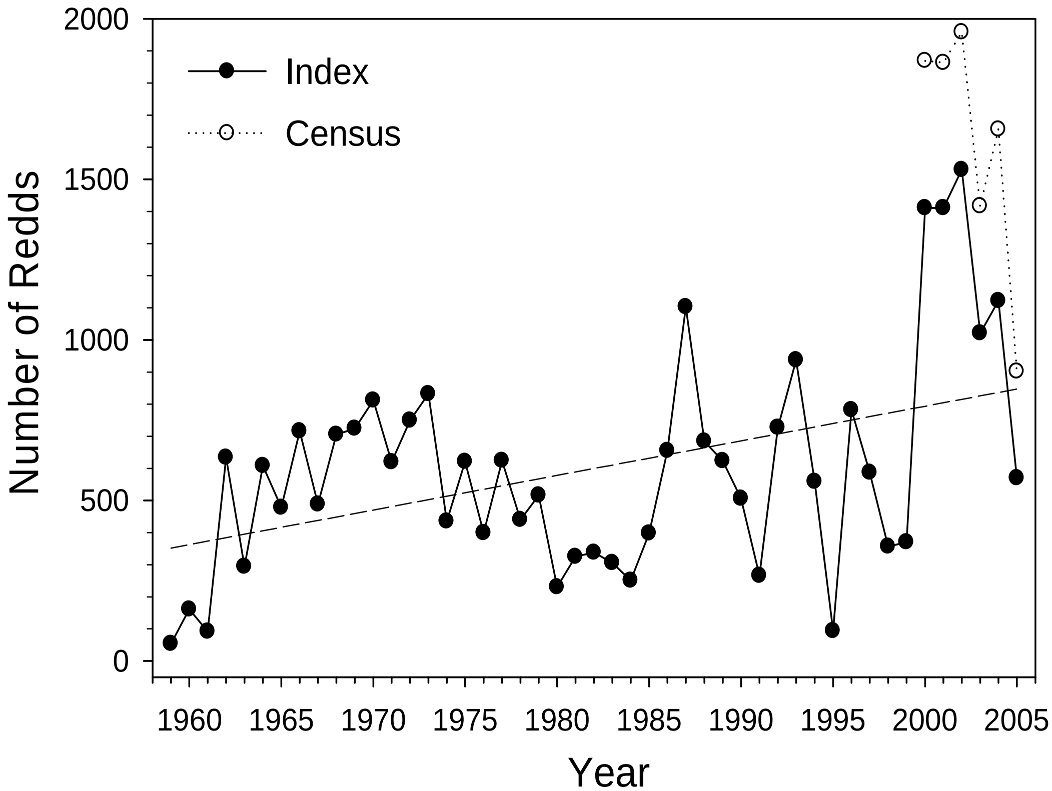

Figure 5. Index and census spawning ground survey counts of spring Chinook salmon redds in the John Day River basin. A linear regression fit to the index redd counts (P = 0.002) is also shown.

Table 5. Number of carcasses sampled during all surveys of spring Chinook salmon spawning surveys in the John Day River basin during 2005. Totals include carcasses of unknown sex.

Stream	Number of carcasses					
	Total	Pre-index	Index	Post-index	Census	Random
Mainstem	50	--	22	6	21	1
South Fork	0	--	--	--	0	0
Middle Fork	149	--	90	--	58	1
North Fork and tributaries						
North Fork	413	85	175	74	79	0
Big Creek	0	--	--	--	0	--
Trail Creek	0	--	--	--	0	0
Desolation Creek	18	--	--	--	18	--
Camas Creek	0	--	--	--	0	0
Granite Creek System	71	--	19	49	3	--
Basin total	701	85	306	129	179	2

Table 6. Number of female, male, and unknown carcasses (n) sampled during all surveys of spring Chinook salmon spawning surveys in the John Day River basin during 2005.

Stream	Number of carcasses			
	n	Female	Male	Unknown
Mainstem	50	23	24	3
South Fork	0	--	--	--
Middle Fork	149	75	64	10
North Fork	413	217	168	28
Desolation Creek	18	7	7	4
Granite Creek System	71	53	15	3
Basin total	701	375	278	48

Table 7. Sex ratio of carcasses sampled during all surveys in the John Day River basin, 2005. Number of carcasses (n) in which sex could be determined is also shown.

Survey type	n	% Female	% Male
Pre-index	79	60.8	39.2
Index	292	56.2	43.8
Post-index	119	64.5	35.5
Census	159	53.5	46.5
Random	2	0.0	100.0
All surveys	653	57.4	42.6

We determined the MEPS length of 448 and both age and gender of 439 carcasses. Age-4 adults composed 91.2% of the carcasses aged with age-5 adults accounting for 7.1%, age-3 adults 1.6%, and age-2 precocious adults 0.2% (Table 8). Six of 439 carcasses (1.4%) in the basin consisted of age-3 males (jacks). One of 439 (0.2%) was an age-3 female and one was an age-2 precocious male. As expected, age four and five females composed a larger percentage of their respective age classes than males (Table 9)..

We estimated the percentage of eggs retained by individual female carcasses for 254 of 375(67.7%) known female carcasses sampled during spawning surveys (Table 10). Of those sampled, 82.3% (209) spawned completely, 9.0% (23) were incompletely spawned, and 8.7% (22) were pre-spawn mortalities (i.e. 100% egg retention). Most females examined in the GCS (24 of 44, 54.5%) were observed with egg retention greater than 0%, 16 of which (36.4%) were complete pre-spawn mortalities. Sixteen of 22 (72.7%) pre-spawn mortalities sampled basin-wide were observed in Granite Creek within the GCS. In Granite Creek, 22 of 30 (73.3%) female Chinook sampled had some sort of egg retention and 16 of 30 (53.3%) were pre-spawn mortalities. Egg retention was significantly greater in the GCS, specifically Granite Creek, when compared to the rest of the basin ($P < 0.001$).

Table 8. Percent age (y) and sex composition of male (M) and female (F) spring Chinook salmon carcasses sampled in the survey areas of the John Day River basin during 2005. Number of carcasses (n) where both age and sex could be determined is also shown.

		Age (y)						
		2	3		4		5	
Stream	n	M	F	M	F	M	F	M
Mainstem	49	0.0	2.0	8.2	38.8	42.9	6.1	2.0
Middle Fork	78	0.0	0.0	1.3	57.7	38.5	0.0	2.6
North Fork	239	0.0	0.0	0.4	51.5	39.3	6.3	2.5
Desolation Creek	14	0.0	0.0	0.0	42.9	50.0	7.1	0.0
Granite Creek System	59	1.7	0.0	0.0	72.9	20.3	3.4	1.7
Basin total	439	0.2	0.2	1.4	53.8	37.4	4.8	2.3

Table 9. Number examined (n), mean, standard error (SE), and range of middle of eye to posterior scale (MEPS) length (mm) by age (y) and sex (male, M; female, F) of spring Chinook salmon carcasses sampled during spawning ground surveys in the John Day River basin during 2005.

				MEPS length		
Survey area	Age	Sex	n	Mean	SE	Range
Mainstem	3	M	4	398.8	12.3	370–430
	3	F	1	430.0		
	4	M	21	606.1	10.3	520–704
	4	F	19	602.8	7.3	540–670
	5	M	1	700.0		
	5	F	3	720.7	19.5	682–745
Middle Fork	3	M	1	360.0		
	4	M	30	599.0	9.7	480–690
	4	F	45	595.7	5.2	530–690
	5	M	2	705.0	15.0	690–720
North Fork	3	M	1	430.0		
	4	M	94	643.6	6.2	515–820
	4	F	123	631.5	4.1	535–755
	5	M	6	783.3	23.5	720–850
	5	F	15	718.5	6.3	655–745
Granite Creek System	2	M	1	110.0		
	4	M	12	602.5	13.7	540–695
	4	F	43	604.9	7.2	535–760
	5	M	1	760.0		
	5	F	2	695.0	5.0	690–700
Desolation Creek	4	M	7	574.3	18.2	520–645
	4	F	6	604.7	9.7	580–648
	5	F	1	680.0		
Entire basin	2	M	1	110.0		
	3	M	6	397.5	12.0	360–430
	3	F	1	430.0		
	4	M	164	624.7	4.7	480–820
	4	F	236	616.9	2.9	530–760
	5	M	10	757.0	18.2	690–850
	5	F	21	714.7	5.6	655–745

Of 298 carcasses examined for gill lesions during spawning ground surveys, 4.0% (12) were positive for the presence of lesions (Table 11). Gill lesion prevalence differed among spawning areas of the John Day Basin. Proportion of gill lesions in the GCS was significantly greater (8 of 44 or 18.2%, $P < 0.001$) than that of the entire basin. Two infected fish (both female) were observed in Granite Creek and six (4 females and 2 males) were observed in Clear Creek (all within the GCS). There were significantly more lesions observed in Clear Creek than Granite Creek ($P = 0.007$). Three of six (50%) females observed with gill lesions in the GCS were pre-spawn mortalities. However, most pre-spawn mortalities (83.3%) observed in the GCS did not have gill lesions. Lesion presence in this system was similar to what was recorded in 2004 but significantly lower than 2003 (Wilson et al. 2005; Schultz et al. 2006). Four completely spawned fish with gill lesions were observed in the mainstem North Fork. Temperatures recorded at the mouth of Granite Creek in 2005 were similar to those recorded in 2004 during July–September (Kristy Groves, USFS, personal communication). Granite Creek had slightly cooler temperatures in September 2005 versus 2004. Stream flow recorded at Service Creek, OR in the Mainstem and at Monument, OR in the North Fork was lower during August–September (< 100 cfs) 2005 compared to 2004(USGS), indicating a slightly drier year. Hatchery carcasses composed 1.3% (9 of 701) of all carcasses examined for adipose fin clips and were observed in all four main spawning areas including Desolation Creek (Appendix Table A-1). Two of seven snouts (28.6%) collected contained CWTs (Table 12).

One-hundred fourteen kidney samples were taken from fresh spring Chinook salmon carcasses and analyzed for Rs antigen by the ELISA method. Of 114 samples, two (1.8%) had clinical ELISA values above 1.0 (1.135 OD units and 1.337 OD units), indicating the presence of BKD (Tables 2 and 13). Both infected fish were fully spawned 4-year old females sampled between Caribou Creek and Placer Gulch in the Middle Fork. One kidney sample from the North Fork had a moderate positive value of 0.334 OD units and the other 111 samples had negative or low positive values ≤ 0.280. All incompletely spawned females or pre-spawn mortalities had negative or low positive levels of Rs antigen. Of 114 kidney samples, 63 (55%) were tested for IHNV and found to be negative.

A female Chinook was observed alive but distressed in Granite Creek on 15 September due to an arrow protruding from her side. Surveyors removed the arrow so the fish could recover and spawn successfully. However, on 27 September this fish was observed as a fresh carcass with an obvious arrow wound and 100% egg retention. Surveyors also recovered a passive integrated transponder (PIT) tag from a male Chinook, measuring 600 mm MEPS in length, on 13 September approximately 2.4 km downstream of McCarty Gulch in the North Fork. This Chinook was captured via beach seine and implanted with a PIT tag as a juvenile on 9 April 2003 in the Mainstem. The fish went undetected as it migrated past the Columbia River dams, but was detected as an adult at Bonneville Dam on 17 May 2005.

Table 10. Number of female spring Chinook salmon assigned to one of five categories based on the percentage of total eggs retained as estimated by dissection of carcasses observed in four subbasins during spawning ground surveys of the John Day River basin, 2005. Each female was examined separately and placed into one of five categories shown. Number of female carcasses examined in each survey section (n) is also shown.

Survey Area	n	0%	25%	50%	75%	100%
Mainstem	21	18	2	0	0	1
Middle Fork	44	42	0	1	1	0
North Fork	138	123	8	2	0	5
Desolation Creek	7	6	1	0	0	0
Granite Creek	30	8	3	1	2	16
Clear Creek	11	9	2	0	0	0
Bull Run Creek	3	3	0	0	0	0
Granite Creek System	44	20	5	1	2	16
Entire basin	**254**	**209**	**16**	**4**	**3**	**22**

Table 11. Number of adult spring Chinook salmon observed (n) and identified with gill lesions as determined by carcass gill observations in four subbasins (five spawning areas) during spawning ground surveys in the John Day River basin, 2005. Each carcass was examined separately and placed into one of two categories shown. Percentage (%) of carcasses with lesions in each survey section is also shown.

Survey Area	n	Gill lesions	%
Mainstem	28	0	0
Middle Fork	48	0	0
North Fork	192	4	2.1
Desolation Creek	9	0	0
Granite Creek System	44	8	18.2
Entire basin	**298**	**12**	**4.0**

Table 12. Sample date, sample identification, stream location, fin clip, sex, medial eye to posterior scale length (MEPS, mm), and hatchery origin and release location as determined by coded wire tag (CWT) information for all fin-clipped spring Chinook salmon sampled during spawning ground surveys of the John Day Basin, 2005. Fin clips were adipose (Ad).

Date	Sample tag #	Stream	Fin clip	Sex	MEPS (mm)	CWT record of hatchery origin and release location
9/9/05	05E4061	North Fork	Ad	F	610	No CWT
9/16/05	05E4071	North Fork	Ad	F	620	No CWT
9/23/05	05E4072	North Fork	Ad	F	670	No CWT
9/19/05	05E4000	Desolation Cr.	Ad	M	565	No CWT
9/19/05	No ID #	Desolation Cr.	Ad	U	--	No snout taken
9/27/05	No ID #	GCS (Clear Cr.)	Ad	F	--	Missing part of snout
9/6/05	05E4070	Mainstem	Ad	M	600	No CWT
9/22/05	05E4005	Mainstem	Ad	M	700	Lookingglass Hatchery, Catherine Creek, Grande Ronde River, OR
9/22/05	05E4001	Mainstem	Ad	M	395	Round Butte Hatchery, Deschutes River, OR

Table 13. ELISA readings (OD405) for *Renibacterium salmoninarum* from kidney samples taken from spring Chinook salmon carcasses during spawning surveys of the John Day River basin, 2005.

Granite Creek System		North Fork		Mainstem		Middle Fork		Desolation Creek	
Sample	OD405	Sample	OD405	Sample	OD405	Sample	OD405	Sample	OD405
1[a]	0.078	1	0.119	1	0.083	1	0.115	1	0.187
2[a]	0.083	2	0.143	2	0.076	2	0.136	2	0.135
3[d]	0.111	3	0.109	3	0.092	3	0.123	3	0.109
4[d]	0.105	4	0.133	4	0.113	4	0.246	4	0.115
5[d]	0.081	5	0.130	5	0.087	5	0.093		
6[a]	0.106	6[d]	0.190	6	0.100	6[e]	1.135		
7[a,d]	0.079	7	0.143	7	0.083	7	0.108		
8[a,d]	0.067	8	0.100	8	0.083	8	0.108		
9[a]	0.125	9	0.114	9	0.091	9	0.109		
10	0.076	10	0.079	10	0.083	10	0.105		
11	0.072	11	0.145	11	0.084	11	0.186		
12[a]	0.072	12	0.105	12	0.106	12	0.151		
		13	0.114	13	0.080	13	0.078		
		14	0.105	14[c]	0.156	14	0.141		
		15	0.101	15	0.100	15[b]	0.144		
		16[a]	0.120			16	0.131		
		17	0.098			17	0.089		
		18[a]	0.085			18	0.115		
		19	0.130			19	0.138		
		20	0.103			20	0.181		
		21[c]	0.073			21[e]	1.337		
		22	0.173			22	0.155		
		23	0.079			23	0.108		
		24	0.100			24	0.195		
		25	0.130			25	0.186		
		26[d]	0.149			26	0.154		
		27	0.103						
		28	0.134						
		29	0.162						
		30	0.086						
		31	0.092						
		32	0.086						
		33	0.143						
		34	0.168						
		35	0.071						
		36	0.168						
		37	0.113						
		38	0.113						
		39	0.334						
		40	0.121						
		41	0.107						
		42	0.270						
		43	0.134						
		44	0.118						
		45	0.125						
		46	0.091						
		47	0.082						
		48	0.127						
		49	0.131						
		50	0.150						
		51[c]	0.138						
		52	0.106						
		53	0.099						
		54	0.280						
		55	0.079						
		56	0.104						
		57	0.105						

[a] Female pre-spawn mortality, 100% egg retention
[b] Female incompletely spawned, 75% egg retention
[c] Female incompletely spawned, 25% egg retention
[d] Gill lesions observed
[e] Fish had clinical BKD

Table 14. Percent pre-spawning mortality (PSM; 100% egg retention) of female carcasses and percent gill lesion incidence (GL) of all examined carcasses in the Granite Creek System, including significant difference, between 2000–2005 in the John Day Basin. Carcasses were not examined for gill lesions until 2003.

			Significantly different from rest of basin?	
Year	% Pre-spawn mortality	% Gill lesion incidence	PSM	GL
2005	36.4	18.2	Yes	Yes
2004	0.0	19.6	No	Yes
2003	8.7	59.0	No	Yes
2002	6.0	--	No	--
2001	16.7	--	Yes	--
2000	0.9	--	No	--

Juvenile Spring Chinook Capture and Tagging

We PIT tagged 5,794 juvenile spring Chinook during the migration from September 2, 2004 to July 6, 2005 (Table 15). Of these, 656 were tagged between September 2 and January 31, 2005 (Fall/Winter tag group) while the remainder, 5,138, were tagged between February 1 and July, 6, 2005 (Spring tag group). Migration rates of Chinook juveniles peaked during the months of April, May, and June at trapping sites (Figures 6–8). Mean FL at capture for Fall/winter migrants from all trapping sites was 97.6 mm and mean FL of spring migrants was 103.9 mm (Table 16). Of the 5,794 juvenile spring Chinook examined for *Neascus spp.* infestation, 69 (1.2%) showed visible signs of black spot. Of the 229 fish PIT tagged during our tag retention and mortality trial, none died and no tags were lost.

Table 14. Number of juvenile spring Chinook and steelhead PIT tagged during the fall/winter (September 2, 2004 to January 31, 2005) and spring (February 1 to July 6, 2005) periods at three rotary screw traps and while seining in the Mainstem John Day River.

	Spring Chinook		steelhead	
Trap Site	Fall	Spring	Fall	Spring
South Fork	39	54	322	2,069
Mainstem	447	1,348	246	1,455
Middle Fork	170	1,237	5	1,360
Mainstem Seining		2,499		29
Total	656	5,138	573	4,913

Table 15. Number (N), mean, and range of fork length and mass for spring Chinook migrants captured in rotary screw traps and while seining on the Mainstem John Day River during two periods (Fall/Winter–September, 2004 to January 31, 2005; Spring–February 1 to July 6, 2005).

		Fork Length (mm)			Mass (g)			Coefficient of condition		
Location	Period	N	Mean	Range	N	Mean	Range	N	Mean	Range
South Fork Trap	Fall/winter	39	99.2	77–110	39	11.1	4.8–17.4	39	1.12	0.9–1.3
Mainstem Trap	Fall/winter	447	99.9	80–123	427	11.4	5.0–20.7	427	1.13	0.8–1.6
Middle Fork Trap	Fall/winter	170	91.2	68–122	168	9.0	3.1–21.6	168	1.13	0.9–1.4
All sites	Fall/winter	656	97.6	68–123	634	10.7	3.1–21.6	634	1.13	0.8–1.6
South Fork Trap	Spring	54	104.3	75–118	44	12.8	5.7–19.7	44	1.15	0.9–1.4
Mainstem Trap	Spring	1,346	104.8	69–145	937	13.6	4.3–33.4	937	1.21	0.5–1.6
Middle Fork Trap	Spring	1,236	100.5	64–143	847	12.2	3.4–34.3	846	1.22	0.6–1.7
Mainstem Seining	Spring	2,498	105.1	78–142	1,954	14.7	4.2–33.2	1,954	1.16	0.4–1.7
All sites	Spring	5,134	103.9	64–145	3,782	13.9	3.4–34.3	3,781	1.20	0.4–1.7

At our Mainstem trap we captured 5,244 and PIT tagged 1,795 Chinook juveniles during the migration period (Tables 15, 17). Of those PIT tagged, 25% were tagged during the Fall/Winter period. Trapping efficiency (TE) varied seasonally (Table 17). Juvenile migration past the trap site peaked during spring (Figure 6). We estimated that 32,601 juvenile Chinook migrated past the Mainstem trap site during our trapping period (Table 18). Mean FL during the Fall/winter migration was 99.9 mm and 104.8 mm during the Spring period (Table 16). Thirty (1.7%) of the 1,795 juvenile spring Chinook examined for *Neascus sp.* infestation showed visible signs of black spot. Only 93 juvenile spring Chinook were captured at the South Fork trap and all were PIT tagged (Tables 15, 16). Mean FL was 99.2 and 104.3 mm for Fall and Spring tag groups, respectively. None of the 93 juveniles examined for *Neascus spp.* infestation in the South Fork showed visible signs of black spot.

At our Middle Fork trap we captured 3,087 and PIT tagged 1,407 juvenile Chinook (Tables 15, 16). Of those tagged, the majority (88%) were tagged during the Spring migration. Trapping efficiency varied seasonally from 40.9% during the fall to 27.1% during the spring (Table 17). Ice formation prohibited trap operations from November 19, 2004 to February 22, 2005. We estimated that 20,193 juvenile Chinook migrated past the Middle Fork trap site during our trapping period (Table 17). Mean FL was 91.2 and 100.5 mm for Fall and Spring tag groups, respectively. Of 1,407 juveniles examined for *Neascus sp.* infestation, 29 (2.1 %) showed visible signs of black spot.

We PIT tagged 2,499 of the 2,635 juvenile spring Chinook captured in 513 seine hauls on the Mainstem John Day River (Tables 15, 16). Fifty one juveniles were recaptured during our mark-recapture efforts indicating a capture efficiency of 2.04% (Table 17). Catch-per-seine haul peaked during the month of April (Figure 8). We estimated that 130,144 juveniles migrated past the seining area during our seining period (Table 17). Mean FL was 105.1 mm (Table 16). Of 2,499 smolts examined for *Neascus sp.* infestation, 10 (0.4%) showed visible signs of black spots. Based on adult spring Chinook redd counts during 2003 and abundance estimates from our seining operation during 2005, we estimate freshwater survival at 92 smolts per redd for the 2003 brood year (Table 18).

Table 16. Season, collection period, number captured (n), percent capture efficiency, and 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 basin from September 2, 2004 to July 6, 2005.

Location	Season	Collection Period	n	Capture Efficiency	Abundance	95% CL's
Mainstem	Fall/Winter	10/4/04–1/31/05	917	59.2		
	Spring	2/1/05–7/6/05	4,327	32.1		
	Total		**5,244**		**32,601**	**29,651–36,264**
Middle	Fall/Winter	10/6/04–11/18/04	185	40.9		
Fork	Spring	2/23/05–6/17/05	2,902	27.1		
	Total		**3,087**		**20,193**	**17,699–22,983**
Mainstem	Spring	2/4/05–6/16/05	2,635	2.0		
Seining					**130,144**	**97,133–168,409**
South	Fall/Winter	9/2/04–1/31/05	55	90.0		
Fork	Spring	2/1/05–6/17/05	56	34.9		

Table 17. Smolt/redd ratios based on recent and historic estimates of smolt and redd abundances for spring Chinook salmon for the entire John Day River basin. Estimates for the 1978–1982 brood years are from Lindsay et al. (1986).

Brood Year	Redds	Smolt migration year	Smolt abundance estimate	95% CLs	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
1999	478	2001	92,922	79,258 - 111,228	194
2000	1,869	2002	103,097	90,280 - 119,774	55
2001	1,863	2003	83,394	76,739 - 91,734	45
2002	1,959	2004	91,372	76,507 - 113,027	47
2003	1,417	2005	130,144	97,133 - 168,409	92

Juvenile Steelhead capture and Tagging

Of the 5,486 juvenile steelhead PIT tagged during the 2005 migration, 573 were tagged during the Fall and Winter and 4,913 were tagged during the Spring at our three rotary screw traps and while seining (Table 15). Mean FL was 140.1 and 157.9 mm for Fall and Spring tag groups, respectively. Of the 59 fish PIT tagged during our tag retention and mortality trial, none died and no tags were lost. Of 5,486 juvenile steelhead examined for *Neascus sp.* infestation, 50 (0.9%) showed visible signs of black spot.

Most steelhead migrants were age 2. Of the 487 Fall/Winter migrants, age-2 fish composed the majority, 72% while age-1 and age-3 fish composed 23.5% and 4.5%

respectively (Table 19). The majority (73.2%) of the migrants captured during the Spring period were also age 2. As determined by reading scales, age-1 juveniles ranged from 65–178 mm FL, age-2 juveniles from 68–321 mm, and age 3 juveniles ranged from 111–303 mm FL (Figures 9, 10).

The age composition of fall/winter migrating steelhead captured at the South Fork and Mainstem traps differed significantly with more age-1 fish captured at the Mainstem trap ($\chi^2 = 25.22$, $P < 0.001$, df = 1; Table 19). The age composition of spring migrating steelhead also differed among the three trap sites with fewer age-1 and more age-3 fish captured at the Middle Fork trap and fewer age-3 fish captured at the South Fork Trap than at all three trap sites ($\chi^2 = 377.5$, $P < 0.001$, df = 9; Table 19).

At our Mainstem trap, we captured 1,922 and PIT tagged 1,701 juvenile steelhead during the migration from October 4, 2004 to July 6, 2005 (Tables 15 and 20). Of those PIT tagged, 246 were tagged for the fall/winter tag group and 1,455 were tagged for the spring tag group. Trapping efficiency varied seasonally with 20.6% TE during the fall/ winter and 7.6% during the spring (Table 20). Juvenile steelhead migration peaked during the spring (Figure 12). We estimated that 47,921 juvenile steelhead migrated past the Mainstem trap site between October 4, 2004 and July 6, 2005 (Table 20). Mean FL of Fall/winter migrants was 141.2 mm (Table 21). Mean FL of spring migrants was 162.5 mm. Of 1,701 juvenile Steelhead examined for *Neascus sp.* infestation at the Mainstem trap, 45 (2.6%) showed visible signs of black spot.

At our South Fork trap, we captured 3,688 and PIT tagged 2,391 juvenile steelhead during the migration from September 2, 2004 to June 17, 2005 (Tables 15 and 20). Of those PIT tagged, 246 were tagged for the fall/winter tag group and 1,455 were tagged for the spring tag group. Trapping efficiency varied seasonally with 28.3% TE during the fall/winter, and 16.2% TE during the spring (Table 20). Juvenile steelhead migration peaked during the last week of October, second week of December, and from the last week of March through the second week of May, 2005 (Figure 11). We estimated that 25,364 juveniles migrated past the trap site (Table 20). Mean FL of fall/winter migrants was 138.8 mm (Table 21). Of 2,391 juvenile steelhead examined for *Neascus sp.* infestation at the South Fork trap, only three (1.3%) showed visible signs of black spot.

At our Middle Fork trap we captured 1,522 and PIT tagged 1,365 juvenile steelhead from October 6, 2004 to June 16, 2005 (Tables 15 and 20). Of those tagged, five were PIT tagged for the fall/winter tag group and 1,360 were PIT tagged for the spring tag group (Table 15). We only captured five steelhead during the fall and we did not operate the Middle Fork trap during the winter due to ice. Trapping efficiency for steelhead during the spring was 12.1% (Table 20). Juvenile steelhead migration peaked during the last week of April and second week of May (Figure 13). We estimated that 28,980 juvenile steelhead migrated past the Middle Fork trap site (Table 20). Spring migrant mean FL was 161.8 mm (Table 21). Of 1,365 juvenile steelhead examined for *Neascus sp.* infestation at the Middle Fork trap, two (1.5%) showed visible signs of black spot.

We captured 30 and PIT tagged 29 juvenile steelhead seined in the Mainstem John Day River between rkm 274–296 from February 4 to June 16, 2005 (Tables 15 and 20). We were unable to estimate an abundance estimate for steelhead past our seining reach because we did not recapture any of our PIT tagged steelhead during our mark-recapture efforts. Mean FL was 116.6 mm (Table 21). Of 29 juvenile steelhead migrants examined for *Neascus sp.* infestation, none showed any visible signs of black spots.

Table 18. Number (n) and percent age structure of juvenile steelhead captured and PIT tagged at three rotary screw trap sites during two periods (Fall/Winter, September 2004 to January 31, 2005; Spring, February 1 to July 6, 2005).

			Brood year (age)			
			2004	2003	2002	2001
Trap Site	Season	n	(age-1)	(age-2)	(age-3	(age-4)
South Fork	Fall/Winter	243	14.8	82.3	2.9	0
Mainstem	Fall/Winter	244	32.0	61.9	6.1	0
South Fork	Spring	1,925	16.1	78.0	5.8	0.2
Mainstem	Spring	1,408	12.0	76.7	11.2	0.1
Middle Fork	Spring	1,327	8.7	62.1	27.7	0.8
All sites	Spring	4,660	12.8	73.1	13.8	0.3

Table 19. Season, collection period, number captured (n), 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 basin from September 2, 2004 to July 6, 2005.

Location	Season	Collection Period	n	Capture Efficiency	Abundance	95% CL's
South	Fall/Winter	9/2/04–1/31/05	1,087	28.3		
Fork	Spring	2/1/05–6/17/05	2,601	16.2		
	Total		**3,688**		**25,364**	**21,952–29,919**
Mainstem	Fall/Winter	10/4/04–1/31/05	349	26.0		
	Spring	2/1/05–7/6/05	1,573	7.6		
	Total		**1,922**		**47,921**	**35,025–67,366**
Middle	Fall/Winter	10/6/04–11/18/05	5	0.0		
Fork	Spring	2/23/05–6/17/05	1,517	12.1		
	Total		**1,522**		**28,980**	**19,914–43,705**
Seining	Spring	2/4/05–6/16/05	30			

Table 20. Number (N), mean, and range of fork length and mass for steelhead migrants captured in rotary screw traps and while seining on the Mainstem John Day River during two periods (Fall/Winter, September, 2004 to January 31, 2005; Spring, February 1 to July 6, 2005).

		Fork Length (mm)			Mass (g)			Coefficient of condition		
Location	Period	N	Mean	Range	N	Mean	Range	N	Mean	Range
South Fork Trap	Fall/Winter	322	138.8	73–253	314	32.3	3.9–165.8	314	1.02	0.65–1.4
Mainstem Trap	Fall/Winter	248	141.2	65–292	246	36.8	3.0–230.2	246	1.02	0.78–1.3
Middle Fork Trap	Fall/Winter	5	168.4	68–312	5	87.6	3.4–280.4	5	0.99	0.87–1.1
All sites	Fall/Winter	575	140.1	65–312	565	34.8	3.0–280.4	565	1.02	0.70–1.4
South Fork Trap	Spring	2,068	152.0	65–256	1,628	39.3	2.5–169.9	1,628	1.02	0.20–2.6
Mainstem Trap	Spring	1,454	162.5	65–303	941	52.0	2.8–352.8	941	1.05	0.63–1.8
Middle Fork Trap	Spring	1,360	161.8	66–284	938	47.3	2.9–247.7	938	1.03	0.75–1.7
Mainstem Seining	Spring	29	116.6	99–207	26	49.6	12.2–94.2	26	1.02	0.29–1.3
All sites	Spring	4,911	157.9	65–303	3,533	44.9	2.5–352.9	3,533	1.03	0.20–2.6

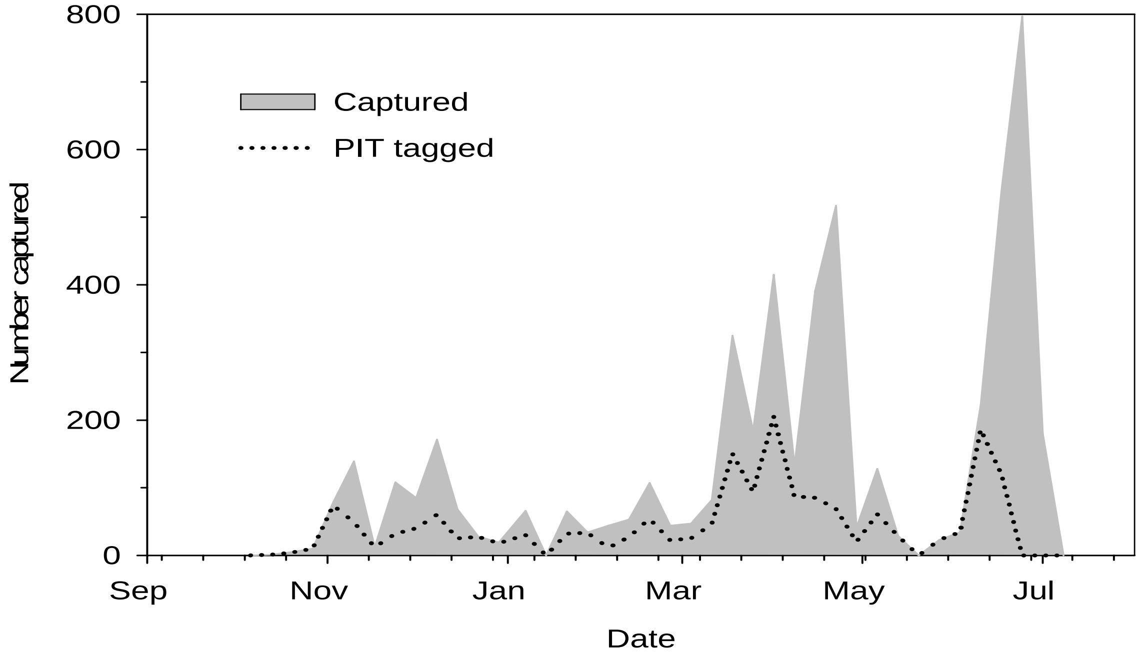

Figure 6. Weekly number of juvenile spring Chinook captured and PIT tagged at our rotary screw trap on the Mainstem John Day River (rkm 326) from October, 2004 to July, 2005. Numbers are not corrected for trap efficiency.

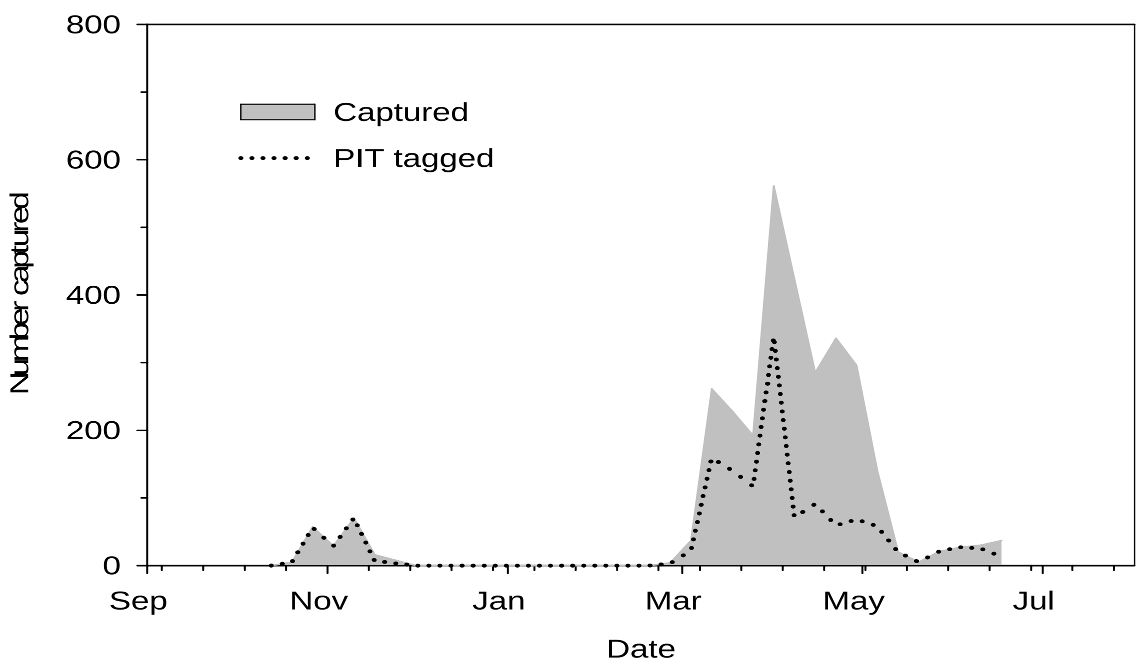

Figure 7. Weekly number of juvenile spring Chinook captured and PIT tagged at the Middle Fork John Day River rotary screw trap (rkm 24) from October, 2004 to June, 2005. Numbers are not corrected for trap efficiency.

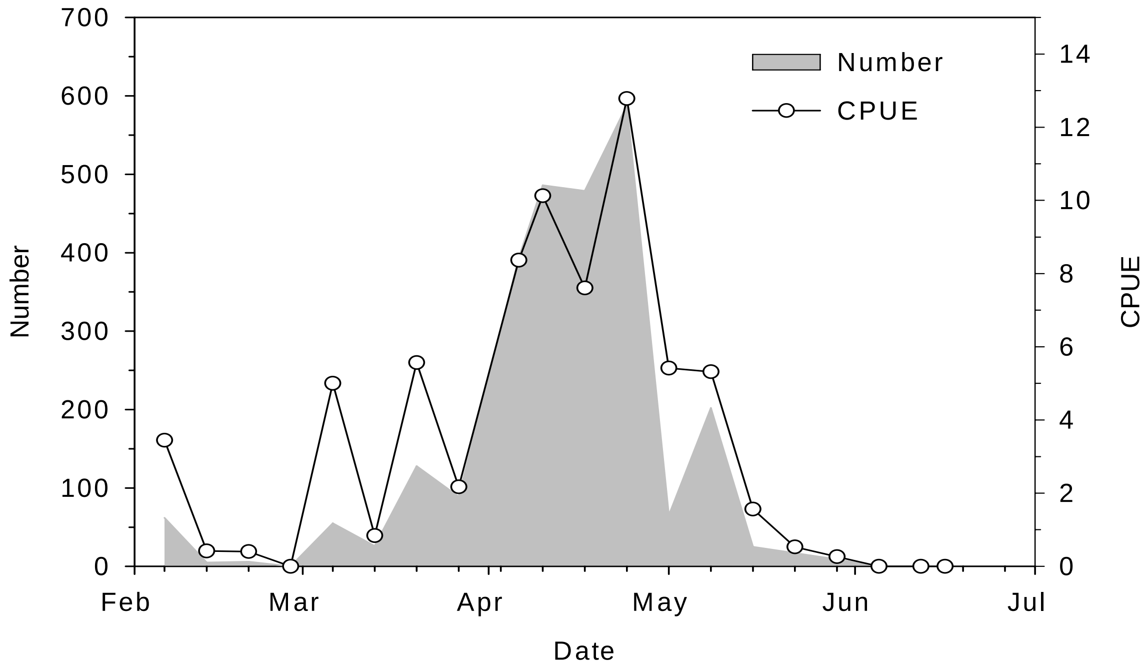

Figure 8. Weekly number captured, and catch per unit effort (CPUE, number/seine haul) of spring Chinook smolts while seining the John Day River between river kilometers 274 and 296 during 2005.

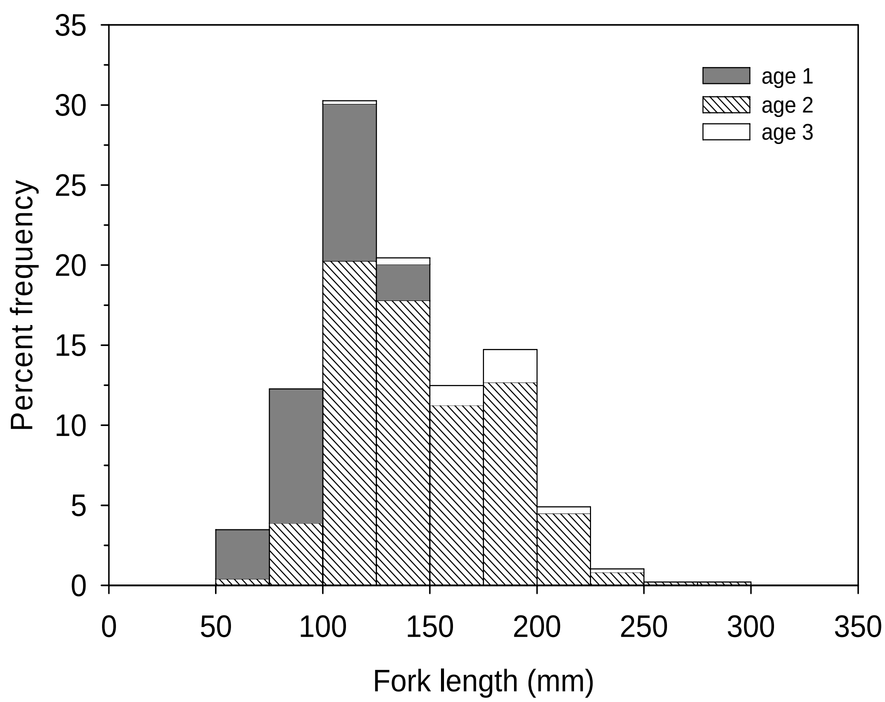

Figure 9. Length and age frequency histogram of 489 juvenile steelhead captured at three rotary screw trap sites during the Fall/Winter period (September, 2004 to January 31, 2005).

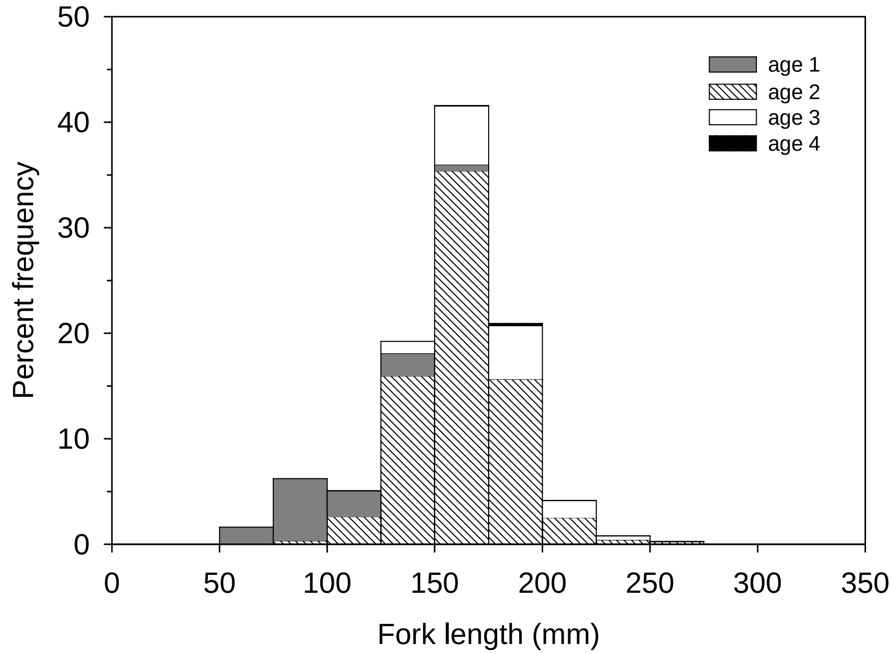

Figure 10. Length and age frequency distribution of 4,689 juvenile steelhead captured at three rotary screw trap sites in the John Day River basin during the Spring (February 1 to July 6) of 2005.

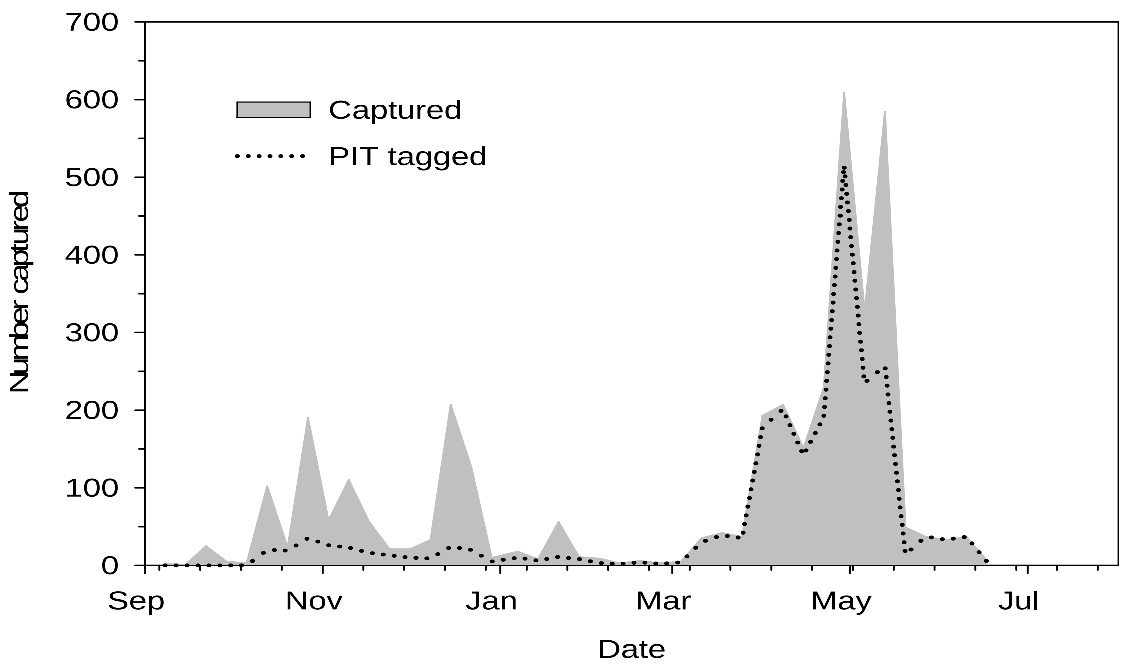

Figure 11. Weekly number of juvenile steelhead captured and PIT tagged at our rotary screw trap on the South Fork John Day River (rkm 10) from September 2004 to June 2005. Numbers are not corrected for trap efficiency.

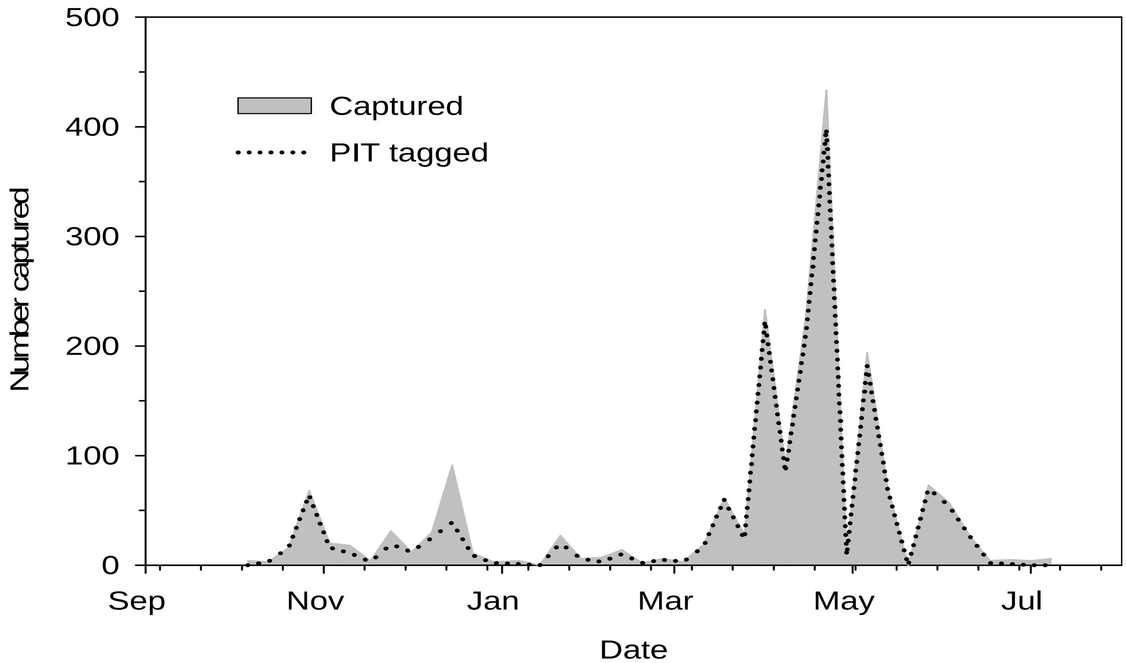

Figure 12. Weekly number of juvenile steelhead captured and PIT tagged at our rotary screw trap on the on Mainstem John day River (rkm 326) from October, 2004 to July 2005. Numbers are not corrected for trap efficiency.

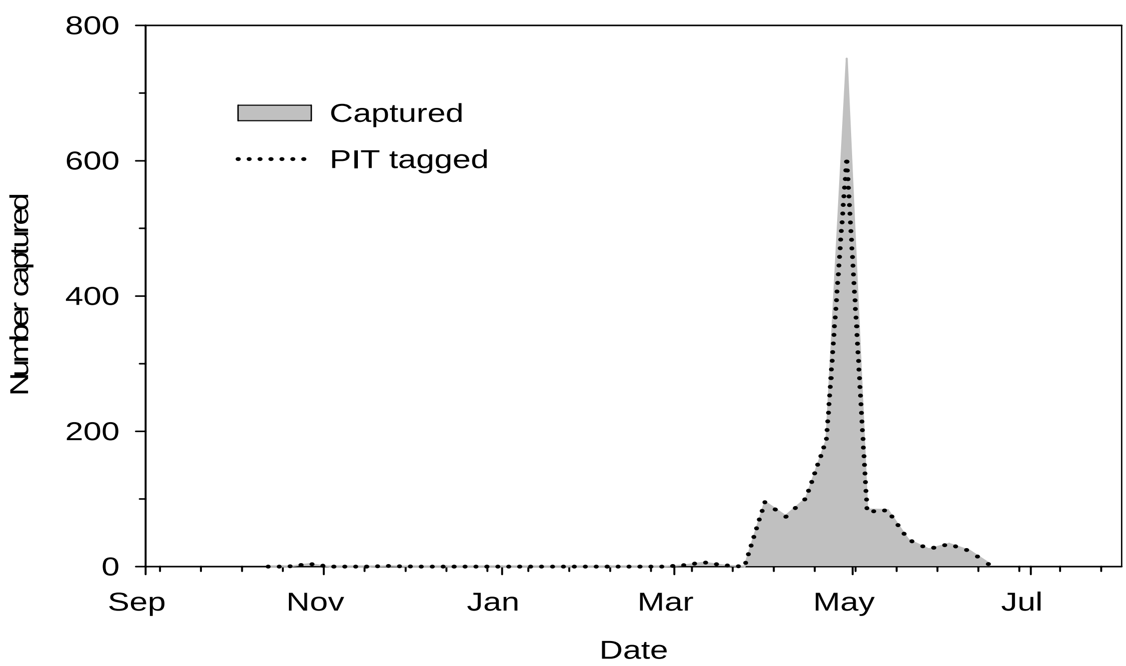

Figure 13. Weekly number of juvenile steelhead captured and PIT tagged at our rotary screw trap on the Middle Fork John Day River (rkm 24) from October, 2004 to June 2005. Numbers are not corrected for trap efficiency.

Incidental Catch and Observations

We captured at least 15 non-target species of fish in our seining and trapping efforts during the 2005 migration (Table 22). A total of 12 adult summer steelhead were captured during our trapping and seining efforts. Four of these, 33.3% were of hatchery origin (adipose fin clips), the remainder were unmarked. We captured one bull trout (152 mm FL) in the Middle Fork trap on June 7, 2005. We also captured four west slope cutthroat trout (*Oncorhynchus clarki lewisi)*; two each on November 23, (263 mm and 267mm FL) and November 30 (252 mm FL) and one on December 1, 2004 (261 mm FL). and three bluegill between May 13 and June 21, 2005.

Adult pacific lamprey were captured at all of our trapping and seining sites. Five adults were observed on during May and June at our Mainstem trap. Three adults were observed from May 27, to June 15 in our Middle Fork trap, one adult was observed at the South Fork trap on May 26, and one by the seining crew on April 4. We also captured 3,654 juvenile pacific lamprey at all three rotary screw trap sites with the majority captured at the Middle fork trap between November 4, 2004 and June 2, 2005. We also captured 1,097 in the Mainstem trap between October 5, 2004 and July 6, 2005; and 1001 in the South Fork trap between September 26, 2004 and June 8, 2005 (Table 22).

Smolt Detections at FCRPS Facilities

Of 656 juvenile spring Chinook migrants released as our fall/winter tag group, 20.3% were detected at John Day Dam, 3.2% at Bonneville Dam and 0.6% were detected as juveniles in the Columbia River Estuary (Table 23). Detections of these migrants at John Day Dam occurred bduring April and May, 2005 with 50% of the detections occurring by April 25. Mean travel time to John Day Dam was 152 days. Detections of this tag group at Bonneville Dam occurred between April 22 and May 6, 2005 with 50% occurring by April 30 (Table 23). Mean travel time to Bonneville Dam was 144 days. Detections in the Columbia River estuary occurred during May, 2005 and mean travel time was 153 days.

Of 5,138 juvenile spring Chinook migrants captured and released as our spring tag group, 33.9% were detected at John Day Dam, 10.5% at Bonneville Dam, and 1.4% in the Columbia River Estuary (Table 23). Detections at John Day Dam occurred between April 2 and June 12, 2005 and 50% of these were recorded by April 30. Mean travel time from all release sites to John Day Dam was 24 days. Detections at Bonneville dam occurred between April 22 and June 6, 2005 and 50% of these occurred by May 5. Mean travel time to Bonneville Dam was 28 days. Detections in the Columbia River estuary occurred between May 1 and June 16, 2005 and mean travel time was 30 days.

Of 573 juvenile steelhead migrants captured, PIT tagged, and released at our trapping and seining sites between September 2, 2004 and January 31, 2005 (fall/winter tag group), 10.3% (59) were detected at John Day Dam, 2.6% (15) at Bonneville Dam, and 1.4% (8) were detected in the Columbia River Estuary (Table 24). Detections at John Day Dam occurred between April 22 and May 25, 2005 and 50% occurred by May 2, 2005. Mean travel from all release sites to John Day Dam was 156 days (± 4.7 range 93–211 days, Table 21). Detections at Bonneville Dam occurred between April 30 and May 26, 2005 with 50% occurring by May 3. Mean travel time to Bonneville Dam was 161 days (± 10.7 days SE, range 103–197 days, Table 24). Detections in the Columbia River estuary occurred between April 15 and June 13, 2005 and mean travel time was 151 days (± 16.1 days SE, range 106–196 days).

Table 21. Number of non-target fish captured at the South Fork Trap (rkm 10, 9/2/04–6/17/05), Mainstem Trap (rkm 326, 10/4/04 - 7/6/05), Middle Fork Trap (rkm 24, 10/6/04–6/17/05), and in the Mainstem seining operation (rkms 274-296, 2/4–6/16/05).

Species	Trap sites			Seining
	South Fork	Mainstem	Middle Fork	Mainstem
Hatchery adult Summer Steelhead (Oncorhynchus mykiss)	1	1	0	2
Wild adult Summer Steelhead (Oncorhynchus mykiss)	1	0	2	5
West Slope Cutthroat Trout (Oncorhynchus clarki lewisi)		4	0	0
Mountain Whitefish (Prosopium williamsoni)	33	20	34	0
Brown Bullhead (Ameiurus nebulosus)	3	7	11	82
Bull Trout (Salvelinus confluentus)	0	0	1	0
Chiselmouth (Acrocheilus alutaceus)	1,092	6,997	264	22
Bluegill (Lepomis macrochirus)		3		0
Common Carp (Cyprinus carpio)				5
Dace (Rhinichthys sp.)	1,239	222	1,187	1
Northern Pike Minnow (Ptychocheilus oregonensis)	1,196	1,521	159	140
Sucker Sp. (Catostomus macrocheilus or C. columbianus)	2,970	6,788	967	200
Smallmouth Bass (Micropterus dolomieui)	1	896	12	130
Red Side Shiner (Richardsonius balteatus)	3,783	543	1,042	7
Sculpin sp. (Cottus sp.)	47	2	2	0
Adult Pacific Lamprey (Lampetra tridentata)	1	5	3	1
Juvenile Pacific Lamprey (Lampetra tridentata)				
Silver w/ eyes	505	668	756	
Silver w/ no eyes	6	1	0	
Brown w/ eyes	2	1	0	
Brown w/ no eyes	488	427	800	
Total Juvenile Pacific Lamprey	1,001	1,097	1,556	
Totals	11,368	18,107	5,240	595

Table 22. 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 2005 for spring Chinook smolts PIT tagged in the John Day Basin during the fall/winter (September 9, 2004 to January 31, 2005) and spring (February 1 to July 6, 2005) periods.

Tag Group	Detection Location	N	Detection Dates	Travel Time		
				Mean	SE	Range
Fall/winter	John Day Dam	133	April 3–May 2	152	2.5	75–192
	Bonneville Dam	21	April 22–May 6	144	6.8	97–194
	Estuary	4	May 3–May7	153	20.2	104–193
Spring	John Day Dam	1,743	April 2–June 12	24	0.4	3–87
	Bonneville Dam	538	April 22–June 6	28	0.7	5–87
	Estuary	70	May 1–June 16	30	1.6	9–82

Of 4,913 juvenile steelhead migrants captured, PIT tagged, and released at our trapping and seining sites between February 1, 2004 and July 17, 2005 (spring tag group), 29.7% were detected at John Day Dam, 4.3% at Bonneville Dam, and 1.6% were detected in the Columbia

River Estuary (Table 24). Detections at the John Day Dam occurred from April to June, with 50% occurring by May 9, 2005. Mean travel time from all release sites to John Day Dam was 17.4 days. Detections at Bonneville dam occurred from April to June and 50% occurred by May 5, 2005 (Table 24). Mean travel time to Bonneville Dam was 19 days. Detections in the Columbia River estuary occurred during April and May and mean travel time was 19 days.

Table 23. 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 2005 for summer steelhead smolts PIT tagged in the John Day Basin during the fall/winter time period (September 2, 2004 to January 31, 2005) and spring time period (February 1 to July 6, 2005).

				Travel Time		
Tag Group	Detection Location	N	Detection Dates	Mean	SE	Range
Fall/winter	John Day Dam	59	April 22–May 25	156	4.7	93–211
	Bonneville Dam	15	April 30–May 26	161	10.7	103–197
	Estuary	8	April 15–June 13	151	16.1	106–196
Spring	John Day Dam	1,461	April 6–June 12	17.4	0.4	3–109
	Bonneville Dam	211	April 8–June 3	19	1.0	5–108
	Estuary	77	April 28–May 23	19	1.1	7–49

Adult Chinook and Steelhead Detection at FCRPS Facilities

There were 125 detections of returning adult spring Chinook salmon at Bonneville Dam between April 16 and June 9, 2005 (Table 25). Of these 4.0% were age-3 from the 2004 smolt migration, 88% were age-4 from the 2003 migration, and 7.2% were age-5 from the 2002 migration and one was an age-6 fish from the 2001 migration. Eighty two (65.6%) of the 125 detections occurred during May with 29.6% (13 fish) during April and 4.8% (6 fish) during June. Of the 125 detected at Bonneville Dam, only one was also detected at McNary Dam (Table 26). Estimated smolt-to-adult returns (SAR) for spring Chinook from the Mainstem John Day River at Kimberly to the ocean and back to Bonneville Dam for the 2000 brood year was 2.5%. We adjusted the SAR for the 1999 brood year to 2.65% with the addition of one age-6 fish. Return data for subsequent cohorts is not yet complete.

Sixty seven PIT-tagged adult summer steelhead were detected at Bonneville Dam from July 26 to September 16, 2005 with 56.7% (38 fish) during July, 38.8% (26 fish) during August, and 4.5% (3 fish) during September. Estimated SAR for summer steelhead from the 2003 juvenile migration year was 1.3% (Table 27). Of the 67 PIT tagged adults detected at Bonneville Dam, 66 (98.5%) returned as one-ocean fish and one (1.5%) returned as a two-ocean fish. We will be able to reconstruct cohort SARs for summer steelhead after additional data on smolt age structure is collected. Some of the steelhead adults detected at Bonneville Dam appeared to stray upriver past the mouth of the John Day River. Thirty six (53%) of our PIT-tagged adults detected at Bonneville Dam were also detected at McNary Dam. At least 19% (13 fish) were also detected at Ice Harbor Dam and 13% (9 fish) were detected at Lower Granite Dam (Table 28).

Table 24. 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 2000–2005.

Brood Year	Migration Year	# Smolts Tagged	Bonneville Dam PIT Tag Detection						SAR
				Adult Detections					
			Return Years	Age 3	Age 4	Age 5	Age 6	Total	
1998	2000	1,852	2001–2004	4	112	28	0	144	7.78 %
1999	2001	3,893	2002–2005	7	80	15	1	103	2.65 %
2000	2002	4,000	2003–2006	5	86	9		100	2.50 %
2001	2003	6,147	2004–2007	5	110				1.87 %[c]
2002	2004								
	Fall/winter[a]	399	2005–2008	0					
	Spring[b]	4,036		5					
2003	2005								
	Fall/winter[a]	656	2006–2009						
	Spring[b]	5,138							

[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.
[c] Preliminary SAR.

Table 25. Detection year and number detected at Bonneville, McNary, Ice Harbor, and Lower Granite Dams from 2001–2005 of adult spring Chinook PIT tagged as juveniles in the John Day River basin. Not all dams had detectors during all return years.

Detection Year	Bonneville Detections	Number (%)		
		McNary	Ice Harbor	Lower Granite
2001	4	--	--	--
2002	119	12	--	7
2003	113	3	2	2
2004	106	1	1	0
2005	125	1	0	0

Table 26. Smolt-to-adult return (SAR), year, and number tagged, return year as adults, age at return by ocean year, and number of delayed migrants (migrants than smolt one year after being tagged) detected at Bonneville Dam for summer steelhead PIT tagged as smolts in the John Day River basin 2001–2005.

		Bonneville Dam Detection				
			Number by ocean residence			
Tag Year	Number Tagged	Return Years	One-ocean	Two-ocean	Delayed migrants	SAR
2001	435	2002–2004	1	5	1[c]	1.61 %
2002	0					
2003	144	2004–2005	1	1		1.39 %
2004						
Fall/Winter[a]	898	2005–2006	6			0.67 %[d]
Spring[b]	3,732		60			1.61 %[d]
2005						
Fall/Winter[a]	573	2006–2007				
Spring[b]	4,913					

[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] One fish tagged in 2001 did not migrate until 2002 and returned as an adult in 2004 as a two-ocean fish.
[d] Preliminary SAR excludes two-ocean fish.

Table 27. Detection year, number detected at Bonneville Dam, and percentage of those also detected at McNary, Ice Harbor, and Lower Granite Dams during 2003–2005 of returning adult steelhead PIT-tagged as juveniles in the John Day River basin.

Detection Year	Bonneville Detections	Number (%) McNary	Ice Harbor	Lower Granite
2003	5	3 (60 %)	1 (20 %)	0
2004	2	1 (50 %)	1 (50 %)	0
2005	67	36 (53 %)	13 (19 %)	9 (13 %)

DISCUSSION

This is the first year since 2000 where fewer than 1,000 spring Chinook redds were observed during spawning season in the John Day River basin. The 2005 census redd count of 902 redds decreased 45.5% from 2004, and was well below the 2000–2005 mean of 1,612 redds. Redd numbers declined in all subbasins, especially the North Fork subbasin and all of its tributaries, including the GCS and Desolation Creek. The index redd count for 2005 (570) was the lowest recorded since 1999, was slightly below the 47 year mean (1959–2005) of 599 redds, and was well below the 2000–2005 mean of 1,173 redds.

There is an overall increasing trend in redd counts since 1959, when spawning surveys first began in the John Day Basin. However, during this latest year we observed a substantial decrease in redd counts across all subbasins. Similarly, large declines (around 50%) in redd counts were also recorded throughout the Columbia River Basin. There are many speculations as to why such a drop in spring Chinook redd and fish numbers occurred in the Pacific Northwest. Ocean productivity and predation coupled with freshwater influences are factors currently being studied.

Although it is unlikely that the low return is due to freshwater events alone, habitat degradation, harvest, hydroelectric factors, and hatchery production all play roles in fish survival and should continue to be considered for management decisions. Persistent habitat improvements have probably increased survival for juvenile salmon over the long-term, at least during their freshwater rearing stage. However, recently developed stock recruitment data suggests that freshwater rearing habitat is still limiting freshwater production. Emigrating juveniles also face obstacles such as dam passage, drought, temperature fluctuations, and freshwater predation by fish, birds, humans, and marine mammals. Juvenile passage survival was not atypical in 2002 and 2003, the years contributing to most of the 2005 return run (TAC 2005). Dam passage and low flow during these years did not appear to have a detrimental effect on juvenile salmon because age-3 fish (jack) returns were relatively high. Computer modeling by NOAA National Marine Fisheries Service (NMFS) has shown that mortality of salmon is low once they have survived their first year in the ocean (2005).

Freshwater temperature and dam spill are potential factors affecting adult salmonid mortality. Elevated temperatures have been linked to altered migration behavior and lower migration success, slower swim speeds, later arrival to spawning grounds and more energy expended to reach spawning grounds (Peery et al. 2003; University of Idaho 2005; Salinger and Anderson 2006). Higher temperatures may increase fish passage time through the dams and more fish reject fishways at John Day Dam when the water temperatures exceed 18°C (Peery et al. 2003, University of Idaho 2005). This in turn can cause straying or failure to reach spawning beds. However in 2004 and 2005, temperatures at the John Day Dam did not exceed 18°C until the end of June when most of the run had already entered the John Day River (DART). Higher spill volumes at dams slightly increase adult passage time and can cause higher fallback rates, which decrease survival for individual fish (Hinch and Rand 2000; University of Idaho 2005; Salinger and Anderson 2006). Spill data from April through August of 2004 and 2005 show spill less than 100 kcfs and often less than 80 kcfs in 2005 (DART).

As speculated by NOAA, primary indicators associate poor oceanic conditions with the low spring Chinook return. We know relatively little about upriver Columbia River

Chinook migration during their ocean residency because less than 20% of the ocean troll catch contains stream-type fish (Healey 2003). Since unexpectedly low returns occurred across the Columbia River Basin and affected multiple stream-type Chinook stocks, it is probable that significant mortality struck adult salmon in pelagic regions of the ocean beyond scientific measurements.

Most available studies involve the relatively short time juveniles spend on the coasts upon their entry to seawater. Most of this year's adult Chinook migrated to sea as juveniles during 2003, a year with less favorable ocean environmental conditions as indicated by the Pacific Decadal Oscillation Index, Northern Copepod Index, and piscine predator abundance (NOAA 2005). NOAA suspects a "prolonged but weak El Niño event" in 2003 that possibly caused predators such as hake (Pacific whiting) to leave the California coast and congregate in Northwest waters (2005). This El Niño event also caused higher temperatures and a lack of upwelling (TAC 2005). Results from a study conducted by NOAA using smolt abundance and adult return data from the 1960's through 2003 and predicted changes in ocean survival, led researchers to expect optimistic SARs in 2001–2003 (Scheuerell and Williams 2005). This prediction was made using the Pacific Coastal Upwelling Index which influences salmon in the ocean by forcing marine nutrients to the surface. Water is cooled, primary production is increased, and as a result, smolt foraging conditions improve. Though optimistic for brood years 2002–2003, Scheuerell and Williams (2005) did foresee a natural decline in salmon survival as inevitable due to the cyclic nature of the NE Pacific ecosystem. Natural populations can be extremely influenced (positively or negatively) by climate conditions (Zabel et al. 2006).

Other evidence points to an increasing trend in mammalian predators. More pinnipeds are congregating and staying for longer periods at Bonneville Dam, reportedly taking 3.4% of the 2005 spring Chinook return run (TAC 2005; University of Idaho 2005). Investigations are underway to examine other factors that might have affected salmon productivity.

Over the last six years, index surveys represented a majority of redds observed (mean = 72.7%; 63.2% in 2005) in the John Day River basin. However, census surveys are accounting for a greater proportion of redds each year as spring Chinook expand into new areas to spawn. Census surveys from 2000–2005 accounted for a mean of 439.5 more redds than index surveys alone. Index surveys are only useful for observing population trends and are inadequate for estimating escapement for a sport fishery. Total census redd counts are necessary to produce an accurate smolt per redd estimate as well. Index surveys when coupled with census surveys produce a complete picture of spring Chinook spawning distribution and redd count in the John Day Basin.

Insufficient numbers of spring Chinook have returned to the John Day River basin to meet the management goal of an average annual escapement of 5,950 adults for natural production (Columbia-Blue Mountain Resource Conservation and Development Area 2005). An average annual return of 5,950 spring Chinook would also trigger a limited sport fishery on the Mainstem that was discontinued in 1976. Conservative estimates of spawner escapement based on the ratio of three fish per redd multiplied by the number of redds counted during census surveys of the basin for 2000, 2001, 2002, 2003, 2004, and 2005 were 5,607, 5,589, 5,877, 4,251, 4,968, and 2,706 respectively. The mean escapement for all six years is 4,833 adults, 1,117 fish (or 372 redds) less than the number required to trigger a local fishery. There is currently a limited spring Chinook fishery in the summer for the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) on the North Fork and Granite Creek. In 2005, Tribal members caught and kept eight spring Chinook on Granite Creek, with a CTUIR quota of eight and ODFW recommendation of eight (Gary James, CTUIR; Tim Unterwegner, ODFW, personal communication). A quota of 60 fish was set for the North Fork but harvest information for that area is unknown. Bob Wolfe, an enforcement officer for USFS who patrols the North Fork subbasin, usually witnesses Tribal fishing in both areas most years but only observed indirect evidence of such activity during 2005 (personal communication).

Current methods of estimating adult escapement to the John Day River spawning grounds may not be adequate. Presently we use the pre-determined fish/redd standard or use a fish/redd ratio from a weir outside of the basin to estimate population size. The closest representative fish weirs are on the Warm Springs River, Catherine Creek, Grande Ronde River, and Imnaha River. Weir estimates are usually higher than the standard three fish/redd ratio, vary substantially from year to year, and vary between weir sites due to different operation protocols and natural variation. More accurate escapement estimates would require a within-basin ratio. Suggestions on how to accomplish this task have been presented previously (Schultz et al. 2006).

The spring Chinook spawner characteristics of age composition, length-age relationship, and basin-wide sex ratio were all within recently reported ranges (Schultz et al. 2006; Wilson et al. 2005, 2002; Carmichael et al. 2002; Ruzycki et al. 2002). There was one precocious age-2 carcass and seven age-3 carcasses sampled in 2005. The precocious carcass was a male and one of the age-3 carcasses was a female. Incidence of age-3 male carcasses was similar to observations in 2004 but lower than in 2000–2003. An age-3 female has not been observed in the basin since 2001. Proportions of age-4 and age-5 carcasses were similar to those observed in 2004. As expected, most carcasses (91%) sampled in 2005 were age 4. Proportions of males and females in each subbasin were similar to previous years, however, the GCS held a significantly greater proportion of females compared to the remainder of the basin. Significantly more females than males were observed in both Granite Creek and Clear Creek.

Basin-wide female spawner success measured as percentage of eggs retained from examined female carcasses for 2005 (82.3% spawned with 0% egg retention), was lower than 2004 by 12.2% (see Schultz et al. 2006). Spawning success this year was also lower than 2003 (87.1%), 2002 (90.8%) and 2000 (94.4%; see Carmichael et al. 2002; Wilson et al. 2002, 2005). Stress due to drought conditions and elevated water temperatures may account for varying levels of female spawner success.

The GCS exhibited significantly greater pre-spawning mortality (females with 100% egg retention), this year (16 of 44, 36.4%). Of all pre-spawn mortalities observed basin-wide, significantly more were found in the GCS (16 of 22, 72.7%, Table 10). Most females sampled in the Granite Creek tributary (53.3%) were pre-spawn mortalities. Females, which outnumbered males in this subbasin, may have been waiting for males to arrive on the spawning grounds and were therefore retaining eggs until mating was possible. This presumption might also explain why spawning was later than usual in this drainage. Temperatures at the mouth of Granite Creek were not significantly different from those recorded in 2004, when the GCS exhibited a comparatively greater (47.4%) female spawner success rate. Significant pre-spawning mortality was also observed in 2001, when low stream flow was comparable to flow in 2005 (USGS). In fact, stream flow recorded both at Monument, OR on the North Fork and at Service Creek, OR on the Mainstem was less than 100 cfs from August to October for both 2001 and 2005. Stress from low flows may have contributed to mortality during these years. It would be advantageous to have a gauging station in Granite Creek to better measure correlations between flow and disease and/or pre-spawning mortality. The current limited data suggests that low flow rather than high temperatures has been a factor contributing to mortality in 2005.

For three consecutive years (2003–2005), carcasses in the GCS showed a significantly higher incidence of gill lesions compared to other John Day subbasins (Table 14). Although these fish were probably exposed to multiple stressors potentially contributing to lesion prevalence, evidence points to possible water quality issues, crowding, and possibly rough handling or mechanical injury from anglers. These factors together with high water temperature, low oxygen, high ammonia, and high nitrite concentrations may contribute to gill lesion occurrence (Moeller 1996; Durborow et al. 1998). We have little knowledge about current water quality levels in this system. Most local mineral mines are present on Clear Creek where effluent or heavy metals from settling ponds have been reported to seep into the water column during periods of high runoff, resulting in fish kills (Wilson et al. 2002, 2005; Jeff Neal, ODFW, personal communication). Heavy metals also leak into Clear Creek and Bull Run Creek as a natural occurrence, but historical mining practices have likely concentrated these elements in the streams. Blackjack Mine, "No-Name" Mine, and Red Boy Mine lower the water pH potentially inhibiting salmonid reproduction, and also release high amounts of copper, zinc, manganese, and iron (Felix 1981). In most years, Chinook will spawn in Clear Creek near Red Boy Mine (Wilson et al. 2002, 2005; Schultz et al. 2006; John Dadoly, DEQ, personal communication). On June 2006, Red Boy Mine was observed leaking orange sludge directly into Congo Gulch (a tributary to Clear Creek; Terra Schultz, ODFW, personal observation). Several plans have been made to reclaim mines but, limited progress has been made except on Blackjack and Bluebird Mines. Installation of permanent plugs in these mines occurred in the summer of 2006 (Dennis Boles, USFS, personal communication). Consistent water quality testing would help to determine if heavy metal effluent is a source of lesions or pre-spawning mortality. It still remains a possibility that *Flavobacterium columnare* is causing lesions and we plan on collecting gill samples from fresh carcasses in 2006 to test for columnaris disease in the lab. Lesions may be affecting spawning activity because 50% of infected fish observed in the GCS were also pre-spawn mortalities.

The proportion of hatchery strays this year (nine of 701, 1.3%) was lower than 2004 (3.6%) and slightly below the 2000–2005 mean of 1.5% (Table 12; Carmichael et al. 2002; Ruzycki et al. 2002; Wilson et al. 2002, 2005; Schultz et al. 2006). The prevalence of spring Chinook strays in the John Day River basin from a particular hatchery is dependent on both the stray rate and number of individuals tagged from the stock. Not all hatchery stocks are tagged at the same rate. As expected from previous data, one sampled hatchery fish originated at Lookingglass Hatchery (LGH, Table 12). Even though the stray rate is low and well under 10%, it raises some concern to have fish from this hatchery spawning in the John Day Basin. LGH has had BKD and IHNV infections among juvenile Chinook. There is an increasing trend of Rs infection in juvenile salmon at LGH, a potentially serious problem if these juveniles are used to supplement natural populations (Groberg et al. 1999). Infected juveniles can survive to return as adults and infected adult females may carry Rs antigen in ovarian fluid. Risk of vertical transmission to the eggs increases with higher levels of Rs. BKD has been detected in progeny reared from these females as detected by the ELISA test (Sam Onjukka, ODFW, personal communication). It is also possible for adults to shed bacteria into the water, infecting other fish (horizontal transmission). The majority of hatchery adults sampled on John Day River spawning grounds in 2005 (predominantly age 4) were from the 2001 brood year . During this brood year, LGH juveniles were generally healthy with only some fish showing low BKD infection (Sam Onjukka, ODFW, personal communication). Adult Chinook returning to the hatchery in 2005 had similar health. The 2002 brood year also had some BKD mortalities and other diseases at LGH while juveniles from the 2000 brood year had low mortality and no signs of BKD during their hatchery residency. Only one hatchery fish (age 5) sampled in the basin in 2005 had a CWT from LGH.

Despite the potential transmission risk from hatchery strays, few BKD infections were detected within the John Day Basin during 2005. Of 114 kidney samples taken from carcasses examined during spawning surveys, two (1.8%) had clinical levels of Rs antigen (Table 13). Factors other than BKD are likely causing this proximate pre-spawning mortality in the John Day Basin since all females with partial or complete pre-spawning mortality had negative or low positive levels (non-clinical) of Rs antigen. In addition, no fish from the GCS were identified as having a significant infection even though this subbasin exhibited the highest pre-spawning mortality. No kidney samples from 2002 and 2003 (samples were not collected in 2004) showed clinical Rs levels (Wilson et al. 2005).

Other diseases observed at LGH and at other local hatcheries include bacterial cold water disease, Erythrocytic Inclusion Body Syndrome, enteric red mouth (ERM), and furunculosis. Both ERM and furunculosis are known to cause pre-spawning mortality in adults at LGH (Groberg et al. 1999). Some experimental vaccines are being developed but there is no treatment for infection from IHNV and culling and treatment of BKD does not always remove it entirely from the population. It is essential we continue to monitor infections in hatchery strays as well as the natural Chinook population during spawning surveys given the continuing potential for disease transmission.

The abundance estimate for emigrating Chinook smolts was higher than the previous four years but within the range of expected production (70,359–168,810 smolts) described by Lindsay et al (1986). Juvenile spring Chinook peak migration timing, mean smolt length and mass, percent detection at John Day and Bonneville Dams, and mean travel time to both John Day and Bonneville Dams were all within the range previously reported (Carmichael et al. 2002, Ruzycki et al. 2002, Wilson et al. 2005, Schultz et al. 2006). While condition factor was similar among seasons for all migrants, spring migrants were overall larger than those migrating during the fall/winter period. As reported for 2004, both fall/winter and spring emigrating juvenile spring Chinook captured at the Middle Fork trap tended to be smaller than those captured at the Mainstem Trap and in the Mainstem seining operation (Schultz et al. 2006).

Abundance estimates for Steelhead emigrating from the John Day River basin were reported for the second consecutive year. All of our estimates are for areas above our rotary screw trap sites and were more than twice the number of migrants estimated for the 2004 juvenile migration (see Schultz et al. 2006). As in 2004, the upper Mainstem produced almost twice as many migrants as did the Middle Fork. However, steelhead production from tributaries of the Middle Fork downstream of our trap site (including

Long Creek) were not accounted for in our abundance estimate. The majority of steelhead emigrated past the Mainstem (82%) and Middle Fork (100%) traps during the months of March, April, and June. A majority of the steelhead in the South Fork also emigrated between the months of April and June, however, an estimated 29% of South Fork migrants emigrated past the trap site during the fall and winter. As during 2004, spring emigrating steelhead captured at the Mainstem Trap tended to be larger than those captured at both the South Fork and Middle Fork Traps. Overall mean FL at all trapping sites was similar to previous years (Carmichael et al. 2002, Ruzycki et al. 2002, Wilson et al. 2005, Schultz et al. 2006).

We adjusted our estimated spring Chinook SAR to 2.65% for the 1999 brood year to account for the detection of an age-6 spring Chinook at Bonneville Dam during 2005. Our estimated spring Chinook SAR for the 2000 brood year was 2.5% and is the lowest we have measured for the John Day basin (Table 25). Preliminary data suggests that the John Day spring Chinook 2001 brood year SAR (currently 1.87% excluding age-5 adults) will be lower than the 2000 brood year. Detections of juvenile spring Chinook and steelhead emigrants at John Day Dam and Bonneville Dam were similar to previous years. The addition of three rotary screw traps in the Mainstem, South Fork, and Middle Fork significantly increased our capture efficiency over our previous seining efforts and made it possible for our crews to PIT tag 4,913 Steelhead during the spring of 2005. Our preliminary (excludes two-ocean fish) SAR estimate for the 2004 juvenile migratory year is 0.67% for fall/winter tagged fish and 1.61% for spring tagged fish.

CONCLUSIONS

Adult spring Chinook salmon pre-spawning mortality surveys should be continued in order to better understand the limiting factors that influence adult survival prior to spawning. Knowledge of these limiting factors could guide future habitat restoration and mine reclamation projects and influence management decisions regarding a spring Chinook fishery.

The John Day Basin wild spring Chinook population is an index population for assessing the effects of alternative management practices on other salmon stocks in the Columbia Basin. Data collection regarding the percentage of female egg retention, incidence of BKD, and incidence of gill lesions should be continued. BKD management should be a high priority given the serious possibility of infection. Comprehensive water quality testing of tributaries in the Granite Creek System are recommended since it is unknown whether heavy metals, columnaris, and/or other stressors cause gill lesions and pre-spawning mortality. Continued fish health monitoring will provide valuable pathogen and disease information for comparison to other systems where alternative management practices (hatchery production and/or supplementation) are applied.

Temperatures in Clear and Granite Creeks should also be monitored to determine possible correlations with disease (columnaris and furunculosis are exacerbated by high temperatures, Groberg et al. 1999). A temperature logger was installed in Granite Creek between Ten Cent and Buck Creek and also in Clear Creek near the mouth, for the 2006 return run. Since there are also possible correlations between stream flow and disease or stress, a water gauge is recommended for Granite Creek. Presently, the closest gauge is in Monument, Oregon on the North Fork. Rotary screw traps should continue to be used to capture and PIT tag juvenile spring Chinook and summer steelhead for emigrant abundance and SAR estimates.

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APPENDIX

Appendix A.   2005 Spring Chinook Spawning Survey Data

Appendix Table A-1. Spring Chinook spawning survey data depicting males (M), females (F), unknowns (U), and precocious males (P), from the John Day River basin, 2005.

Stream, section	Survey type	Date	Km	Miles	New Redds	Live Fish On dig	Live Fish Off dig	Dead Fish, Unmarked M	Dead Fish, Unmarked F	Dead Fish, Unmarked U	Dead Fish, Unmarked P	Dead Fish, Marked M	Dead Fish, Marked F	Dead Fish, Marked U	U	Dead Fish	Live Fish	Unmarked Dead	Marked Dead
Mainstem John Day River																			
Forrest Conservation Area property boundary to Dad's Creek	Census 1	6-Sep	2.9	1.8	5	1	3	0	0	0	0	0	0	0	0	0	4	0	0
Dad's Creek to Emmel Upper Fence	Index		1.8	1.1	Access Denied														
Emmel Upper Fence to Smith Upper Fence	Index		1.6	1.0	Access Denied														
Smith Upper Fence to Field Upper Fence[a]	Index	6-Sep	1.9	1.2	18	10	4	2	2	0	0	0	0	0	1	5	14	4	0
Field Upper Fence to Split Channel[a]	Index	6-Sep	0.2	0.1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North Channel[b]	Index	6-Sep	1.9	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upstream end of Split Channel to French Lane (N. River Rd)	Index	6-Sep	0.3	0.2	2	2	0	1	0	0	0	0	0	0	0	1	2	1	0
South Channel (Upper Split to Smith/Coombs Upper Fence)	Index	6-Sep	0.8	0.5	13	9	1	2	3	0	0	1	0	0	0	6	10	5	1
South Channel (Lower Split to Smith/Coombs Upper Fence)	Index		2.1	1.3	Access Denied														
French Lane (N. River Rd) to Jacobs Upper Fence	Index	6-Sep	1.6	1.0	5	4	0	0	0	0	0	0	0	0	1	1	4	0	0
Jacobs Upper Fence to Road 13 Bridge	Index		1.9	1.2	Access Denied														
Road 13 Bridge to Klondike Lower (Reynolds Upper) Fence	Index	6-Sep	2.3	1.4	21	20	6	6	3	0	0	0	0	0	0	9	26	9	0
Klondike Lower (Reynolds Upper) Fence to Klondike Upper Fence	Index		0.8	0.5	Access Denied														
Klondike Upper Fence to Ricco Upper Fence	Index		3.7	2.3	Access Denied														
Ricco Upper Fence to Call Creek	Census	6-Sep	3.2	2.0	3	2	0	0	0	0	0	0	0	0	0	0	2	0	0
Deardorff Creek (mouth to 2.3 km upstream)[c]	Census	6-Sep	2.3	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Indian Creek to Shaw Gulch	Census		4.5	2.8	Access Denied														
Shaw Gulch to Prairie Wood Products Lower Boundary	Census		2.6	1.6	Access Denied														
Prairie Wood Products Boundary to Dixie Creek[a]	Census	14-Sep	0.8	0.5	6	5	0	0	0	0	0	0	0	0	0	0	5	0	0
Dixie Creek to Main Street Bridge	Census	14-Sep	0.6	0.4	1	2	1	0	1	0	0	0	0	0	0	1	3	1	0
Main Street Bridge to Forrest Conservation Area boundary	Census	14-Sep	0.6	0.4	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0
Forrest Conservation Area boundary to Dad's Creek[d]	Census 2	14-Sep	2.9	1.8	10	23	0	8	8	1	0	2	0	0	0	19	23	17	2
Dad's Creek to Emmel Upper Fence	Post-Index		1.8	1.1	Access Denied														
Emmel Upper Fence to Smith Upper Fence	Post-Index		1.6	1.0	Access Denied														
Smith Upper Fence to Field Upper Fence[a]	Post-Index	14-Sep	1.9	1.2	4	2	0	0	2	0	0	0	0	0	0	2	2	2	0
Field Upper Fence to Split Channel[a]	Post-Index	14-Sep	0.2	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upstream end of Split Channel to French Lane (N. River Rd)	Post-Index	14-Sep	0.3	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Channel (Upper Split to Smith/Coombs Upper Fence)	Post-Index	14-Sep	0.8	0.5	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0
South Channel (Lower Split to Smith/Coombs Upper Fence)	Post-Index		2.1	1.3	Access Denied														
French Lane (N. River Rd) to Jacobs Upper Fence	Post-Index	14-Sep	1.6	1.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jacobs Upper Fence to Road 13 Bridge	Post-Index		1.9	1.2	Access Denied														
Road 13 Bridge to Reynolds Upper Fence	Post-Index	14-Sep	2.3	1.4	3	2	0	0	4	0	0	0	0	0	0	4	2	4	0
Klondike Lower Fence to Klondike Upper Fence	Post-Index		0.8	0.5	Access Denied														
Klondike Upper Fence to Ricco Upper Fence	Post-Index		3.7	2.3	Access Denied														

Appendix Table A-1. Continued.

Stream, section	Survey type	Date	Km	Miles	New Redds	Live Fish On dig	Live Fish Off dig	Dead Fish, Unmarked M	Dead Fish, Unmarked F	Dead Fish, Unmarked U	Dead Fish, Unmarked P	Dead Fish, Marked M	Dead Fish, Marked F	Dead Fish, Marked U	U	Dead Fish	Live Fish	Unmarked Dead	Marked Dead
Mainstem John Day River (continued)																			
Call Creek to 2.3 km upstream	Random	22-Sep	2.3	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.2 km downstream of Deep Gulch to 0.2 km downstream of Fisk Cr.	Random	22-Sep	2.1	1.3	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0
Mainstem Subbasin Total					**95[e]**	**83**	**15**	**21**	**23**	**1**	**0**	**3**	**0**	**0**	**2**	**50**	**98**	**45**	**3**
Middle Fork John Day River Subbasin																			
Middle Fork John Day River[f]																			
Beaver Creek to Split Channel	Index	20-Sep	1.4	0.9	5	5	2	1	1	1	0	0	0	0	0	3	7	3	0
South Braid	Index	20-Sep	1.6	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North Braid	Index	20-Sep	1.1	0.7	6	4	0	1	2	0	0	0	0	0	2	5	4	3	0
Upstream end of Split Channel to Upper Oxbow Boundary	Index	20-Sep	1.1	0.7	2	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Upper Oxbow Boundary to Windlass Creek	Index	20-Sep	1.4	0.9	9	1	0	3	2	0	0	0	0	0	0	5	1	5	0
Windlass Creek to Caribou Creek	Index	20-Sep	6.0	3.7	12	2	3	5	8	1	0	0	0	0	1	15	5	14	0
Caribou Creek to Dead Cow Bridge	Index	20-Sep	3.4	2.1	44	7	0	12	15	1	0	0	0	0	0	28	7	28	0
Dead Cow Bridge to Placer Gulch	Index	20-Sep	2.3	1.4	18	5	2	8	8	1	0	0	0	0	0	17	7	17	0
Placer Gulch to Upper Forrest Conservation Area boundary	Index	20-Sep	0.3	0.2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper Forrest Conservation Area boundary to Hwy 7	Index	20-Sep	3.9	2.4	17	6	2	6	10	1	0	0	0	0	0	17	8	17	0
Hwy 7 to Phipps Meadow	Census 1	20-Sep	7.1	4.4	18	7	1	10	8	0	0	0	0	0	0	18	8	18	0
Armstrong Creek to Deep Creek	Census	21-Sep	5.3	3.3	2	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Deep Creek to Road 36 Bridge	Census	21-Sep	5.0	3.1	2	1	0	0	1	0	0	0	0	0	0	1	1	1	0
Road 36 Bridge to Lower Nature Conservancy Property Boundary	Census	21-Sep	2.7	1.7	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Lower Nature Conservancy Property Boundary to Coyote Creek	Census	21-Sep	2.1	1.3	8	6	3	7	3	0	0	0	0	0	0	10	9	10	0
Coyote Creek to Upper Nature Conservancy Property Boundary	Census	21-Sep	4.2	2.6	10	2	0	1	3	0	0	0	0	0	0	4	2	4	0
Upper Nature Conservancy Boundary to Lower Oxbow Boundary	Census	21-Sep	1.8	1.1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Lower Oxbow Boundary to Beaver Creek	Census	21-Sep	2.4	1.5	6	4	1	9	3	0	0	0	0	0	0	12	5	12	0
0.4 km downstream to 1.9 km upstream of Big Creek	Random	28-Sep	2.3	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.6 km downstream to 0.6 km upstream of Slide Creek	Random	28-Sep	2.1	1.3	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0
Hwy 7 to Phipps Meadow	Census 2	30-Sep	7.1	4.4	6	0	1	0	7	0	0	0	0	0	0	7	1	7	0
Clear Creek, tributary of the Middle Fork John Day River																			
Mouth to Hwy 26	Census	20-Sep	2.1	1.3	9	0	0	0	3	2	0	0	0	0	0	5	0	5	0
Hwy 26 to 1.6 km (1 mi) upstream	Census	20-Sep	1.6	1.0	1	0	0	0	1	0	0	0	0	0	0	1	0	1	0
Middle Fork Subbasin Total					**178**	**53**	**16**	**64**	**75**	**7**	**0**	**0**	**0**	**0**	**3**	**149**	**69**	**146**	**0**

Appendix Table A-1. Continued.

Stream, section	Survey type	Date	Km	Miles	New Redds	Live Fish		Dead Fish, Unmarked				Dead Fish, Marked			U	Dead Fish	Live Fish	Unmarked Dead	Marked Dead
						On dig	Off dig	M	F	U	P	M	F	U	U				
North Fork John Day River Subbasin																			
North Fork John Day River																			
Trail Crossing to Cunningham Creek	Pre-Census	10-Aug	3.5	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cunningham Creek to Baldy Creek	Pre-Census	10-Aug	5.0	3.1	2	0	0	0	1	0	0	0	0	0	1	2	0	1	0
Baldy Creek to Road 73 Bridge	Pre-Census	10-Aug	8.4	5.2	8	6	6	2	6	0	0	0	0	0	0	8	12	8	0
Road 73 Bridge to Trout Creek	Pre-Census	10-Aug	4.8	3.0	3	3	7	2	3	1	0	0	0	0	0	6	10	6	0
Cunningham Creek to Baldy Creek	Census 1	23-Aug	5.0	3.1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Baldy Creek to Road 73 Bridge	Census 1	23-Aug	8.4	5.2	16	6	5	1	4	0	0	0	0	0	0	5	11	5	0
Road 73 Bridge to Trout Creek	Census 1	23-Aug	4.8	3.0	3	9	4	0	2	0	0	0	0	0	0	2	13	2	0
Granite Creek to Silver Creek	Pre-Index	7-Sep	3.2	2.0	16	15	7	0	3	0	0	0	0	0	0	3	22	3	0
Silver Creek to Dixon Bar	Pre-Index	7-Sep	2.7	1.7	15	20	4	1	1	0	0	0	0	0	0	2	24	2	0
Dixon Bar to Ryder Creek	Pre-Index	8-Sep	4.0	2.5	35	34	20	0	0	0	0	0	0	0	1	1	54	0	0
Ryder Creek to Cougar Creek	Pre-Index	8-Sep	3.4	2.1	18	13	14	0	4	0	0	0	0	0	0	4	27	4	0
Big Creek to Oriental Creek	Pre-Index	9-Sep	5.5	3.4	72	66	22	9	15	2	0	0	0	0	0	26	88	26	0
Oriental Creek to Sulphur Creek	Pre-Index	9-Sep	3.2	2.0	42	51	7	10	15	1	0	0	0	0	0	26	58	26	0
Sulphur Creek to Nye Creek	Pre-Index	9-Sep	6.4	4.0	45	48	22	11	9	0	0	0	1	0	2	23	70	20	1
Trail Crossing to Cunningham Creek	Census 2	13-Sep	3.5	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cunningham Creek to Baldy Creek	Census 2	13-Sep	5.0	3.1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0
Baldy Creek to Road 73 Bridge	Census 2	13-Sep	8.4	5.2	3	0	0	2	1	1	0	0	0	0	0	4	0	4	0
Road 73 Bridge to Trout Creek	Census 2	13-Sep	4.8	3.0	2	0	0	3	2	0	0	0	0	0	0	5	0	5	0
Trout Creek to McCarty Gulch	Census	13-Sep	9.7	6.0	17	2	0	1	7	0	0	0	0	0	3	11	2	8	0
McCarty Gulch to Trail Crossing	Census	14-Sep	4.7	2.9	10	0	0	0	3	0	0	0	0	0	0	3	0	3	0
Trail Crossing to Granite Creek	Census	14-Sep	6.1	3.8	14	1	0	0	0	0	0	0	0	0	1	1	1	0	0
Granite Creek to Silver Creek	Index	15-Sep	3.2	2.0	3	2	1	0	1	0	0	0	0	0	2	3	3	1	0
Silver Creek to Wind Rock	Index	15-Sep	1.1	0.7	1	2	0	1	0	0	0	0	0	0	0	1	2	1	0
Wind Rock to Dixon Bar (Glade Creek)	Index	15-Sep	1.6	1.0	3	2	0	0	2	0	0	0	0	0	0	2	2	2	0
Dixon Bar (Glade Creek) to Ryder Creek	Index	15-Sep	4.0	2.5	2	13	0	0	7	0	0	0	0	0	0	7	13	7	0
Ryder Creek to Cougar Creek	Index	16-Sep	3.4	2.1	2	10	0	3	3	0	0	0	0	0	1	7	10	6	0
Cougar Creek to Big Creek	Census	16-Sep	3.9	2.4	11	1	2	2	1	0	0	0	0	0	0	3	3	3	0
Big Creek to Oriental Creek	Index	16-Sep	5.5	3.4	9	26	2	29	35	0	0	0	0	0	1	65	28	64	0
Oriental Creek to Sulphur Creek	Index	16-Sep	3.2	2.0	1	8	0	21	25	0	0	0	1	0	0	47	8	46	1
Sulphur Creek to Nye Creek	Index	16-Sep	6.4	4.0	7	15	6	23	20	0	0	0	0	0	0	43	21	43	0
Nye Creek to Horse Canyon	Census	16-Sep	4.2	2.6	8	3	2	5	2	1	0	0	0	0	0	8	5	8	0
Horse Canyon to Desolation Creek	Census	16-Sep	6.8	4.2	10	13	9	9	4	2	0	0	0	0	0	15	22	15	0
Granite Creek to Silver Creek	Post-Index	21-Sep	3.2	2.0	7	1	0	0	0	1	0	0	0	0	0	1	1	1	0
Silver Creek to Dixon Bar	Post-Index	21-Sep	2.7	1.7	3	0	0	0	1	0	0	0	0	0	0	1	0	1	0
Dixon Bar to Ryder Creek	Post-Index	22-Sep	4.0	2.5	6	0	0	0	2	0	0	0	0	0	0	2	0	2	0
Ryder Creek to Cougar Creek	Post-Index	22-Sep	3.4	2.1	6	1	0	0	2	0	0	0	0	0	0	2	1	2	0
Big Creek to Oriental Creek	Post-Index	23-Sep	5.5	3.4	16	5	0	7	18	0	0	0	0	0	1	26	5	25	0

Appendix Table A-1. Continued.

Stream, section	Survey type	Date	Km	Miles	New Redds	Live Fish		Dead Fish, Unmarked				Dead Fish, Marked			U	Dead Fish	Live Fish	Unmarked Dead	Marked Dead
						On dig	Off dig	M	F	U	P	M	F	U	U				
North Fork John Day River (continued)																			
Oriental Creek to Sulphur Creek	Post-Index	23-Sep	3.2	2.0	0	1	0	9	6	0	0	0	0	0	0	15	1	15	0
Sulphur Creek to Nye Creek	Post-Index	23-Sep	6.4	4.0	1	2	1	15	8	1	0	0	1	0	2	27	3	24	1
Desolation Creek to Camas Creek	Census	23-Sep	5.6	3.5	3	0	0	1	1	3	0	0	0	0	0	5	0	5	0
2.1 km downstream of Sulphur Gulch to 1.0 km downstream of Hunter Cr.	Random	26-Sep	2.3	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North Fork Total					**420**	**380**	**141**	**168**	**214**	**13**	**0**	**0**	**3**	**0**	**15**	**413**	**521**	**395**	**3**
Big Creek, tributary of North Fork[g]																			
Big Creek (Mouth to Winom Creek)	Census	9-Sep	2.6	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Big Creek Total					**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Trail Creek, tributary of North Fork																			
Mouth to North and South Forks	Census 1	23-Aug	3.1	1.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mouth to North and South Forks	Census 2	13-Sep	3.1	1.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2 km on NF upstream from confluence with SF to SF	Random	13-Sep	2.1	1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trail Creek Total					**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Granite Creek System																			
Granite Creek, tributary of North Fork																			
73 Rd Culvert to 1.6 km above Clear Creek	Index	8-Sep	2.4	1.5	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
1.6 km above Clear Creek to Ten Cent Creek	Index	8-Sep	3.1	1.9	8	15	46	0	3	0	0	0	0	0	0	3	61	3	0
Ten Cent Creek to Buck Creek	Index	8-Sep	4.0	2.5	3	5	21	0	5	0	0	0	0	0	0	5	26	5	0
73 Rd Culvert to 1.6 km above Clear Creek	Post-Index	15-Sep	2.4	1.5	0	0	1	0	0	0	0	0	0	0	1	1	1	0	0
1.6 km above Clear Creek to Ten Cent Creek[h]	Post-Index	15-Sep	3.1	1.9	13	28	36	7	12	0	0	0	0	0	0	19	64	19	0
Ten Cent Creek to Buck Creek[h]	Post-Index	15-Sep	4.0	2.5	7	11	29	4	10	2	0	0	0	0	0	16	40	16	0
Buck Creek to Indian Creek	Census	15-Sep	4.5	2.8	9	4	0	0	3	0	0	0	0	0	0	3	4	3	0
Indian Creek to Mouth	Census	15-Sep	3.4	2.1	3	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Granite Creek Total					**43**	**63**	**135**	**11**	**33**	**2**	**0**	**0**	**0**	**0**	**1**	**47**	**198**	**46**	**0**
Clear Creek, tributary of Granite Creek																			
Ruby Creek Trailhead to Alamo Road	Census	8-Sep	1.8	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alamo Road to Smith Lower Boundary	Census		1.3	0.8	Access denied														
Smith Lower Boundary to Beaver Creek	Census	8-Sep	1.4	0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beaver Creek to Old Road Crossing	Census	8-Sep	1.6	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old Road Crossing to Mouth	Index	8-Sep	4.8	3.0	12	7	4	2	8	0	1	0	0	0	0	11	11	11	0
Old Road Crossing to Mouth[h]	Post-Index	15-Sep	4.8	3.0	3	3	3	1	8	0	0	0	1	0	0	10	6	9	1
Clear Creek Total					**15**	**10**	**7**	**3**	**16**	**0**	**1**	**0**	**1**	**0**	**0**	**21**	**17**	**20**	**1**

Appendix Table A-1. Continued.

Stream, section	Survey type	Date	Km	Miles	New Redds	Live Fish On dig	Live Fish Off dig	Dead Fish, Unmarked M	Dead Fish, Unmarked F	Dead Fish, Unmarked U	Dead Fish, Unmarked P	Dead Fish, Marked M	Dead Fish, Marked F	Dead Fish, Marked U	U U	Dead Fish	Live Fish	Unmarked Dead	Marked Dead
Bull Run Creek, tributary of Granite Creek																			
Deep Creek to Guard Station	Census	8-Sep	2.4	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guard Station to Mouth	Index	8-Sep	5.0	3.1	1	1	5	0	0	0	0	0	0	0	0	0	6	0	0
Guard Station to Mouth[h]	Post-Index	15-Sep	5.0	3.1	3	3	7	0	3	0	0	0	0	0	0	3	10	3	0
Bull Run Total					**4**	**4**	**12**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**16**	**3**	**0**
Granite Creek System Total					**62**	**77**	**154**	**14**	**52**	**2**	**1**	**0**	**1**	**0**	**1**	**71**	**231**	**69**	**1**
Desolation Creek, tributary of North Fork																			
South Fork Desolation (Culvert upstream to Falls)	Census	12-Sep	2.9	1.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Fork Desolation (Culvert downstream to Forks)	Census	12-Sep	1.6	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forks to Howard Creek	Census	12-Sep	4.0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Howard Creek to Battle Creek	Census	12-Sep	3.7	2.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Battle Creek to Bruin Creek	Census 1	12-Sep	5.3	3.3	3	1	2	0	1	0	0	0	0	0	0	1	3	1	0
Bruin Creek to Rd 1010 Bridge	Census 1	12-Sep	3.7	2.3	4	4	1	3	2	0	0	0	0	0	0	5	5	5	0
Rd 1010 Bridge to Peep Creek	Census 1	12-Sep	2.3	1.4	2	0	0	1	1	0	0	0	0	0	2	4	0	2	0
Peep Creek to Rd 1003 Bridge	Census 1	12-Sep	8.1	5.0	3	5	2	0	0	0	0	0	0	0	0	0	7	0	0
Rd 1003 Bridge to Mouth	Census 1	12-Sep	6.1	3.8	1	1	2	0	0	0	0	0	0	0	0	0	3	0	0
Battle Creek to Bruin Creek	Census 2	19-Sep	5.3	3.3	1	0	0	1	1	0	0	0	0	0	0	2	0	2	0
Bruin Creek to Rd 1010 Bridge	Census 2	19-Sep	3.7	2.3	0	1	0	1	2	0	0	0	0	1	1	5	1	3	1
Rd 1010 Bridge to Peep Creek	Census 2	19-Sep	2.3	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peep Creek to Rd 1003 Bridge	Census 2	19-Sep	8.1	5.0	1	3	0	0	0	0	0	1	0	0	0	1	3	0	1
Rd 1003 Bridge to Mouth	Census 2	19-Sep	6.1	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Desolation Creek Total					**15**	**15**	**7**	**6**	**7**	**0**	**0**	**1**	**0**	**1**	**3**	**18**	**22**	**13**	**2**
Camas Creek, tributary of North Fork																			
0.4 km upstream to 0.4 km downstream of Fivemile Creek	Census	26-Sep	0.8	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mouth to 2.3 km upstream	Random	26-Sep	2.3	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North Fork Subbasin Total					**497**	**472**	**302**	**188**	**273**	**15**	**1**	**1**	**4**	**1**	**19**	**502**	**774**	**477**	**6**

Appendix Table A-1. Continued.

Stream, section	Survey type	Date	Km	Miles	New Redds	Live Fish On dig	Live Fish Off dig	Dead Fish, Unmarked M	Dead Fish, Unmarked F	Dead Fish, Unmarked U	Dead Fish, Unmarked P	Dead Fish, Marked M	Dead Fish, Marked F	Dead Fish, Marked U	U U	Dead Fish	Live Fish	Unmarked Dead	Marked Dead
South Fork John Day River																			
1.3 km downstream to 0.9 km upstream of Black Canyon Creek	Random	29-Sep	2.1	1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Murderer's Creek to Rock Pile Ranch Bridge	Census	29-Sep	5.5	3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rock Pile Ranch Bridge to Cougar Gulch	Census	29-Sep	4.5	2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cougar Gulch to Izee Falls	Census	29-Sep	5.2	3.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Fork Subbasin Total					**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

[a] Surveys only conducted on north side of river (left side going upstream)
[b] Surveys conducted on north side of river until Lawrence Lower Fence
[c] Redds were observed here in 2004; therefore this section is now a census instead of a random
[d] A third survey was done on 9-22 and carcass data was added to census 2 data
[e] Does not include estimates for sections where landowners denied access
[f] Post-index surveys were not conducted; all fish had finished spawning by the index surveys
[g] One redd was observed here in 2004; therefore this section is now a census instead of a random
[h] A third survey was done on 9/27 and data was added to post-index survey data

Appendix B. 2005 Spring Chinook Salmon Redd Locations

Appendix Table B-1. Spring Chinook redd GPS coordinates and number of redds observed during spawning surveys, 2005. Coordinates are in UTM and D.D format, NAD 27 conus datum and obtained by using handheld GPS receivers and Maptech Terrain Navigator software (Maptech 2004). Sections are listed in survey order.

Stream, section	UTM Coordinates				D.D. Coordinates		Redds
Mainstem John Day River[a]							
Lower Prairie Wood Products Boundary to	11T	363335 E	UTM	4923120 N	44.450422 N	118.717590 W	2
Dixie Cr.	11T	363235 E	UTM	4923479 N	44.453632 N	118.718946 W	2
	11T	363361 E	UTM	4923547 N	44.454265 N	118.717382 W	1
	11T	363624 E	UTM	4923864 N	44.457169 N	118.714160 W	1
Dixie Cr. to Main St. Bridge	11T	364001 E	UTM	4923991 N	44.458386 N	118.709457 W	1
Lower FCA Boundary to Dad's Cr.	11T	364761 E	UTM	4924086 N	44.459377 N	118.699936 W	1
	11T	364855 E	UTM	4924089 N	44.459427 N	118.698750 W	2
	11T	365120 E	UTM	4924107 N	44.459636 N	118.695429 W	1
	11T	365240 E	UTM	4924070 N	44.459330 N	118.693905 W	2
	11T	365530 E	UTM	4924019 N	44.458920 N	118.690250 W	1
	11T	365791 E	UTM	4923847 N	44.457426 N	118.686932 W	1
	11T	366093 E	UTM	4923807 N	44.457119 N	118.683129 W	1
	11T	366320 E	UTM	4923793 N	44.457038 N	118.680264 W	1
	11T	366435 E	UTM	4923675 N	44.455994 N	118.678790 W	1
	11T	366475 E	UTM	4923635 N	44.455643 N	118.678278 W	2
	11T	366599 E	UTM	4923465 N	44.454131 N	118.676681 W	1
	11T	366792 E	UTM	4923315 N	44.452823 N	118.674217 W	1
Upper Smith Fence to Upper Field Fence	11T	369444 E	UTM	4922296 N	44.444135 N	118.640640 W	2
	11T	369503 E	UTM	4922310 N	44.444271 N	118.639909 W	2
	11T	369601 E	UTM	4922296 N	44.444159 N	118.638670 W	1
	11T	369748 E	UTM	4922211 N	44.443422 N	118.636802 W	1
	11T	369852 E	UTM	4922152 N	44.442909 N	118.635477 W	1
	11T	369880 E	UTM	4922161 N	44.442993 N	118.635128 W	1
	11T	369928 E	UTM	4922158 N	44.442977 N	118.634533 W	1
	11T	370130 E	UTM	4921828 N	44.440045 N	118.631908 W	2
	11T	370156 E	UTM	4921809 N	44.439880 N	118.631580 W	1
	11T	370197 E	UTM	4921743 N	44.439295 N	118.631039 W	1
	11T	370224 E	UTM	4921736 N	44.439233 N	118.630707 W	1
	11T	370226 E	UTM	4921707 N	44.438978 N	118.630673 W	1
	11T	370281 E	UTM	4921641 N	44.438386 N	118.629969 W	3
	11T	370356 E	UTM	4921639 N	44.438384 N	118.629020 W	1
	11T	370361 E	UTM	4921621 N	44.438221 N	118.628957 W	1
	11T	370480 E	UTM	4921590 N	44.437969 N	118.627449 W	1
	11T	370592 E	UTM	4921450 N	44.436724 N	118.626012 W	1
Upper Field Fence to Split Channel	11T	370582 E	UTM	4921390 N	44.436184 N	118.626126 W	1
South Channel	11T	372443 E	UTM	4919687 N	44.421191 N	118.602323 W	3
(Upper Split to Upper Smith / Coombs Fence)	11T	372413 E	UTM	4919691 N	44.421217 N	118.602703 W	1
	11T	372320 E	UTM	4919729 N	44.421547 N	118.603878 W	1
	11T	372290 E	UTM	4919731 N	44.421559 N	118.604257 W	2
	11T	372271 E	UTM	4919767 N	44.421876 N	118.604507 W	1
	11T	372264 E	UTM	4919766 N	44.421869 N	118.604601 W	1
	11T	372223 E	UTM	4919769 N	44.421884 N	118.605114 W	1
	11T	372031 E	UTM	4919798 N	44.422111 N	118.607533 W	1
	11T	371832 E	UTM	4919770 N	44.421831 N	118.610020 W	1
	11T	371747 E	UTM	4919790 N	44.421991 N	118.611087 W	1
	11T	371724 E	UTM	4919791 N	44.421995 N	118.611384 W	1

Appendix Table B-1. Continued.

Stream, section	UTM Coordinates				D.D. Coordinates		Redds
Upstream End of Split Channel to French Lane	11T	372655 E	UTM	4919534 N	44.419845 N	118.599624 W	1
	11T	372540 E	UTM	4919620 N	44.420599 N	118.601089 W	1
French Lane to Upper Jacobs Fence	11T	372831 E	UTM	4919718 N	44.421923 N	118.596309 W	1
	11T	373039 E	UTM	4918859 N	44.413844 N	118.594635 W	1
	11T	373081 E	UTM	4918786 N	44.413195 N	118.594099 W	1
	11T	373320 E	UTM	4918707 N	44.412519 N	118.591073 W	1
	11T	373386 E	UTM	4918703 N	44.412503 N	118.590242 W	1
	11T	373541 E	UTM	4918593 N	44.411538 N	118.588273 W	1
	11T	373608 E	UTM	4918499 N	44.410701 N	118.587404 W	1
Road 13 Bridge to Upper Reynolds Fence	11T	374527 E	UTM	4916746 N	44.395081 N	118.575445 W	1
	no coordinates available				no coordinates available		2
	11T	374530 E	UTM	4916728 N	44.394927 N	118.575401 W	1
	11T	374516 E	UTM	4916696 N	44.394632 N	118.575571 W	1
	11T	374611 E	UTM	4916612 N	44.393897 N	118.574362 W	1
	11T	374697 E	UTM	4916498 N	44.392885 N	118.573249 W	1
	11T	374716 E	UTM	4915968 N	44.388115 N	118.572889 W	2
	11T	374692 E	UTM	4915934 N	44.387802 N	118.573184 W	1
	11T	374687 E	UTM	4915877 N	44.387295 N	118.573228 W	1
	11T	374703 E	UTM	4915861 N	44.387151 N	118.573031 W	2
	11T	374667 E	UTM	4915643 N	44.385179 N	118.573420 W	1
	11T	374673 E	UTM	4915548 N	44.384331 N	118.573329 W	1
	11T	374665 E	UTM	4915528 N	44.384149 N	118.573426 W	1
	11T	374582 E	UTM	4915423 N	44.383190 N	118.574445 W	1
	11T	374509 E	UTM	4915360 N	44.382611 N	118.575337 W	2
	11T	374452 E	UTM	4915154 N	44.380744 N	118.576001 W	1
	11T	374456 E	UTM	4915124 N	44.380472 N	118.575943 W	2
	11T	374455 E	UTM	4915009 N	44.379436 N	118.575930 W	2
Upper Ricco Fence to Call Creek	11T	374617 E	UTM	4910491 N	44.338808 N	118.572811 W	1
	11T	374812 E	UTM	4909908 N	44.333595 N	118.570226 W	1
	11T	374956 E	UTM	4909660 N	44.331388 N	118.568361 W	1
Middle Fork John Day River							
Clear Creek (Mouth to Hwy 26)	11T	380572 E	UTM	4938122 N	44.588489 N	118.504513 W	1
	11T	380587 E	UTM	4938078 N	44.588092 N	118.504314 W	2
	11T	380743 E	UTM	4937788 N	44.585511 N	118.502281 W	1
	11T	380744 E	UTM	4937789 N	44.585517 N	118.502270 W	1
	11T	380777 E	UTM	4937760 N	44.585259 N	118.501847 W	2
	11T	380960 E	UTM	4937638 N	44.584197 N	118.499513 W	1
	11T	381586 E	UTM	4936773 N	44.576510 N	118.491429 W	1
Clear Creek (Hwy 26 to 1.6 km upstream)	11T	381798 E	UTM	4935643 N	44.566376 N	118.488501 W	1
Armstrong Cr. to Deep Cr.	11T	354963 E	UTM	4954600 N	44.732044 N	118.831638 W	1
	11T	355648 E	UTM	4954237 N	44.728917 N	118.822895 W	1
Deep Cr. to Road 36 Bridge	11T	356112 E	UTM	4952076 N	44.709572 N	118.816420 W	1
	11T	356207 E	UTM	4952025 N	44.709127 N	118.815208 W	1
Road 36 Bridge to TNC Boundary (lower)	11T	358146 E	UTM	4950129 N	44.692452 N	118.790222 W	1
TNC Boundary to Coyote Cr.	11T	360161 E	UTM	4948942 N	44.682172 N	118.764481 W	1
	11T	360278 E	UTM	4948771 N	44.680658 N	118.762959 W	1
	11T	360381 E	UTM	4948550 N	44.678683 N	118.761598 W	1
	11T	360457 E	UTM	4948519 N	44.678425 N	118.760628 W	2
	11T	360591 E	UTM	4948499 N	44.678271 N	118.758935 W	1
	11T	361417 E	UTM	4948106 N	44.674890 N	118.748415 W	2

Appendix Table B-1. Continued.

Stream, section	UTM Coordinates				D.D. Coordinates		Redds
Coyote Cr. to TNC Boundary (upper)	11T	362269 E	UTM	4948298 N	44.676783 N	118.737717 W	1
	11T	362397 E	UTM	4948320 N	44.677003 N	118.736115 W	2
	11T	362983 E	UTM	4948038 N	44.674577 N	118.728643 W	1
	11T	363237 E	UTM	4947764 N	44.672161 N	118.725372 W	1
	11T	363408 E	UTM	4947502 N	44.669834 N	118.723144 W	1
	11T	363929 E	UTM	4947091 N	44.666235 N	118.716464 W	4
TNC Boundary to Lower Oxbow Boundary	11T	365617 E	UTM	4946472 N	44.660985 N	118.695017 W	1
Lower Oxbow Boundary to Beaver Cr.	11T	365866 E	UTM	4946204 N	44.658620 N	118.691804 W	1
	11T	366348 E	UTM	4946271 N	44.659312 N	118.685748 W	3
	11T	366925 E	UTM	4945536 N	44.652804 N	118.678286 W	1
	11T	366998 E	UTM	4945516 N	44.652644 N	118.677364 W	1
Beaver Creek to Split Channel	11T	367364 E	UTM	4945373 N	44.651420 N	118.672713 W	2
	11T	367780 E	UTM	4945179 N	44.649757 N	118.667413 W	2
	11T	368021 E	UTM	4944967 N	44.647885 N	118.664323 W	1
North Braid	11T	368235 E	UTM	4944710 N	44.645616 N	118.661555 W	1
	11T	368382 E	UTM	4944619 N	44.644822 N	118.659683 W	2
	11T	368466 E	UTM	4944551 N	44.644227 N	118.658600 W	2
	11T	368534 E	UTM	4944516 N	44.643921 N	118.657742 W	1
Upstream End of Split Channel to Upper	11T	369567 E	UTM	4944264 N	44.641850 N	118.644653 W	1
Oxbow Boundary	11T	369715 E	UTM	4944191 N	44.641212 N	118.642775 W	1
Upper Oxbow Boundary to Windlass Cr.	11T	370425 E	UTM	4944472 N	44.643872 N	118.633892 W	1
	11T	370241 E	UTM	4944307 N	44.642354 N	118.636167 W	1
	11T	370507 E	UTM	4944449 N	44.643684 N	118.632851 W	1
	11T	370566 E	UTM	4944457 N	44.643760 N	118.632116 W	1
	11T	370639 E	UTM	4944435 N	44.643577 N	118.631183 W	1
	11T	370672 E	UTM	4944454 N	44.643760 N	118.630781 W	1
	11T	370779 E	UTM	4944349 N	44.642826 N	118.629402 W	2
	11T	370841 E	UTM	4944316 N	44.642542 N	118.628608 W	1
Windlass Cr. to Caribou Cr.	11T	371182 E	UTM	4943536 N	44.635584 N	118.624119 W	2
	11T	371863 E	UTM	4943355 N	44.634082 N	118.615482 W	1
	11T	372326 E	UTM	4943213 N	44.632886 N	118.609619 W	1
	11T	372372 E	UTM	4943114 N	44.632000 N	118.609018 W	1
	11T	373876 E	UTM	4942574 N	44.627403 N	118.589922 W	1
	11T	374091 E	UTM	4942433 N	44.626175 N	118.587180 W	1
	11T	374210 E	UTM	4942394 N	44.625842 N	118.585678 W	1
	11T	374777 E	UTM	4941903 N	44.621529 N	118.578415 W	1
	11T	374850 E	UTM	4941956 N	44.622012 N	118.577509 W	1
	11T	374880 E	UTM	4942031 N	44.622698 N	118.577144 W	2
Caribou Cr. to Dead Cow Bridge	11T	375285 E	UTM	4941953 N	44.622064 N	118.572023 W	1
	11T	375404 E	UTM	4941719 N	44.619983 N	118.570467 W	1
	11T	375508 E	UTM	4941703 N	44.619851 N	118.569156 W	1
	11T	375526 E	UTM	4941679 N	44.619637 N	118.568914 W	1
	11T	375550 E	UTM	4941670 N	44.619559 N	118.568614 W	1
	11T	375721 E	UTM	4941614 N	44.619093 N	118.566441 W	1
	11T	375873 E	UTM	4941550 N	44.618541 N	118.564521 W	1
	11T	375862 E	UTM	4941511 N	44.618184 N	118.564638 W	1
	11T	376005 E	UTM	4941517 N	44.618262 N	118.562839 W	3
	11T	376050 E	UTM	4941537 N	44.618450 N	118.562284 W	1
	11T	376134 E	UTM	4941457 N	44.617750 N	118.561204 W	1
	11T	376135 E	UTM	4941446 N	44.617647 N	118.561186 W	1

Appendix Table B-1. Continued.

Stream, section	UTM Coordinates				D.D. Coordinates		Redds
	11T	376185 E	UTM	4941326 N	44.616574 N	118.560524 W	1
	11T	376243 E	UTM	4941335 N	44.616667 N	118.559798 W	1
	11T	376267 E	UTM	4941339 N	44.616708 N	118.559497 W	2
	11T	376309 E	UTM	4941196 N	44.615431 N	118.558941 W	1
	11T	376413 E	UTM	4941118 N	44.614742 N	118.557612 W	1
	11T	376472 E	UTM	4941104 N	44.614632 N	118.556862 W	1
	11T	376547 E	UTM	4941028 N	44.613962 N	118.555892 W	2
	11T	376658 E	UTM	4940802 N	44.611944 N	118.554442 W	2
	11T	376675 E	UTM	4940776 N	44.611711 N	118.554229 W	1
	11T	376794 E	UTM	4940768 N	44.611663 N	118.552722 W	2
	11T	376795 E	UTM	4940760 N	44.611590 N	118.552709 W	1
	11T	376835 E	UTM	4940697 N	44.611030 N	118.552186 W	2
	11T	376856 E	UTM	4940652 N	44.610626 N	118.551919 W	2
	11T	376862 E	UTM	4940599 N	44.610150 N	118.551824 W	1
	11T	376904 E	UTM	4940546 N	44.609681 N	118.551284 W	2
	11T	376911 E	UTM	4940541 N	44.609635 N	118.551200 W	1
	11T	376919 E	UTM	4940536 N	44.609595 N	118.551088 W	1
	11T	377105 E	UTM	4940493 N	44.609235 N	118.548733 W	2
	11T	377141 E	UTM	4940489 N	44.609206 N	118.548279 W	1
	11T	377173 E	UTM	4940439 N	44.608764 N	118.547866 W	2
	11T	377258 E	UTM	4940347 N	44.607951 N	118.546777 W	1
Dead Cow Bridge to Placer Gulch	11T	377508 E	UTM	4940203 N	44.606694 N	118.543596 W	1
	11T	377526 E	UTM	4940195 N	44.606629 N	118.543364 W	1
	11T	377580 E	UTM	4940228 N	44.606934 N	118.542697 W	1
	11T	377608 E	UTM	4940171 N	44.606423 N	118.542331 W	1
	11T	377680 E	UTM	4940133 N	44.606096 N	118.541411 W	2
	11T	377704 E	UTM	4940116 N	44.605947 N	118.541109 W	1
	11T	377821 E	UTM	4939988 N	44.604812 N	118.539601 W	1
	11T	377830 E	UTM	4939971 N	44.604665 N	118.539484 W	1
	11T	377833 E	UTM	4939965 N	44.604609 N	118.539438 W	1
	11T	377856 E	UTM	4939947 N	44.604454 N	118.539151 W	1
	11T	377877 E	UTM	4939923 N	44.604244 N	118.538875 W	1
	11T	377969 E	UTM	4939790 N	44.603055 N	118.537688 W	1
	11T	377983 E	UTM	4939778 N	44.602954 N	118.537503 W	2
	11T	378016 E	UTM	4939745 N	44.602658 N	118.537089 W	1
	11T	378061 E	UTM	4939725 N	44.602489 N	118.536520 W	1
	11T	378164 E	UTM	4939639 N	44.601732 N	118.535198 W	1
Placer Gulch to Upper FCA Property Boundary	11T	379274 E	UTM	4938992 N	44.596098 N	118.521066 W	1
Upper FCA Boundary to Hwy 7	11T	379660 E	UTM	4938848 N	44.594869 N	118.516169 W	2
	11T	379712 E	UTM	4938844 N	44.594838 N	118.515512 W	1
	11T	380221 E	UTM	4938702 N	44.593645 N	118.509063 W	1
	11T	380385 E	UTM	4938721 N	44.593846 N	118.507007 W	1
	11T	380403 E	UTM	4938700 N	44.593656 N	118.506776 W	1
	11T	380428 E	UTM	4938705 N	44.593706 N	118.506461 W	1
	11T	380590 E	UTM	4938690 N	44.593598 N	118.504415 W	1
	11T	380672 E	UTM	4938688 N	44.593595 N	118.503384 W	1
	11T	380827 E	UTM	4938711 N	44.593832 N	118.501434 W	2
	11T	380839 E	UTM	4938722 N	44.593926 N	118.501294 W	1
	11T	380875 E	UTM	4938728 N	44.593989 N	118.500840 W	1
	11T	381023 E	UTM	4938780 N	44.594483 N	118.498979 W	1

Appendix Table B-1. Continued.

Stream, section	UTM Coordinates				D.D. Coordinates		Redds
	11T	381038 E	UTM	4938824 N	44.594883 N	118.498805 W	1
	11T	381124 E	UTM	4938843 N	44.595062 N	118.497729 W	1
	11T	381538 E	UTM	4939023 N	44.596756 N	118.492560 W	1
Hwy 7 to Phipps Meadow	11T	383292 E	UTM	4939264 N	44.599210 N	118.470520 W	1
	11T	383394 E	UTM	4939217 N	44.598799 N	118.469226 W	1
	11T	383448 E	UTM	4939187 N	44.598541 N	118.468534 W	1
	11T	383909 E	UTM	4939282 N	44.599475 N	118.462752 W	1
	11T	384494 E	UTM	4938923 N	44.596331 N	118.455295 W	1
	11T	384538 E	UTM	4938888 N	44.596025 N	118.454737 W	1
	11T	384565 E	UTM	4938871 N	44.595875 N	118.454389 W	1
	11T	384618 E	UTM	4938789 N	44.595145 N	118.453708 W	1
	11T	385231 E	UTM	4937842 N	44.586723 N	118.445774 W	1
	11T	385446 E	UTM	4937637 N	44.584910 N	118.443022 W	2
	11T	385469 E	UTM	4937608 N	44.584658 N	118.442727 W	1
	11T	385486 E	UTM	4937594 N	44.584534 N	118.442507 W	1
	11T	385503 E	UTM	4937561 N	44.584239 N	118.442293 W	1
	11T	385514 E	UTM	4937540 N	44.584052 N	118.442148 W	1
	11T	385528 E	UTM	4937530 N	44.583966 N	118.441971 W	1
	11T	385551 E	UTM	4937522 N	44.583896 N	118.441676 W	2
	11T	385561 E	UTM	4937478 N	44.583499 N	118.441536 W	1
	11T	385539 E	UTM	4937474 N	44.583461 N	118.441815 W	1
	11T	385521 E	UTM	4937441 N	44.583156 N	118.442035 W	2
	11T	385556 E	UTM	4937438 N	44.583140 N	118.441590 W	1
	11T	385618 E	UTM	4937395 N	44.582759 N	118.440801 W	1
North Fork John Day River							
Cunningham Cr. to Baldy Cr.	11T	398181 E	UTM	4974160 N	44.915674 N	118.289098 W	1
	11T	397280 E	UTM	4973968 N	44.913833 N	118.301363 W	1
Baldy Cr. to Rd 73 Bridge	11T	395927 E	UTM	4973521 N	44.909461 N	118.318353 W	3
	11T	395908 E	UTM	4973515 N	44.909400 N	118.318593 W	1
	11T	395892 E	UTM	4973614 N	44.910293 N	118.318810 W	1
	11T	395873 E	UTM	4973599 N	44.910155 N	118.319052 W	1
	11T	395854 E	UTM	4973578 N	44.909966 N	118.319293 W	1
	11T	395256 E	UTM	4973582 N	44.909912 N	118.326862 W	1
	11T	394977 E	UTM	4973696 N	44.910894 N	118.330426 W	1
	11T	394563 E	UTM	4973909 N	44.912748 N	118.335714 W	1
	11T	394419 E	UTM	4973881 N	44.912474 N	118.337521 W	1
	11T	394325 E	UTM	4973844 N	44.912135 N	118.338711 W	1
	11T	394160 E	UTM	4973869 N	44.912330 N	118.340799 W	1
	11T	393976 E	UTM	4973864 N	44.912263 N	118.343127 W	1
	11T	393811 E	UTM	4973818 N	44.911817 N	118.345215 W	1
	11T	393785 E	UTM	4973782 N	44.911493 N	118.345532 W	1
	11T	393720 E	UTM	4973785 N	44.911509 N	118.346356 W	1
	11T	393649 E	UTM	4973871 N	44.912272 N	118.347271 W	1
	11T	393454 E	UTM	4973921 N	44.912695 N	118.349754 W	1
	11T	393471 E	UTM	4973884 N	44.912366 N	118.349529 W	1
	11T	393394 E	UTM	4973869 N	44.912217 N	118.350504 W	1
	11T	392323 E	UTM	4973520 N	44.908919 N	118.363993 W	1
	11T	389906 E	UTM	4974063 N	44.913434 N	118.394726 W	2
	no coordinates available				no coordinates available		3
Rd 73 Bridge to Trout Cr.	11T	389471 E	UTM	4973978 N	44.912604 N	118.400216 W	2

Appendix Table B-1. Continued.

Stream, section	UTM Coordinates				D.D. Coordinates		Redds
	11T	389482 E	UTM	4973985 N	44.912667 N	118.400073 W	1
	11T	389469 E	UTM	4973994 N	44.912746 N	118.400246 W	2
	11T	388946 E	UTM	4974312 N	44.915520 N	118.406930 W	1
	11T	388943 E	UTM	4974292 N	44.915348 N	118.406969 W	2
Trout Cr. to McCarty Gulch	11T	385872 E	UTM	4974991 N	44.921150 N	118.446019 W	1
	11T	385580 E	UTM	4974916 N	44.920422 N	118.449704 W	2
	11T	385573 E	UTM	4974928 N	44.920536 N	118.449793 W	1
	11T	385282 E	UTM	4974749 N	44.918879 N	118.453440 W	1
	11T	384963 E	UTM	4974575 N	44.917259 N	118.457437 W	1
	11T	384691 E	UTM	4974411 N	44.915740 N	118.460841 W	1
	11T	384263 E	UTM	4974073 N	44.912632 N	118.466182 W	1
	11T	383779 E	UTM	4973619 N	44.908464 N	118.472209 W	1
	11T	383758 E	UTM	4973574 N	44.908057 N	118.472473 W	1
	11T	383686 E	UTM	4973497 N	44.907346 N	118.473357 W	1
	11T	383637 E	UTM	4973313 N	44.905686 N	118.473945 W	1
	11T	383548 E	UTM	4973003 N	44.902882 N	118.474999 W	1
	11T	383136 E	UTM	4972580 N	44.899004 N	118.480116 W	1
	11T	382672 E	UTM	4971519 N	44.889384 N	118.485745 W	1
	11T	382329 E	UTM	4971606 N	44.890111 N	118.490102 W	1
	11T	381834 E	UTM	4971152 N	44.885946 N	118.496261 W	1
McCarty Gulch to Trail Crossing	11T	381511 E	UTM	4971034 N	44.884827 N	118.500333 W	2
	11T	381233 E	UTM	4970765 N	44.882359 N	118.503781 W	1
	11T	381109 E	UTM	4970640 N	44.881215 N	118.505318 W	2
	11T	380725 E	UTM	4970270 N	44.877819 N	118.510092 W	1
	11T	380853 E	UTM	4970152 N	44.876781 N	118.508448 W	1
	11T	380791 E	UTM	4970117 N	44.876451 N	118.509229 W	1
	11T	380731 E	UTM	4969996 N	44.875355 N	118.509958 W	2
Trail Crossing to Granite Cr.	11T	379277 E	UTM	4970023 N	44.875357 N	118.528369 W	1
	11T	379247 E	UTM	4970026 N	44.875378 N	118.528750 W	1
	11T	378851 E	UTM	4970090 N	44.875885 N	118.533768 W	1
	11T	378532 E	UTM	4969850 N	44.873671 N	118.537745 W	1
	11T	378077 E	UTM	4969775 N	44.872917 N	118.543486 W	1
	11T	377571 E	UTM	4969966 N	44.874548 N	118.549942 W	1
	11T	377255 E	UTM	4969948 N	44.874333 N	118.553940 W	2
	11T	377142 E	UTM	4969636 N	44.871505 N	118.555295 W	1
	11T	377246 E	UTM	4969605 N	44.871243 N	118.553971 W	1
	11T	377335 E	UTM	4969629 N	44.871473 N	118.552841 W	3
	11T	377295 E	UTM	4969451 N	44.869869 N	118.553304 W	1
	11T	369806 E	UTM	4978043 N	44.945856 N	118.650281 W	1
Granite Cr. to Silver Cr.	11T	376111 E	UTM	4969323 N	44.868512 N	118.568256 W	1
	11T	375357 E	UTM	4969235 N	44.867589 N	118.577776 W	1
	11T	375064 E	UTM	4969249 N	44.867658 N	118.581484 W	2
	11T	374794 E	UTM	4969336 N	44.868402 N	118.584930 W	4
	11T	374704 E	UTM	4969456 N	44.869460 N	118.586093 W	1
	11T	374625 E	UTM	4969631 N	44.871024 N	118.587135 W	2
	11T	374576 E	UTM	4969726 N	44.871865 N	118.587789 W	1
	11T	374558 E	UTM	4969732 N	44.871923 N	118.588008 W	1
	11T	374463 E	UTM	4969897 N	44.873384 N	118.589256 W	4
	11T	374464 E	UTM	4970084 N	44.875070 N	118.589284 W	2
	11T	374589 E	UTM	4970341 N	44.877404 N	118.587773 W	1

Appendix Table B-1. Continued.

Stream, section	UTM Coordinates				D.D. Coordinates		Redds
	11T	374633 E	UTM	4970458 N	44.878465 N	118.587241 W	6
Silver Cr. to Dixon Bar	11T	374449 E	UTM	4970676 N	44.880399 N	118.589623 W	2
	11T	374433 E	UTM	4970687 N	44.880493 N	118.589837 W	1
	11T	374464 E	UTM	4970728 N	44.880868 N	118.589447 W	1
	11T	374240 E	UTM	4970832 N	44.881760 N	118.592306 W	1
	11T	374209 E	UTM	4970868 N	44.882076 N	118.592712 W	1
	11T	374160 E	UTM	4970897 N	44.882329 N	118.593333 W	1
	11T	373936 E	UTM	4971236 N	44.885347 N	118.596259 W	1
	11T	373817 E	UTM	4971243 N	44.885386 N	118.597762 W	3
	11T	373769 E	UTM	4971316 N	44.886030 N	118.598397 W	1
	11T	373751 E	UTM	4971341 N	44.886252 N	118.598630 W	1
	11T	373747 E	UTM	4971356 N	44.886387 N	118.598682 W	1
	11T	373728 E	UTM	4971380 N	44.886604 N	118.598920 W	1
	11T	373667 E	UTM	4971479 N	44.887479 N	118.599722 W	1
	11T	373509 E	UTM	4971923 N	44.891451 N	118.601837 W	3
	11T	373501 E	UTM	4972019 N	44.892314 N	118.601961 W	2
	11T	373360 E	UTM	4972273 N	44.894575 N	118.603811 W	1
Dixon Bar to Ryder Cr.	11T	373015 E	UTM	4972966 N	44.900749 N	118.608353 W	5
	11T	373101 E	UTM	4973452 N	44.905136 N	118.607379 W	1
	11T	373122 E	UTM	4973512 N	44.905682 N	118.607131 W	1
	11T	373106 E	UTM	4973598 N	44.906451 N	118.607356 W	1
	11T	373064 E	UTM	4974059 N	44.910594 N	118.607999 W	1
	11T	372967 E	UTM	4974163 N	44.911513 N	118.609254 W	2
	11T	372957 E	UTM	4974216 N	44.911990 N	118.609400 W	1
	11T	372955 E	UTM	4974245 N	44.912246 N	118.609431 W	2
	11T	372961 E	UTM	4974326 N	44.912980 N	118.609372 W	1
	11T	373036 E	UTM	4974445 N	44.914061 N	118.608460 W	3
	11T	373055 E	UTM	4974473 N	44.914318 N	118.608217 W	1
	11T	372699 E	UTM	4974710 N	44.916388 N	118.612783 W	2
	11T	372656 E	UTM	4974745 N	44.916688 N	118.613348 W	1
	11T	372490 E	UTM	4975071 N	44.919596 N	118.615522 W	1
	11T	372403 E	UTM	4975177 N	44.920532 N	118.616661 W	1
	11T	372391 E	UTM	4975204 N	44.920772 N	118.616811 W	1
	11T	372290 E	UTM	4975294 N	44.921569 N	118.618122 W	1
	11T	372276 E	UTM	4975335 N	44.921937 N	118.618309 W	1
	11T	372270 E	UTM	4975341 N	44.921985 N	118.618378 W	1
	11T	372296 E	UTM	4975428 N	44.922777 N	118.618079 W	1
	11T	372299 E	UTM	4975477 N	44.923215 N	118.618054 W	1
	11T	372345 E	UTM	4975738 N	44.925575 N	118.617533 W	7
	11T	372383 E	UTM	4975851 N	44.926594 N	118.617080 W	1
	11T	372395 E	UTM	4975895 N	44.926992 N	118.616938 W	1
	11T	372375 E	UTM	4975923 N	44.927241 N	118.617202 W	1
	11T	372379 E	UTM	4975990 N	44.927843 N	118.617161 W	3
Ryder Cr. to Cougar Cr.	11T	372289 E	UTM	4976215 N	44.929854 N	118.618361 W	3
	11T	372200 E	UTM	4976176 N	44.929484 N	118.619482 W	1
	11T	372118 E	UTM	4976204 N	44.929723 N	118.620530 W	1
	11T	372013 E	UTM	4976159 N	44.929296 N	118.621848 W	1
	11T	371987 E	UTM	4976187 N	44.929546 N	118.622176 W	1
	11T	371945 E	UTM	4976208 N	44.929729 N	118.622721 W	1
	11T	371824 E	UTM	4976188 N	44.929525 N	118.624244 W	1

Appendix Table B-1. Continued.

Stream, section	UTM Coordinates						D.D. Coordinates				Redds
	11T	371717	E	UTM	4976269	N	44.930234	N	118.625616	W	1
	11T	371689	E	UTM	4976347	N	44.930937	N	118.625996	W	1
	11T	371641	E	UTM	4976487	N	44.932188	N	118.626644	W	1
	11T	371599	E	UTM	4976556	N	44.932800	N	118.627187	W	2
	11T	371602	E	UTM	4976573	N	44.932948	N	118.627158	W	1
	11T	371585	E	UTM	4976580	N	44.933014	N	118.627373	W	1
	11T	371575	E	UTM	4976598	N	44.933171	N	118.627503	W	1
	11T	371657	E	UTM	4976758	N	44.934623	N	118.626503	W	1
	11T	371719	E	UTM	4976864	N	44.935590	N	118.625752	W	1
	11T	371512	E	UTM	4976963	N	44.936443	N	118.628396	W	1
	11T	370991	E	UTM	4977237	N	44.938817	N	118.635067	W	1
	11T	370343	E	UTM	4977536	N	44.941390	N	118.643353	W	1
	11T	370177	E	UTM	4977645	N	44.942340	N	118.645478	W	1
	11T	370221	E	UTM	4977675	N	44.942621	N	118.644937	W	1
	11T	370181	E	UTM	4977692	N	44.942761	N	118.645444	W	1
	11T	370137	E	UTM	4977733	N	44.943125	N	118.646017	W	1
Cougar Cr. to Big Cr.	11T	369711	E	UTM	4978147	N	44.946770	N	118.651512	W	1
	11T	369602	E	UTM	4978358	N	44.948653	N	118.652951	W	2
	11T	369595	E	UTM	4978420	N	44.949208	N	118.653053	W	1
	11T	369595	E	UTM	4978442	N	44.949404	N	118.653058	W	1
	11T	368737	E	UTM	4978726	N	44.951798	N	118.664011	W	1
	11T	368245	E	UTM	4979223	N	44.956182	N	118.670376	W	1
	11T	368030	E	UTM	4979558	N	44.959156	N	118.673186	W	1
	11T	368023	E	UTM	4979556	N	44.959142	N	118.673265	W	2
Big Cr. to Oriental Cr.	11T	367200	E	UTM	4979752	N	44.960753	N	118.683755	W	1
	11T	366918	E	UTM	4980258	N	44.965250	N	118.687455	W	1
	11T	366896	E	UTM	4980345	N	44.966032	N	118.687768	W	1
	11T	366868	E	UTM	4980347	N	44.966037	N	118.688117	W	1
	11T	366601	E	UTM	4980415	N	44.966600	N	118.691522	W	5
	11T	366508	E	UTM	4980385	N	44.966314	N	118.692688	W	2
	11T	366498	E	UTM	4980409	N	44.966525	N	118.692822	W	1
	11T	366397	E	UTM	4980476	N	44.967110	N	118.694118	W	4
	11T	366385	E	UTM	4980493	N	44.967260	N	118.694279	W	2
	11T	365990	E	UTM	4980729	N	44.969314	N	118.699350	W	1
	11T	365937	E	UTM	4980890	N	44.970749	N	118.700061	W	1
	11T	365898	E	UTM	4980900	N	44.970837	N	118.700561	W	4
	11T	365893	E	UTM	4980904	N	44.970870	N	118.700618	W	2
	11T	365879	E	UTM	4980910	N	44.970919	N	118.700796	W	24
	11T	365818	E	UTM	4980955	N	44.971318	N	118.701583	W	2
	11T	365774	E	UTM	4980958	N	44.971337	N	118.702149	W	2
	11T	365746	E	UTM	4980954	N	44.971288	N	118.702499	W	1
	11T	365343	E	UTM	4981078	N	44.972334	N	118.707643	W	2
	11T	364642	E	UTM	4981416	N	44.975235	N	118.716618	W	3
	11T	364634	E	UTM	4981419	N	44.975261	N	118.716721	W	1
	11T	364335	E	UTM	4981519	N	44.976110	N	118.720541	W	1
	11T	364317	E	UTM	4981528	N	44.976189	N	118.720765	W	1
	11T	364172	E	UTM	4981719	N	44.977876	N	118.722661	W	1
	11T	364170	E	UTM	4981771	N	44.978343	N	118.722691	W	1
	11T	364165	E	UTM	4981959	N	44.980032	N	118.722815	W	1
	11T	364069	E	UTM	4982021	N	44.980570	N	118.724041	W	1

Appendix Table B-1. Continued.

Stream, section	UTM Coordinates				D.D. Coordinates		Redds
	11T	363931 E	UTM	4982011 N	44.980452 N	118.725788 W	2
	11T	363904 E	UTM	4981989 N	44.980250 N	118.726125 W	1
	11T	363766 E	UTM	4981838 N	44.978865 N	118.727832 W	4
	11T	363746 E	UTM	4981813 N	44.978641 N	118.728088 W	5
	11T	363744 E	UTM	4981779 N	44.978332 N	118.728095 W	1
	11T	363727 E	UTM	4981758 N	44.978138 N	118.728315 W	1
	11T	363754 E	UTM	4981506 N	44.975880 N	118.727893 W	3
	11T	363770 E	UTM	4981489 N	44.975729 N	118.727686 W	3
	11T	363822 E	UTM	4981465 N	44.975519 N	118.727025 W	3
	no coordinates available				no coordinates available		7
Oriental Cr. to Sulphur Cr.	11T	363856 E	UTM	4981189 N	44.973048 N	118.726526 W	1
	11T	363817 E	UTM	4981182 N	44.972972 N	118.727016 W	9
	11T	363794 E	UTM	4981146 N	44.972645 N	118.727295 W	2
	11T	363390 E	UTM	4981190 N	44.972964 N	118.732422 W	1
	11T	363363 E	UTM	4981198 N	44.973032 N	118.732768 W	3
	11T	363146 E	UTM	4981277 N	44.973702 N	118.735542 W	1
	11T	362934 E	UTM	4981280 N	44.973686 N	118.738234 W	1
	11T	362799 E	UTM	4981330 N	44.974111 N	118.739955 W	6
	11T	362465 E	UTM	4981319 N	44.973951 N	118.744183 W	1
	11T	362372 E	UTM	4981317 N	44.973910 N	118.745359 W	1
	11T	362222 E	UTM	4981581 N	44.976259 N	118.747337 W	1
	11T	362178 E	UTM	4981591 N	44.976342 N	118.747903 W	2
	11T	362121 E	UTM	4981556 N	44.976010 N	118.748614 W	1
	11T	362074 E	UTM	4981559 N	44.976033 N	118.749214 W	1
	11T	361946 E	UTM	4981597 N	44.976348 N	118.750838 W	1
	11T	361919 E	UTM	4981599 N	44.976360 N	118.751191 W	3
	11T	361651 E	UTM	4981711 N	44.977315 N	118.754609 W	1
	11T	361421 E	UTM	4981923 N	44.979182 N	118.757585 W	5
	11T	361308 E	UTM	4982072 N	44.980501 N	118.759055 W	2
Sulphur Cr. to Nye Cr.	11T	361195 E	UTM	4982054 N	44.980310 N	118.760492 W	6
	11T	360292 E	UTM	4982185 N	44.981312 N	118.771968 W	1
	11T	360191 E	UTM	4982140 N	44.980889 N	118.773235 W	2
	11T	360115 E	UTM	4982105 N	44.980560 N	118.774193 W	2
	11T	359777 E	UTM	4982354 N	44.982731 N	118.778549 W	5
	11T	359770 E	UTM	4982366 N	44.982841 N	118.778636 W	3
	11T	359749 E	UTM	4982377 N	44.982940 N	118.778914 W	1
	11T	359447 E	UTM	4982620 N	44.985067 N	118.782809 W	1
	11T	359175 E	UTM	4982868 N	44.987244 N	118.786323 W	1
	11T	358833 E	UTM	4982927 N	44.987705 N	118.790675 W	3
	11T	358197 E	UTM	4983432 N	44.992121 N	118.798876 W	1
	11T	358149 E	UTM	4983512 N	44.992829 N	118.799515 W	1
	11T	358156 E	UTM	4983526 N	44.992959 N	118.799426 W	2
	11T	358118 E	UTM	4983653 N	44.994093 N	118.799945 W	4
	11T	358112 E	UTM	4983669 N	44.994240 N	118.800032 W	2
	11T	358049 E	UTM	4983744 N	44.994901 N	118.800851 W	2
	11T	358036 E	UTM	4983745 N	44.994902 N	118.801009 W	1
	11T	357971 E	UTM	4983764 N	44.995065 N	118.801845 W	1
	11T	357870 E	UTM	4983865 N	44.995946 N	118.803151 W	5
	11T	357691 E	UTM	4984033 N	44.997431 N	118.805470 W	2
	11T	357664 E	UTM	4984057 N	44.997634 N	118.805811 W	1

Appendix Table B-1. Continued.

Stream, section	UTM Coordinates				D.D. Coordinates		Redds
	11T	357598 E	UTM	4984246 N	44.999321 N	118.806712 W	4
	11T	358501 E	UTM	4983061 N	44.988841 N	118.794917 W	2
Nye Cr. to Horse Canyon	11T	356132 E	UTM	4985134 N	45.007015 N	118.825556 W	1
	11T	356027 E	UTM	4985159 N	45.007219 N	118.826886 W	1
	11T	355958 E	UTM	4985163 N	45.007240 N	118.827760 W	1
	11T	355781 E	UTM	4985403 N	45.009370 N	118.830078 W	3
	11T	355289 E	UTM	4985317 N	45.008490 N	118.836295 W	1
	11T	354413 E	UTM	4986006 N	45.014514 N	118.847603 W	1
Horse Canyon to Desolation Cr.	11T	352169 E	UTM	4986042 N	45.014370 N	118.876081 W	1
	11T	351847 E	UTM	4985922 N	45.013227 N	118.880121 W	1
	11T	351443 E	UTM	4986027 N	45.014086 N	118.885286 W	1
	11T	351293 E	UTM	4985913 N	45.013029 N	118.887153 W	1
	11T	351287 E	UTM	4985907 N	45.012970 N	118.887228 W	1
	11T	351156 E	UTM	4985901 N	45.012895 N	118.888881 W	1
	11T	351076 E	UTM	4985851 N	45.012423 N	118.889884 W	1
	11T	347577 E	UTM	4984395 N	44.998583 N	118.933821 W	1
	11T	347909 E	UTM	498416 N	44.996540 N	118.929541 W	2
Desolation Cr. to Camas Cr.	11T	345514 E	UTM	4984539 N	44.996779 N	118.959933 W	3
Granite Creek System							
Clear Creek (Granite Cr. Tributary)							
Old Road Crossing to Mouth	11T	383413 E	UTM	4960032 N	44.786126 N	118.473730 W	1
	11T	383409 E	UTM	4960242 N	44.788020 N	118.473830 W	1
	11T	383538 E	UTM	4960974 N	44.794624 N	118.472367 W	1
	11T	383536 E	UTM	4960969 N	44.794580 N	118.472383 W	2
	11T	383518 E	UTM	4960996 N	44.794824 N	118.472625 W	1
	11T	383572 E	UTM	4961177 N	44.796461 N	118.471979 W	1
	11T	383667 E	UTM	4961477 N	44.799171 N	118.470842 W	1
	11T	383727 E	UTM	4961554 N	44.799882 N	118.470111 W	1
	11T	383847 E	UTM	4961676 N	44.801000 N	118.468614 W	1
	11T	384091 E	UTM	4961910 N	44.803139 N	118.465587 W	1
	11T	384111 E	UTM	4961970 N	44.803680 N	118.465348 W	1
	11T	384133 E	UTM	4961958 N	44.803582 N	118.465072 W	1
	11T	384617 E	UTM	4962573 N	44.809192 N	118.459085 W	1
	11T	385249 E	UTM	4963812 N	44.820449 N	118.451384 W	1
Granite Creek							
1.6 km above Clear Cr. to Ten Cent Cr.	11T	385725 E	UTM	4963174 N	44.814776 N	118.445217 W	1
	11T	385705 E	UTM	4963207 N	44.815077 N	118.445475 W	3
	11T	385593 E	UTM	4963387 N	44.816675 N	118.446939 W	2
	11T	385467 E	UTM	4963719 N	44.819647 N	118.448607 W	1
	11T	385454 E	UTM	4963760 N	44.820007 N	118.448779 W	2
	11T	385369 E	UTM	4964020 N	44.822335 N	118.449906 W	3
	11T	385155 E	UTM	4964243 N	44.824309 N	118.452668 W	1
	11T	385045 E	UTM	4964348 N	44.825232 N	118.454074 W	1
	11T	384958 E	UTM	4964446 N	44.826106 N	118.455200 W	1
	11T	384901 E	UTM	4964764 N	44.828960 N	118.455994 W	2
	11T	384902 E	UTM	4964801 N	44.829293 N	118.455994 W	1
	11T	384864 E	UTM	4964959 N	44.830704 N	118.456509 W	1
	11T	384858 E	UTM	4964978 N	44.830875 N	118.456589 W	1
	11T	384771 E	UTM	4965034 N	44.831363 N	118.457694 W	1
Ten Cent Cr. to Buck Cr.	11T	384216 E	UTM	4965386 N	44.834439 N	118.464800 W	1

Appendix Table B-1. Continued.

Stream, section	UTM Coordinates				D.D. Coordinates		Redds
	11T	384029 E	UTM	4965425 N	44.834765 N	118.467178 W	2
	11T	383530 E	UTM	4965701 N	44.837170 N	118.473549 W	2
	11T	383456 E	UTM	4965799 N	44.838040 N	118.474508 W	1
	11T	383452 E	UTM	4965827 N	44.838284 N	118.474560 W	1
	11T	382869 E	UTM	4965931 N	44.839132 N	118.481956 W	1
	11T	382847 E	UTM	4965904 N	44.838879 N	118.482237 W	1
	11T	382776 E	UTM	4965925 N	44.839057 N	118.483133 W	1
Buck Cr. to Indian Cr.	11T	381882 E	UTM	4966222 N	44.841588 N	118.494514 W	1
	11T	381688 E	UTM	4966304 N	44.842286 N	118.496982 W	1
	11T	379881 E	UTM	4966598 N	44.844630 N	118.519903 W	1
	11T	379874 E	UTM	4966600 N	44.844646 N	118.519995 W	1
	11T	379477 E	UTM	4966978 N	44.847988 N	118.525107 W	1
	11T	379076 E	UTM	4967085 N	44.848879 N	118.530203 W	1
	11T	378971 E	UTM	4967197 N	44.849871 N	118.531560 W	2
	11T	378926 E	UTM	4967221 N	44.850075 N	118.532139 W	1
Indian Cr. to Mouth	11T	378300 E	UTM	4967209 N	44.849868 N	118.540047 W	1
	11T	378031 E	UTM	4967294 N	44.850586 N	118.543479 W	2
Bull Run Creek							
Guard Station to Mouth	11T	389568 E	UTM	4961009 N	44.795898 N	118.396162 W	1
	11T	389008 E	UTM	4961223 N	44.797739 N	118.403285 W	1
	11T	388932 E	UTM	4961295 N	44.798372 N	118.404262 W	1
	11T	387657 E	UTM	4962341 N	44.807588 N	118.420601 W	1
Desolation Creek							
Battle Cr. to Bruin Cr.	11T	359704 E	UTM	4970389 N	44.875060 N	118.776148 W	1
	11T	359360 E	UTM	4971021 N	44.880682 N	118.780675 W	1
	11T	358829 E	UTM	4971510 N	44.884973 N	118.787531 W	2
Bruin Cr. to Road 1010 Bridge	11T	356589 E	UTM	4974650 N	44.912782 N	118.816771 W	1
	11T	356564 E	UTM	4974676 N	44.913011 N	118.817094 W	1
	11T	356551 E	UTM	4974716 N	44.913368 N	118.817270 W	1
	11T	355896 E	UTM	4975577 N	44.920983 N	118.825809 W	1
Road 1010 Bridge to Peep Cr.	11T	355613 E	UTM	4976596 N	44.930094 N	118.829683 W	1
	11T	355215 E	UTM	4976967 N	44.933351 N	118.834830 W	1
Peep Cr. to Road 1003 bridge	11T	354850 E	UTM	4977769 N	44.940493 N	118.839684 W	1
	11T	351949 E	UTM	4979090 N	44.951778 N	118.876830 W	1
	11T	351994 E	UTM	4979579 N	44.956188 N	118.876404 W	1
	11T	351988 E	UTM	4980222 N	44.961972 N	118.876668 W	1
Road 1003 Bridge to Mouth	11T	350176 E	UTM	4982218 N	44.979549 N	118.900221 W	1

[a] Table does not include the 132 redds estimated for the Mainstem. Only 95 redds were actually observed.

Appendix C.   Historic Census and Index Redd Counts

Appendix Table C-1. Census (index, post-index, census, and random) redd counts for spring Chinook salmon in the John Day Basin, 2000–2005. Index and census survey areas are defined in Tables 1 and 3.

				North Fork and Tributaries					
					Granite Creek System				
Year	Mainstem	South Fork	Middle Fork	North Fork	Granite Creek	Clear Creek	Bull Run Creek	Desolation Creek	Basin total
2000	380	3	563	612	198	96	12	5	1,872
2001	432	0	354	803	126	80	45	23	1,863
2002	549	0	389	707	163	64	31	56	1,962
2003	323[a]	0	236	668	118	32	1	39	1,417
2004	368[a,b]	0	319	805[c]	72	38	8	46	1,656
2005	227[a]	0	178	420[c]	43	15	4	15	902

[a] Includes estimated redds in denied areas.

[b] Includes Deardorff Creek tributary.

[c] Includes Camas Creek, Trail Creek, and Big Creek tributaries.

Appendix Table C-2. Census (census plus index) survey kilometers for spring Chinook salmon spawning surveys in the John Day Basin, 2000–2005. Index and census survey areas are defined in Tables 1 and 3.

				North Fork and North Fork Tributaries					
					Granite Creek System				
Year	Mainstem	South Fork	Middle Fork	North Fork	Granite Creek	Clear Creek	Bull Run Creek	Desolation Creek	Basin total
2000	34.4	10.6	55.2	85.0	17.4	6.4	5.8	25.3	240.1
2001	34.4	10.6	55.2	85.0	17.4	6.4	5.8	33.8	248.5
2002	34.4	10.6	53.6	88.4	17.4	8.0	5.8	40.4	258.5
2003	34.4	10.6	55.2	88.4	17.4	10.9	5.8	40.4	263.0
2004	41.6[a]	17.6	60.9	102.4[b]	17.4	8.2	7.4	37.7	293.2
2005	43.2[a]	17.3	60.1	104.2[c]	17.4	10.9	7.4	37.7	298.2

[a] Includes 2.3 km on Deardorff Creek tributary.

[b] Includes 3.2 km on Camas Creek, 3.1km on Trail Creek, and 2.6 km on Big Creek tributaries.

[c] Includes 3.1 km on Camas Creek, 5.2 km on Trail Creek, and 2.6 km on Big Creek tributaries.

Appendix Table C-3. Census spawning density (redds/km) for the combined index and census survey areas of the John Day Basin, 2000–2005. Index and census survey areas are defined in Tables 1 and 3.

Year	Mainstem	South Fork	Middle Fork	North Fork and North Fork Tributaries: North Fork	Granite Creek System: Granite Creek	Granite Creek System: Clear Creek	Granite Creek System: Bull Run Creek	Desolation Creek	Basin total
2000	11.0	0.3	10.2	7.2	11.4	15.0	2.1	0.2	7.8
2001	12.6	0.0	6.4	9.4	7.2	12.5	7.8	0.7	7.5
2002	16.0	0.0	7.3	8.0	9.4	8.0	5.3	1.4	7.6
2003	8.8	0.0	4.0	7.6	6.8	3.2	0.1	0.9	5.4[c]
2004	8.8[a]	0.0	5.2	7.9[b]	4.1	4.6	1.1	1.2	5.6[c]
2005	5.3[a]	0.0	3.0	4.0[b]	2.5	1.4	0.5	0.4	3.0[c]

[a] Includes Deardorff Creek tributary.

[b] Includes Camas Creek, Trail Creek, and Big Creek tributaries.

[c] Includes random survey sections which began in 2003.

Appendix Table C-4. Index redd counts for spring Chinook salmon in the John Day Basin for each primary spawning area, 1959–2005.

Year	Mainstem[a]	Middle Fork[b]	North Fork[c]	Granite Creek[d]	Basin total
1959	4	0	--	50	54
1960	9	32	--	120	161
1961	39	11	--	42	92
1962	159	28	--	447	634
1963	10	4	--	280	294
1964	17	36	140	415	608
1965	75	37	146	220	478
1966	121	65	185	345	716
1967	96	17	99	276	488
1968	9	4	158	534	705
1969	121	48	369	186	724
1970	108	76	302	326	812
1971	91	41	212	276	620
1972	51	51	189	458	749
1973	116	43	349	324	832
1974	33	81	130	191	435
1975	92	89	211	229	621
1976	60	66	111	162	399
1977	64	58	295	207	624
1978	59	107	109	165	440
1979	68	118	200	130	516
1980	16	58	78	78	230
1981	51	26	138	110	325
1982	49	62	105	122	338
1983	133	51	76	46	306
1984	73	67	63	48	251
1985	116	40	110	132	398
1986	159	76	257	163	655
1987	247	340	375	141	1,103
1988	82	241	245	116	684
1989	165	113	196	149	623
1990	124	47	257	78	506
1991	61	35	115	55	266
1992	142	108	339	138	727
1993	135	155	379	268	937
1994	169	93	201	96	559
1995	29	15	27	23	94
1996	227	136	291	128	782
1997	125	163	197	102	587
1998	108	79	109	61	357
1999	58	105	120	87	370
2000	337	356	477	241	1,411
2001	383	199	607	222	1,411
2002	480	309	513	198	1,500
2003	273[e]	184	483	81	1,021
2004	263[e]	176	602	81	1,122
2005	161[e]	114	271	24	570

[a] Index survey is 11.8 miles/19.0 kilometers.

[b] Index survey was 9.5 miles during 1959–85, 13 miles during 1986–03, and 13.3 miles/21.4 kilometers in 2004–05.

[c] Index survey is 17.7 miles/28.5 kilometers.

[d] Index survey is 12 miles/19.3 kilometers. In 1993, 12.5 miles were surveyed.

[e] Landowners denied access to some index reaches; number includes estimated redds.

Appendix Table C-5. Spawning density (redds/km) in index areas of the John Day River basin 1959–2005.

Year	Mainstem[a]	Middle Fork[b]	North Fork[c]	Granite Creek System[d]	Basin
1959	0.2	0.0	--	2.6	0.7
1960	0.5	2.1	--	6.2	2.0
1961	2.1	0.7	--	2.2	1.1
1962	8.4	1.8	--	23.2	7.7
1963	0.5	0.3	--	14.5	3.6
1964	0.9	2.4	4.9	21.5	7.4
1965	4.0	2.4	5.1	11.4	5.8
1966	6.4	4.2	6.5	17.9	8.7
1967	5.1	1.1	3.5	14.3	5.9
1968	0.5	0.3	5.5	27.7	8.6
1969	6.4	3.1	12.9	9.6	8.8
1970	5.7	5.0	10.6	16.9	9.9
1971	4.8	2.7	7.4	14.3	7.6
1972	2.7	3.3	6.6	23.7	9.1
1973	6.1	2.8	12.2	16.8	10.1
1974	1.7	5.3	4.6	9.9	5.3
1975	4.9	5.8	7.4	11.9	7.6
1976	3.2	4.3	3.9	8.4	4.9
1977	3.4	3.8	10.4	10.7	7.6
1978	3.1	7.0	3.8	8.5	5.4
1979	3.6	7.7	7.0	6.7	6.3
1980	0.8	3.8	2.7	4.0	2.8
1981	2.7	1.7	4.8	5.7	4.0
1982	2.6	4.1	3.7	6.3	4.1
1983	7.0	3.3	2.7	2.4	3.7
1984	3.9	4.4	2.2	2.5	3.1
1985	6.1	2.6	3.9	6.8	4.8
1986	8.4	3.6	9.0	8.4	7.5
1987	13.1	16.3	13.2	7.3	12.6
1988	4.3	11.5	8.6	6.0	7.8
1989	8.7	5.4	6.9	7.7	7.1
1990	6.6	2.2	9.0	4.0	5.8
1991	3.2	1.7	4.0	2.8	3.0
1992	7.5	5.2	11.9	7.2	8.3
1993	7.1	7.4	13.3	13.3	10.7
1994	8.9	4.4	7.1	5.0	6.4
1995	1.5	0.7	0.9	1.2	1.1
1996	12.0	6.5	10.2	6.6	8.9
1997	6.6	7.8	6.9	5.3	6.7
1998	5.7	3.8	3.8	3.2	4.1
1999	3.1	5.0	4.2	4.5	4.2
2000	17.8	17.0	16.7	12.5	16.1
2001	20.3	9.5	21.3	11.5	16.1
2002	25.4	14.8	18.0	10.3	17.3
2003	14.4	9.5	17.7	5.2	12.3
2004	13.8	8.2	21.1	4.2	12.7
2005	8.5	5.3	9.5	1.2	6.5

[a] Index survey is 11.8 miles/19.0 kilometers.

[b] Index survey was 9.5 miles during 1959–85, 13 miles during 1986–03, and 13.3 miles/21.4 kilometers in 2004–05.

[c] Index survey is 17.7 miles/28.5 kilometers.

[d] Index survey is 12 miles/19.3 kilometers. In 1993, 12.5 miles were surveyed.

Appendix Table C-6. Percentage of redds counted in survey sections of the main spawning areas within the John Day River basin, 2000–2005.

Stream	Survey section	Survey type	Miles	Km	2000	2001	2002	2003	2004	2005
Mainstem	Indian Creek to Main Street Bridge (Prairie City)	Census	5.3	8.5	2.1	4.2	4.4	9.6[a]	12.0[a]	16.7[a]
	Prairie City to Dad's Creek	Census	2.2	3.5	0.8	2.1	4.9	4.6	3.8	6.6
	Dad's Creek to French Lane	Index	5.4	8.7	53.2	53.0	66.7	38.7	35.6[a]	37.5[a]
	French Lane to Road 13 bridge below Deardorff Creek	Index	2.3	3.7	16.8	13.2	8.0	9.9[a]	10.6[a]	10.6[a]
	Road 13 Bridge below Deardorff Creek to Road 62 culvert	Index	4.1	6.6	26.1	27.1	14.4	35.9[a]	26.6[a]	27.3[a]
	Deardorff Creek to 2.3 kilometers upstream	Random	1.4	2.3	0.0[b]	--	--	--	4.9	0.0[c]
	Road 62 culvert to Call Creek	Census	2.1	3.4	1.1	0.5	1.6	1.2	6.5	1.3
	Mainstem Subbasin Redd Count				***380***	***432***	***549***	***323***	***368***	***227***
Middle Fork	Armstrong Creek to Beaver Creek	Census	14.6	23.5	23.8	16.7	2.3	10.2	37.0	16.8
	Beaver Creek to Windlass Creek	Index	3.2	5.2	16.3	10.2	13.9	13.6	12.8	12.4
	Windlass Creek to Caribou Creek	Index	3.7	6.0	10.5	14.1	11.6	7.2	10.0	6.7
	Caribou Creek to Placer Gulch	Index	3.5	5.6	28.8	29.9	36.2	43.2	22.6	34.8
	Placer Gulch to Hwy 7	Index	2.6	4.2	9.6	6.2	17.7	20.3	9.7	10.1
	Hwy 7 to Phipps Meadows	Census	4.4	7.1	6.9	17.8	17.2	4.7	5.0	13.5
	Clear Creek (Mouth to Hwy 26 Bridge)	Census	1.3	2.1	1.8	5.1	1.0	0.8	1.3	5.1
	Clear Creek (Hwy 26 upstream 1.6 km)	Census	1.0	1.6	2.3	0	--	--	1.6	0.6
	Middle Fork Subbasin Redd Count				***563***	***354***	***389***	***236***	***319***	***178***
North Fork	Cunningham Creek to Road 73 Bridge	Census	8.3	13.4	0.7	2.5	2.4	3.3	1.7	6.9
	Road 73 Bridge to Granite Creek	Census	13.8	22.2	7.6	12.2	6.8	18.0	9.2	11.7
	Road 73 Bridge to McCarty Gulch		8.3	13.4	--	4.5	2.6	7.8	4.1	6.0
	McCarty Gulch to Granite Creek		5.5	8.9	--	7.7	13.1	10.2	5.1	5.7
	Granite Creek to Silver Creek	Index	2.0	3.2	5.9	10.6	17.7	10.5	5.5	6.2
	Silver Creek to Dixon Bar	Index	1.7	2.7	10.5	16.6	41.3	11.7	12.2	5.2
	Dixon Bar to Ryder Creek	Index	2.5	4.0	14.9	16.3	37.8	24.1	20.8	10.2
	Ryder Creek to Cougar Creek	Index	2.1	3.4	6.6	8.1	24.8	7.6	7.7	6.2
	Cougar Creek to Big Creek	Census	2.4	3.9	2.5	3.7	4.7	2.7	3.9	2.6
	Big Creek to Oriental Creek	Index	3.4	5.5	15.8	17.8	13.5	10.5	10.6	23.1
	Oriental Creek to Sulphur Creek	Index	2.0	3.2	10.0	6.2	5.0	5.5	8.3	10.2
	Sulphur Creek to Nye Creek	Index	4.0	6.4	15.9	4.5	2.6	5.5	14.9	12.6
	Nye Creek to Desolation Creek	Census	6.8	11.0	8.4	0.9	0.6	0.5	4.4	4.4
	Desolation Creek to Camas Creek	Census	3.5	5.6	1.3	0.6	0	0.0	0.6	0.7
	North Fork Redd Count				***609***	***803***	***704***	***668***	***803***	***420***
Granite Cr.	73 Rd. Culvert to 1.6 km above Clear Creek	Index	1.5	2.4	7.8	6.4	10.9	0.7	0.8	0.0
	1.6 km above Clear Creek to Ten Cent Creek	Index	1.9	3.1	20.6	20.3	33.8	14.7	12.7	33.9
	Ten Cent Creek to Buck Creek	Index	2.5	4.0	21.9	15.5	11.4	30.7	30.5	16.1
	Buck Creek to Indian Creek	Census	2.8	4.5	10.1	6.0	4.2	17.3	12.7	14.5
	Indian Creek to Mouth	Census	2.1	3.4	4.2	2.0	5.3	15.3	4.2	4.8
Clear Cr.	Ruby Creek Trailhead to Alamo Road	Census	1.1	1.8	--	--	0.8	0.0	0.0	0.0
	Alamo Road to Beaver Creek	Census	1.7	2.7	--	--	--	0.0	--	0.0
	Beaver Creek to Old Road Crossing	Census	1.0	1.6	5.2	0	3.1	1.3	6.8	0.0
	Old Road Crossing to Mouth	Index	3.0	4.8	26.1	31.9	20.9	19.3	25.4	24.2

Appendix Table C-6. Continued.

Stream	Survey section	Survey Type	Miles	Km	2000	2001	2002	2003	2004	2005
Bull Run Cr.	Deep Creek to Guard Station	Census	1.5	2.4	0.0	0.4	0.0	0.0	0.0	0.0
	Guard Station to Mouth	Index	3.1	5.0	3.9	17.5	6.2	0.7	6.8	6.5
	Granite Creek System Redd Count				***306***	***251***	***258***	***150***	***118***	***62***
Desolation Cr.	South Fork (culvert downstream to forks)	Census	1.0	1.6	--	--	0.0	0.0	0.0	0.0
	N. & S. forks of Desolation Creek to Howard Creek	Census	2.6	4.2	--	0.0	7.1	2.6	0.0	0.0
	Howard Creek to Battle Creek	Census	3.0	4.8	--	4.3	5.4	15.4	2.2	0.0
	Battle Creek to Bruin Creek	Census	4.7	7.6	--	26.1	51.8	51.3	23.9	26.7
	Bruin Creek to Peep Creek	Census	5.4	8.7	80.0	17.4	33.9	10.2	52.1	40.0
	Peep Creek to Road 1003 Bridge	Census	5.3	8.5	20.0	52.2	1.8	20.5	19.6	26.7
	Road 1003 Bridge to Mouth	Census	4.1	6.6	--	0.0	0.0	0.0	2.2	6.6
	Desolation Creek Redd Count				***5***	***23***	***56***	***39***	***46***	***15***
	Total North Fork Subbasin Redd Count				***920***	***1,077***	***1,018***	***857***	***967***	***497***

[a] Includes estimated redds for stream sections where landowners denied access.
[b] Creek was surveyed from mouth to 0.8 kilometers upstream.
[c] Deardorff Creek became a census survey in 2005.

Appendix D. Location Information for Major Spring Chinook Spawning Survey Sections

Appendix Table D-1. List of major spring Chinook spawning survey section start/stop locations and GPS coordinates for the Mainstem John Day River. Sites are listed in upstream order. Coordinates are in UTM format, NAD 27 conus datum and were obtained by using handheld GPS receivers and Maptech Terrain Navigator software (Maptech 2004).

Survey section start/stop location name	Latitude	Longitude
0.2 km downstream of Deep Gulch	11T 03 53 821 E	UTM 49 21 690 N
Deep Gulch	11T 03 53 826 E	UTM 49 21 854 N
0.2 km downstream of Fisk Creek	11T 03 55 396 E	UTM 49 21 989 N
Fisk Creek	11T 03 55 562 E	UTM 49 21 945 N
Indian Creek	11T 03 56 820 E	UTM 49 22 423 N
Shaw Gulch	11T 03 60 863 E	UTM 49 22 568 N
Prairie Wood Products Lower Fence	11T 03 63 062 E	UTM 49 23 488 N
Dixie Creek	11T 03 63 673 E	UTM 49 23 887 N
Main Street Bridge (Prairie City)	11T 03 64 199 E	UTM 49 24 075 N
West (downstream) Forrest Conservation Area Boundary	11T 03 64 753 E	UTM 49 24 088 N
Dad's Creek	11T 03 67 016 E	UTM 49 23 400 N
Field Lower Fence	11T 03 69 330 E	UTM 49 22 230 N
Smith / Coombs Upper Fence (South Channel)	11T 03 71 743 E	UTM 49 19 779 N
French Lane (N. River Rd)	11T 03 72 668 E	UTM 49 19 490 N
Jacobs Upper Fence	11T 03 73 533 E	UTM 49 18 548 N
Road 13 Bridge downstream of Deardorff Creek (same as Deardorff Creek in early reports)	11T 03 74 466 E	UTM 49 16 822 N
Deardorff Creek (mouth)	11T 03 74 526 E	UTM 49 16 726 N
Deardorff Creek (2.3 km above mouth)	11T 03 76 375 E	UTM 49 16 906 N
Reynolds Upper Fence / Klondike Lower Fence	11T 03 74 283 E	UTM 49 14 852 N
Ricco Upper Fence (same as Road 62 Culvert in former reports)	11T 03 74 608 E	UTM 49 10 638 N
Call Creek	11T 03 75 895 E	UTM 49 08 403 N
2.3 km upstream of Call Creek	11T 03 76 300 E	UTM 49 06 691 N

Appendix Table D-2. List of major spring Chinook spawning survey section start/stop locations and GPS coordinates for the South Fork John Day River. Sites are listed in downstream order. Coordinates are in UTM format, NAD 27 conus datum and were obtained by using handheld GPS receivers and Maptech Terrain Navigator software (Maptech 2004).

Survey section start/stop location name	Latitude	Longitude
Izee Falls	11T 02 98 285 E	UTM 48 95 328 N
Cougar Gulch	11T 02 97 720 E	UTM 49 00 290 N
Rock Pile Ranch Bridge	11T 02 96 496 E	UTM 49 04 561 N
Murderer's Creek	11T 02 97 550 E	UTM 49 09 743 N
0.9 km upstream of Black Canyon Creek	11T 02 95 637 E	UTM 49 11 149 N
Black Canyon Creek	11T 02 95 510 E	UTM 49 11 938 N
1.3 km downstream of Black Canyon Creek	11T 02 96 046 E	UTM 49 12 737 N

Appendix Table D-3. List of major spring Chinook spawning survey section start/stop locations and GPS coordinates for the Middle Fork John Day River. Sites are listed in upstream order. Coordinates are in UTM format, NAD 27 conus datum and were obtained by using handheld GPS receivers and Maptech Terrain Navigator software (Maptech 2004).

Survey section start/stop location name	Latitude	Longitude
1.6 km downstream of Slide Creek	11T 03 44 619 E	UTM 49 62 160 N
Slide Creek	11T 03 45 708 E	UTM 49 61 761 N
0.6 km upstream of Slide Creek	11T 03 46 197 E	UTM 49 61 877 N
0.4 km downstream of Big Creek	11T 03 51 460 E	UTM 49 58 553 N
Big Creek	11T 03 51 741 E	UTM 49 58 443 N
1.9 km upstream of Big Creek	11T 03 52 837 E	UTM 49 58 177 N
Armstrong Creek	11T 03 53 515 E	UTM 49 55 891 N
Deep Creek	11T 03 55 776 E	UTM 49 52 906 N
Road 36 Bridge	11T 03 57 926 E	UTM 49 50 162 N
Lower Nature Conservancy Boundary Fence	11T 03 59 938 E	UTM 49 48 957 N
Coyote Creek	11T 03 61 356 E	UTM 49 48 080 N
Upper Nature Conservancy Boundary Fence	11T 03 64 249 E	UTM 49 47 123 N
Lower Oxbow Ranch Boundary Fence	11T 03 65 724 E	UTM 49 46 205 N
Beaver Creek	11T 03 67 033 E	UTM 49 45 504 N
Windlass Creek	11T 03 71 018 E	UTM 49 43 928 N
Caribou Creek	11T 03 75 168 E	UTM 49 41 888 N
Dead Cow Bridge	11T 03 77 050 E	UTM 49 40 322 N
Placer Gulch	11T 03 79 096 E	UTM 49 38 839 N
Highway 7 Culvert	11T 03 82 375 E	UTM 49 39 822 N
Phipps Meadow	11T 03 86 564 E	UTM 49 37 585 N
Clear Creek (mouth)	11T 03 80 303 E	UTM 49 38 555 N
Clear Creek (Highway 26 Bridge)	11T 03 81 655 E	UTM 49 36 708 N
Clear Creek (1.6 km upstream of Highway 26 Bridge)	11T 03 81 842 E	UTM 49 35 221 N

Appendix Table D-4. List of major spring Chinook spawning survey section start/stop locations and GPS coordinates for the North Fork John Day River. Sites are listed in downstream order. Coordinates are in UTM format, NAD 27 conus datum and were obtained by using handheld GPS receivers and Maptech Terrain Navigator software (Maptech 2004).

Survey section start/stop location name	Latitude	Longitude
North Fork Trail Crossing	11T 04 00 981 E	UTM 49 70 745 N
Cunningham Creek	11T 04 00 092 E	UTM 49 73 615 N
Baldy Creek	11T 03 96 054 E	UTM 49 73 552 N
Road 73 Bridge (North Fork Campground)	11T 03 89 554 E	UTM 49 74 024 N
Trail Creek (mouth)	11T 03 89 079 E	UTM 49 74 327 N
Trail Creek (north and south fork confluence)	11T 03 90 427 E	UTM 49 76 661 N
Trail Creek (north fork 2.2 km upstream of fork confluence)	11T 03 91 222 E	UTM 49 78 025 N
Trout Creek	11T 03 86 079 E	UTM 49 75 615 N
McCarty Gulch	11T 03 81 557 E	UTM 49 71 314 N
Trail Crossing (near Bear Gulch)	11T 03 79 962 E	UTM 49 69 937 N
Granite Creek	11T 03 76 660 E	UTM 49 69 005 N
Silver Creek	11T 03 74 611 E	UTM 49 70 469 N
Dixon Bar (Glade Creek)	11T 03 73 181 E	UTM 49 72 776 N
Ryder Creek	11T 03 72 364 E	UTM 49 76 196 N
Cougar Creek	11T 03 70 099 E	UTM 49 77 858 N
Big Creek (mouth)	11T 03 67 352 E	UTM 49 79 702 N
Big Creek (Winom Creek)	11T 03 68 296 E	UTM 49 81 446 N
Oriental Creek	11T 03 63 922 E	UTM 49 81 285 N
Sulphur Creek	11T 03 61 178 E	UTM 49 82 083 N
Nye Creek	11T 03 56 286 E	UTM 49 85 064 N
Horse Canyon	11T 03 53 100 E	UTM 49 86 258 N
Desolation Creek	11T 03 47 419 E	UTM 49 84 331 N
Camas Creek	11T 03 42 798 E	UTM 49 85 817 N
1.0 km downstream of Hunter Creek	11T 03 36 469 E	UTM 49 84 538 N
2.1 km downstream of Sulphur Gulch	11T 03 34 932 E	UTM 49 83 666 N

Appendix Table D-5. List of major spring Chinook spawning survey section start/stop locations and GPS coordinates for Granite Creek (tributary to North Fork John Day River, also part of the Granite Creek System). Sites are listed in downstream order. Coordinates are in UTM format, NAD 27 conus datum and were obtained by using handheld GPS receivers and Maptech Terrain Navigator software (Maptech 2004).

Survey section start/stop location name	Latitude	Longitude
Road 73 Culvert	11T 03 87 762 E	UTM 49 63 304 N
1.6 km upstream of Clear Creek	11T 03 86 072 E	UTM 49 62 744 N
Clear Creek	11T 03 85 422 E	UTM 49 63 939 N
Ten Cent Creek	11T 03 84 828 E	UTM 49 65 015 N
Buck Creek	11T 03 81 960 E	UTM 49 66 212 N
Indian Creek	11T 03 78 601 E	UTM 49 67 278 N
Mouth	11T 03 76 660 E	UTM 49 69 005 N

Appendix Table D-6. List of major spring Chinook spawning survey section start/stop locations and GPS coordinates for Clear Creek (tributary to the North Fork John Day River, part of the Granite Creek System). Sites are listed in downstream order. Coordinates are in UTM format, NAD 27 conus datum and were obtained by using handheld GPS receivers and Maptech Terrain Navigator software (Maptech 2004).

Survey section start/stop location name	Latitude	Longitude
Ruby Creek Trailhead	11T 03 82 303 E	UTM 49 58 602 N
Alamo Road	11T 03 83 498 E	UTM 49 58 208 N
Smith Upper Boundary	11T 03 84 216 E	UTM 49 58 178 N
Smith Lower Boundary	11T 03 84 716 E	UTM 49 58 227 N
Beaver Creek	11T 03 84 805 E	UTM 49 59 311 N
Old Road Crossing	11T 03 83 579 E	UTM 49 59 984 N
Mouth	11T 03 85 422 E	UTM 49 63 939 N

Appendix Table D-7. List of major spring Chinook spawning survey section start/stop locations and GPS coordinates for Bull Run Creek (tributary to the North Fork John Day River, part of the Granite Creek System). Sites are listed in downstream order. Coordinates are in UTM format, NAD 27 conus datum and were obtained by using handheld GPS receivers and Maptech Terrain Navigator software (Maptech 2004).

Survey section start/stop location name	Latitude	Longitude
Deep Creek	11T 03 93 382 E	UTM 49 59 183 N
Boundary Guard Station	11T 03 91 372 E	UTM 49 60 024 N
Mouth	11T 03 87 382 E	UTM 49 62 402 N

Appendix Table D-8. List of major spring Chinook spawning survey section start/stop locations and GPS coordinates for Desolation Creek (tributary to the North Fork John Day River). Sites are listed in downstream order. Coordinates are in UTM format, NAD 27 conus datum and were obtained by using handheld GPS receivers and Maptech Terrain Navigator software (Maptech 2004).

Survey section start/stop location name	Latitude	Longitude
South Fork Desolation Creek Falls	11T 03 67 754 E	UTM 49 60 903 N
South Fork Desolation Creek Culvert	11T 03 66 970 E	UTM 49 62 979 N
N. and S. Forks Desolation Creek	11T 03 66 514 E	UTM 49 64 183 N
Howard Creek	11T 03 63 819 E	UTM 49 66 197 N
Battle Creek	11T 03 60 919 E	UTM 49 68 357 N
Bruin Creek	11T 03 58 262 E	UTM 49 72 870 N
Road 1010 Bridge	11T 03 55 710 E	UTM 49 75 623 N
Peep Creek	11T 03 54 935 E	UTM 49 77 740 N
Road 1003 Bridge	11T 03 51 610 E	UTM 49 81 337 N
Mouth	11T 03 47 503 E	UTM 49 84 337 N

Appendix Table D-9. List of major spring Chinook spawning survey section start/stop locations and GPS coordinates for Camas Creek (tributary to the North Fork John Day River). Sites are listed in downstream order. Coordinates are in UTM format, NAD 27 conus datum and were obtained by using Maptech Terrain Navigator software (Maptech 2004).

Survey section start/stop location name	Latitude	Longitude
0.4 km upstream of Five Mile Creek	11T 03 43 639 E	UTM 49 93 524 N
0.4 km downstream of Five Mile Creek	11T 03 44 039 E	UTM 49 92 254 N
2.3 km upstream of Mouth	11T 03 43 771 E	UTM 49 87 367 N
Mouth	11T 03 42 802 E	UTM 49 85 790 N

Appendix E. 2005 Mainstem John Day Seining Sites

Appendix Table E-1. Sample site, name, location, percent of overall smolt captures, number of seines pulled at each site, and catch-per-unit effort (CPUE: #smolts/seine haul) during our 2005 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"	3.3	0.0	14	6.2	0
Bass Hole	N 44° 49' 07.4" W 119° 45' 21.3"	8.8	7.1	41	5.7	0
Bullhead Hole	N 44° 49' 24.3" W 119° 44' 12.9"	26.2	17.9	61	11.3	<1
Chucker Hole	N 44° 48' 34.3 " W 119° 44' 11.4"	5.3	3.6	58	2.4	0
Dam Hole	N 44° 48' 21.7" W 119° 43' 57.7"	9.6	3.6	37	6.9	0
Dead Fish Hole	N 44° 48' 26.9" W 119° 43' 28.4"	11	10.7	68	4.3	0
Juniper Hole	N 44° 47' 42.67" W 119° 42' 19.16"	6.0	0.0	11	14.4	0
Log Hole	N 44° 49' 11.6" W 119° 46' 58.4"	9.1	32.1	81	3.0	<1
Lower House Hole	N 44° 48' 57.12" W 119° 47' 19.40"	9.8	3.6	17	15.2	<1
Raven Hole	N 44° 48' 59.1" W 119° 46' 23.7"	2.6	3.6	15	4.6	<1
Spider Hole	N 44° 48' 18.74" W 119° 43' 42.10"	4.3	0.0	22	5.1	0
Spray Boat Ramp	N 44° 49' 34.9" W 119° 47' 34.9"	0.9	7.1	11	2.1	<1
Sucker Hole	N 44° 48' 42.73" W 119° 42' 48.65"	2.0	3.6	10	5.2	<1
Other Sites	---	1.3	7.1	53	0.6	0

Appendix F. Statistics of Fish Captured in Rotary Screw Traps and Seines

Appendix Table F-1. Weekly number caught (N), mean, standard error (SE) and range of fork length (mm), mass (g), and condition factor for juvenile spring Chinook captured at the Mainstem rotary screw trap (rkm 326) from week 44 to 52, 2003 and week 2 to 25, 2004.

Year	Week of the year	Fork length (mm) N	Mean	SE	Range	Mass (g) N	Mean	SE	Range	Coefficient of condition N	Mean	SE	Range
2003	44	22	95.7	1.9	74–108	19	10.7	0.6	4.5–14.5	19	1.19	0.02	1.10–1.38
	45	59	95.7	1.1	80–114	42	10.2	0.4	5.9–17.5	42	1.15	0.02	0.76–1.72
	46	23	96.3	1.5	79–113	19	10.5	0.5	7.1–16.4	19	1.13	0.03	0.81–1.56
	47	16	94.4	2.4	79–111	2	8.8	1.7	7.1–10.5	2	1.12	0.07	1.05–1.20
	48	20	92.3	1.6	81–106	20	9.1	0.4	6.1–13.8	20	1.14	0.02	1.04–1.34
	49	15	96.1	2.2	85–112	8	9.2	1.1	6.5–14.7	8	1.09	0.02	1.02–1.18
	50	19	100.6	2.1	83–116	5	12.5	0.9	10.4–15.6	5	1.20	0.01	1.16–1.25
	51	38	99.5	1.5	80–122	37	11.2	0.5	5.6–19.8	37	1.10	0.01	0.94–1.22
	52	3	108.7	2.9	104–114	3	14.6	1.2	12.8–16.9	3	1.13	0.01	1.12–1.14
2004	2	20	102.2	1.9	91–119	18	12.4	0.8	7.8–19.5	18	1.10	0.03	0.97–1.43
	3	32	101.9	1.3	87–117	28	11.9	0.5	7.8–17.5	20	1.09	0.01	0.98–1.23
	4	41	97.7	1.4	82–116	9	10.8	1.1	7.2–17.2	9	1.05	0.03	0.90–1.13
	5	0				0				0			
	6	62	101.6	1.1	88–126	62	11.7	0.4	7.2–21.7	62	1.10	0.01	0.98–1.26
	7	40	99.0	1.4	82–118	40	11.3	0.5	6.1–18.5	40	1.14	0.01	1.01–1.50
	8	20	99.2	1.6	85–110	20	11.1	0.5	6.6–15.1	20	1.12	0.01	1.02–1.28
	9	62	99.3	1.0	86–124	62	11.3	0.4	6.5–22.5	62	1.13	0.01	0.93–1.46
	10	29	103	1.6	86–121	29	12.4	0.6	7.2–20.5	29	1.11	0.01	0.99–1.26
	11	5	111.2	3.3	100–120	5	12.4	0.8	10.5–15.4	5	0.90	0.06	0.81–1.13
	12	0				0				0			
	13	0				0				0			
	14	50	107.2	1.1	94–127	50	14.9	0.5	9.9–25.3	50	1.19	0.01	0.98–1.31
	15	60	109.4	0.8	97–126	60	15.9	0.4	10.7–26.7	60	1.20	0.01	0.84–1.37
	16	110	110.8	0.7	95–139	100	16.2	0.4	10.6–37.7	100	1.17	0.01	0.92–1.60
	17	61	110.6	1.0	91–127	59	16.8	0.4	10.7–23.3	59	1.23	0.01	1.10–1.42
	18	81	114.1	1.0	92–132	81	18.3	0.5	9.6–27.1	81	1.21	0.01	1.02–1.44
	19	26	112.1	2.6	64–126	26	17.6	0.9	3.4–24.6	26	1.20	0.02	1.07–1.34
	20	48	121.1	1.4	100–141	48	21.4	0.9	3.7–36.5	48	1.18	0.03	0.20–1.37
	21	1	87.0			1	8.6			1	1.31		
	22	24	87.7	1.5	74–117	24	8.5	0.5	2.8–14.8	24	1.23	0.04	0.69–1.52
	23	90	89.3	0.7	69–117	90	9.2	0.3	3.9–19.3	90	1.27	0.02	0.82–1.69
	24	60	95.6	0.9	79–112	60	10.3	0.3	7.0–17.0	60	1.17	0.01	0.92–1.50
	25	40	96.4	0.8	87–106	40	12.1	0.3	7.9–15.0	40	1.34	0.01	1.20–1.56

Appendix Table F-2. Weekly number caught (n), mean, standard error (SE) and range of fork length (mm), mass (g), and condition factor for juvenile spring Chinook captured at the South Fork rotary screw trap (rkm 10) from week 42 to 49, 2003 and week 2 to 24, 2004.

Year	Week of the year	Fork length (mm) N	Mean	SE	Range	Mass (g) N	Mean	SE	Range	Coefficient of condition N	Mean	SE	Range
2003	42	1	85			0				0			
	43	1	84			0				0			
	45	3	88.7	2.7	85–94	1	9.5			1	1.14		
	46	1	81			0				0			
	48	2	92.5	2.5	90–95	2	7.7	1.1	6.6–8.7	2	0.98	0.21	0.77–1.19
	49	2	94	5.0	89–99	2	9.3	1.4	7.9–10.7	2	1.11	0.01	1.10–1.12
2004	2	16	99.2	1.5	90–111	8	10.3	0.8	7.8–14.7	8	1.10	0.02	1.02–1.21
	3	9	100.8	1.0	95–104	5	11.6	0.3	10.5–12	5	1.08	0.02	1.05–1.56
	6	7	97.7	1.3	93–103	7	10.3	0.4	8.3–11.9	7	1.10	0.02	1.03–1.16
	7	3	99.3	3.3	93–104	3	10.1	1.1	8.5–12.3	3	1.02	0.05	0.92–1.09
	12	1	100			1	11.5			1	1.15		
	13	22	104.4	0.9	96–112	22	13.5	0.5	8.7–18.1	22	1.18	0.02	0.98–1.40
	14	9	109.9	3.0	91–118	9	15.7	1.3	8.4–20.7	9	1.16	0.05	0.97–1.43
	15	8	107.1	1.8	100–114	8	15.8	1.1	11.9–21.3	8	1.27	0.03	1.17–1.44
	23	1	78			1	5.6			1	1.18		
	24	1	88			1	9.2			1	1.35		

Appendix Table F-3. Weekly number caught (N), mean, standard error (SE) and range of fork length (mm), mass (g), and condition factor for juvenile spring chinook captured at the Middle Fork rotary screw trap (rkm 24) from week 44 to 51, 2003 and week 2 to 25, 2004.

Year	Week of the year	Fork length (mm)				Mass (g)				Coefficient of condition			
		N	Mean	SE	Range	N	Mean	SE	Range	N	Mean	SE	Range
2003	44	4	81.3	4.1	71–91	2	7	1.0	6.0–8.0	2	1.29	0.11	1.17–1.40
	45	1	96.0			1	10.8			1	1.22		
	46	7	85.1	2.5	76–94	0				0			
	47	9	89.2	2.6	80–104	8	7.8	0.9	4.7–12.9	8	1.03	0.05	0.84–1.21
	48	14	82.6	1.8	71–96	14	6.1	0.4	4.1–9.5	14	1.08	0.03	0.76–1.21
	49	13	85.7	3.0	66–102	6	7.5	0.7	4.8–9.7	6	1.13	0.08	1.01–1.55
	50	4	92.2	3.8	82–100	4	8.2	1.1	5.2–10.2	4	1.03	0.04	0.94–1.13
	51	6	89.2	4.8	73–106	4	9.3	1.6	5.8–13.4	4	1.13	0.03	1.05–1.18
2004	2	3	94.3	5.2	85–103	0				0			
	8	20	94.8	1.7	84–110	2	8.9	3.2	5.7–12.1	2	0.96	0.12	0.84–1.08
	9	48	94.9	1.1	82–114	47	9.3	0.3	5.6–15.8	47	1.07	0.01	0.95–1.23
	10	26	91.2	1.4	79–104	26	8.0	0.4	5.1–11.6	26	1.03	0.01	0.93–1.15
	11	9	102.4	3.2	84–114	9	10.9	0.9	6.1–13.4	9	0.99	0.04	0.84–1.21
	12	2	89.5	0.5	89–90	2	8.0	0.1	7.9–8.1	2	1.12	0.004	1.11–1.12
	13	23	96.4	1.6	80–112	23	11.1	0.6	6.0–17.5	23	1.22	0.017	1.00–1.42
	14	14	98.4	2.4	79–111	14	11.5	0.6	6.0–14.1	14	1.38	0.04	0.95–1.38
	15	24	97.5	2.0	79–121	19	12.1	0.9	7.1–22.9	19	1.21	0.02	1.04–1.44
	16	124	100.4	0.8	78–119	124	12.5	0.3	6.0–22.9	124	1.21	0.01	0.86–1.53
	17	79	102.9	1.1	84–150	77	13.3	0.5	7.1–41.5	77	1.19	0.01	0.85–1.54
	18	71	102.9	0.8	89–120	51	13.7	0.4	8.1–21.0	51	1.21	0.01	0.94–1.40
	19	93	106.0	1.0	71–127	90	13.9	0.4	4.2–24.1	90	1.15	0.01	0.69–1.34
	20	125	110.9	0.6	95–132	124	16.5	0.3	8.8–27.8	124	1.20	0.01	0.94–2.19
	21	0				0				0			
	22	3	75.7	10.5	55–89	3	6.2	1.8	2.9–9.0	3	1.40	0.17	1.19–1.28
	23	7	76.1	4.3	57–93	7	6.5	1.0	2.2–10.4	7	1.44	0.17	1.19–2.46
	24	27	80.0	1.5	60–93	26	6.6	0.4	3.4–10.5	26	1.25	0.04	0.95–1.71
	25	20	78.9	1.1	69–92	20	6.5	0.4	3.7–11.6	20	1.30	0.03	1.05–1.52

Appendix Table F-4. Weekly number caught (n), mean, standard error (SE) and range of fork length (mm), mass (g), and condition factor for juvenile spring Chinook captured while seining in the Mainstem between rkm 274–286 from week 12 to 20, 2004.

Year	Week of the year	Fork length (mm)				Mass (g)				Coefficient of condition			
		N	Mean	SE	Range	N	Mean	SE	Range	N	Mean	SE	Range
2003	12	82	110.1	1.5	82–146	82	16.1	0.6	7.1–30.6	83	1.19	0.02	0.72–1.81
	13	336	110.4	0.6	78–139	319	13.4	0.2	5.9–27.5	318	0.96	0.01	0.56–1.51
	14	502	105.3	0.4	81–144	490	12.3	0.2	5.7–35.3	490	1.04	0.007	0.57–1.44
	15	623	109.3	0.4	87–150	614	13.9	0.2	4.7–33.7	614	1.05	0.007	0.53–1.95
	16	589	106.5	0.3	79–135	581	13.8	0.1	3.5–30.0	581	1.13	0.006	0.38–1.54
	17	454	108.7	0.4	90–139	437	15.9	0.2	6.9–34.4	436	1.22	0.005	0.91–1.92
	18	237	120.7	0.4	103–137	219	16.7	0.2	10–27.6	219	0.94	0.006	0.70–1.53
	19	71	114.2	0.8	95–139	67	18.2	0.4	10.9–33.4	67	1.22	0.01	0.93–1.47
	20	12	112.7	2.6	88–122	12	16.3	1.0	7.8–22.2	12	1.13	0.04	0.91–1.29

Appendix Table F-5. Weekly number caught (n), mean, standard error (SE) and range of fork length (mm), mass (g), and condition factor for juvenile steelhead captured at the Mainstem rotary screw trap (rkm 326) from week 43 to 51, 2003 and week 2 to 24, 2004.

Year	Week of the year	Fork length (mm)				Mass (g)				Coefficient of condition			
		N	Mean	SE	Range	N	Mean	SE	Range	N	Mean	SE	Range
2003	43	9	98.1	7.7	68–142	9	12.0	2.9	4.4–31.9	9	1.14	0.04	0.91–1.40
	44	18	95.7	3.1	71–125	16	10.4	1.0	3.9–20.5	16	1.08	0.02	0.91–1.28
	45	22	118.3	6.6	72–199	22	21.5	4.1	4.4–88.4	22	1.08	0.02	0.95–1.22
	46	35	110.6	5.8	72–226	28	18.7	4.2	3.9–108.5	28	1.06	0.02	0.79–1.32
	47	13	110.5	4.0	85–133	5	14.5	2.5	8.5–23.4	5	1.02	0.03	0.96–1.11
	48	14	122.9	8.4	88–222	14	22.3	6.4	8.0–103.5	14	1.01	0.02	0.94–1.17
	49	8	108.6	7.5	72–133	4	13.2	2.6	6.3–18.8	4	1.05	0.03	1.00–1.14
	50	24	138.7	5.3	91–192	3	38.6	12.6	13.5–52.7	3	1.07	0.05	0.97–1.17
	51	48	127.1	3.6	99–204	48	23.6	2.4	9.9–85.4	48	1.03	0.01	0.79–1.16
2004	2	20	133.4	8.0	82–232	20	29.0	6.1	5.6–122.1	20	1.00	0.01	0.89–1.19
	3	15	146.1	12.0	101–249	9	55.2	17.3	8.1–150	9	0.99	0.03	0.79–1.13
	4	10	126.6	12.9	88–221	4	19.2	4.5	6.9–28.5	4	1.03	0.02	0.98–1.08
	5	0				0				0			
	6	10	114.5	8.8	85–183	10	17.2	4.5	6.2–55.1	10	1.00	0.03	0.85–1.43
	7	10	120.3	11.2	78–195	10	22.6	6.9	5.7–77.6	10	1.05	0.03	0.88–1.20
	8	12	111.3	7.6	70–172	12	17.4	3.9	4.3–55.6	12	1.11	0.03	0.97–1.25
	9	46	119.5	3.8	70–194	46	20.5	2.0	3.0–76.7	46	1.05	0.01	0.85–1.29
	10	16	125.6	8.1	69–207	16	25.3	5.9	3.6–102.6	16	1.05	0.01	0.97–1.16
	11	2	140.0	3.0	137–143	2	22.9	0.2	22.7–23.0	2	0.83	0.05	0.79–0.88
	14	11	171.2	7.2	139–217	11	54.0	7.4	26.1–101	11	1.02	0.01	0.95–1.12
	15	101	176.5	2.3	82–246	101	58.9	2.1	6.2–145	101	1.03	0.008	0.72–1.44
	16	238	172.3	1.6	70–252	238	54.4	1.5	3.0–171.7	223	1.01	0.005	0.79–1.28
	17	289	180.3	1.7	69–307	283	65.9	2.1	3.8–304.1	283	1.03	0.004	0.86–1.24
	18	464	178.1	1.0	81–268	390	61.4	1.5	6.2–454	389	1.04	0.003	0.71–1.30
	19	121	177.0	2.0	93–246	121	58.9	1.9	9.4–141	121	1.02	0.006	0.81–1.19
	20	96	179.1	2.8	101–297	94	63.1	3.2	6.8–215.2	93	1.04	0.01	0.31–1.25
	21	6	181.3	7.7	150–202	6	65.8	7.6	37.7–91	6	1.08	0.02	1.02–1.12
	22	4	150.8	21.4	87–176	4	45.1	13.2	6.9–64.7	4	1.11	0.04	1.04–1.22
	23	28	183.0	5.5	74–238	28	68.6	5.2	4.9–156.1	28	1.05	0.03	0.44–1.21
	24	7	139.6	24.0	53–197	7	40.6	13.0	1.4–74.5	7	0.98	0.01	0.94–1.03

Appendix Table F-6. Weekly number caught (n), mean, standard error (SE) and range of fork length (mm), mass (g), and condition factor for juvenile steelhead captured at the South Fork rotary screw trap (rkm 10) from week 41 to 53, 2003 through week 1 to 15, 2004.

Year	Week of the year	Fork length (mm)				Mass (g)				Coefficient of condition			
		N	Mean	SE	Range	N	Mean	SE	Range	N	Mean	SE	Range
2003	41	28	108.0	6.1	81–206	28	17.7	4.1	6.5–91.5	28	1.12	0.02	1.00–1.48
	42	69	122.3	4.1	82–239	47	25.4	3.8	5.3–133.4	47	1.04	0.01	0.07–0.88
	43	38	101.2	2.2	67–131	18	12.3	1.2	5.8–24.3	18	1.09	0.02	0.98–1.32
	44	52	108.5	4.1	75–209	25	17.6	3.8	3.5–79.2	25	0.99	0.03	0.72–1.19
	45	47	107.8	4.7	74–230	25	16.9	3.8	4.3–92.2	25	1.10	0.04	0.72–1.83
	46	41	105.0	3.1	70–145	5	14.3	2.5	8–20.6	5	0.99	0.02	0.94–1.06
	47	57	115.6	3.1	70–217	9	23.2	6.0	11.4–66	8	1.04	0.02	0.94–1.11
	48	40	121.4	3.8	76–185	40	20.8	2.2	5.6–67.9	40	1.05	0.01	0.83–1.28
	49	61	115.3	3.5	74–189	56	18.7	1.9	4.9–62.4	56	1.01	0.01	0.78–1.21
	50	39	115.1	4.2	75–189	19	12.6	1.1	5.7–25.1	19	0.99	0.01	0.91–1.13
	51	45	112.6	3.4	78–164	45	15.9	1.5	4.7–44.5	45	1.01	0.01	0.87–1.14
	52	2	122.5	4.5	118–127	2	17.0	2.1	14.9–19.1	2	0.92	0.01	0.91–0.93
	53	2	195.0	15.0	180–210	0				0			
2004	1	6	144.0	27.5	87–268	5	47.4	34.5	6.9–185.1	5	1.03	0.03	0.96–1.12
	2	80	133.5	3.7	80–248	58	25.7	2.9	6.1–156.5	58	1.05	0.01	0.89–1.23
	3	46	132.6	4.3	86–198	39	26.9	2.8	7.6–81.4	39	0.99	0.01	0.87–1.15
	4	11	118.5	7.3	91–175	7	17.1	2.9	10.8–32.0	7	1.01	0.03	0.92–1.14
	5	25	114.4	2.4	79–138	25	16.1	0.9	5.0–28.2	25	1.04	0.01	0.94–1.18
	6	27	116.0	4.6	82–179	27	17.7	2.2	5.6–53.2	27	1.02	0.01	0.89–1.18
	7	15	115.9	9.1	74–225	14	13.0	1.9	4.0–28.1	14	0.94	0.04	0.61–1.16
	8	0				0				0			
	9	0				0				0			
	10	0				0				0			
	11	1	150.0			1	36.3			1	1.08		
	12	2	149.5	27.5	122–177	2	38.8	19.4	19.4–58.2	2	1.06	0.01	1.05–1.07
	13	41	140.0	4.5	67–195	39	30.2	2.7	3.8–70.1	38	1.05	0.01	0.87–1.26
	14	10	138.0	7.4	90–172	10	30.1	3.7	11.1–48.4	10	1.12	0.05	0.95–1.52
	15	25	168.6	5.9	97–243	25	54.1	5.4	10.1–132.7	25	1.05	0.01	0.92–1.15

Appendix Table F-7. Weekly number caught (n), mean, standard error (SE) and range of fork length (mm), mass (g), and condition factor for juvenile steelhead captured at the South Fork rotary screw trap (rkm 10) from week 16 to 24, 2004.

Year	Week of the year	Fork length (mm)				Mass (g)				Coefficient of condition			
		N	Mean	SE	Range	N	Mean	SE	Range	N	Mean	SE	Range
2004	16	54	159.7	3.3	74–215	51	45.7	2.4	4.5–101.9	51	1.05	0.009	0.92–1.27
	17	122	165.4	2.5	65–219	120	50.0	1.8	2.7–105	119	1.05	0.006	0.86–1.26
	18	197	167.1	1.6	68–216	197	50.5	1.3	3.8–102.9	195	1.04	0.005	0.86–1.55
	19	658	165.7	0.9	66–227	653	49.4	0.7	3.0–116.2	653	1.04	0.004	0.67–1.65
	20	131	151.4	2.9	73–217	131	42.2	1.9	4.0–101.7	131	1.08	0.008	0.75–1.59
	21	6	97.5	5.3	84–115	6	11.0	2.1	6.0–18.2	6	1.12	0.06	0.91–1.28
	22	6	146.5	14.3	78–169	6	39.0	7.6	5.4–56.1	6	1.11	0.02	1.03–1.16
	23	9	95.3	4.6	76–118	9	10.0	1.5	4.4–17.9	9	1.08	0.02	0.98–1.17
	24	3	86.0	8.5	69–96	3	7.0	2.2	2.7–9.7	3	1.00	0.09	0.82–1.10

Appendix Table F-8. Weekly number caught (n), mean, standard error (SE) and range of fork length (mm), mass (g), and condition factor for juvenile steelhead captured at the Middle Fork rotary screw trap (rkm 326) from week 45, 2003 through week 10 to 25, 2004.

Year	Week of the year	Fork length (mm) N	Mean	SE	Range	Mass (g) N	Mean	SE	Range	Coefficient of condition N	Mean	SE	Range
2003	45	1	173.0			1	58.1			1	1.12		
2004	10	1	140.0			1	25.5			1	0.93		
	11	1	172.0			1	45.5			1	0.84		
	12	0				0				0			
	13	3	154.3	19.5	118–185	3	44.3	15.5	17.5–71.1	3	1.09	0.02	1.07–1.12
	14	2	136.0	4.0	132–140	2	26.5	0.9	25.6–27.3	2	1.05	0.06	0.99–1.11
	15	14	156.9	8.5	64–198	11	48.9	5.0	27.0–81.2	11	1.09	0.02	1.04–1.22
	16	81	168.4	3.4	66–252	80	54.3	3.1	3.2–163.1	80	1.04	0.01	1.04–1.41
	17	210	170.3	1.9	65–236	210	54.6	1.7	2.9–144.7	210	1.03	0.005	0.80–1.43
	18	174	163.6	1.6	83–232	148	47.3	1.3	8.3–98.3	148	1.04	0.007	0.44–1.23
	19	211	160.5	1.9	62–224	211	44.2	1.2	2.6–115.3	211	0.99	0.006	0.47–1.35
	20	291	159.5	1.7	70–231	291	44.5	1.1	2.6–131.6	288	1.01	0.005	0.64–1.80
	21	2	84.0	1.0	83–85	2	7.5	0.6	6.9–8.1	2	1.26	0.05	1.21–1.32
	22	5	107.6	17.0	70–149	5	18.7	7.3	5.9–38.3	5	1.24	0.12	1.06–1.72
	23	13	101.2	6.7	75–169	13	13.0	3.0	5.8–46.3	13	1.10	0.04	0.84–1.37
	24	20	96.4	6.4	62–165	20	11.8	2.7	3.5–43.1	20	1.09	0.05	0.83–1.76
	25	4	85.3	5.7	74–101	4	6.9	1.5	3.8–11.2	4	1.06	0.04	0.94–1.11

Appendix Table F-9. Weekly number caught (n), mean, standard error (SE) and range of fork length (mm), mass (g), and condition factor for juvenile Steelhead captured while seining in the Mainstem between rkm 274–286 from week 12 to 20, 2004.

Year	Week of the year	Fork length (mm) N	Mean	SE	Range	Mass (g) N	Mean	SE	Range	Coefficient of condition N	Mean	SE	Range
2004	12	9	156	22.8	119–196	9	35.6	4.9	19.2–67.6	9	0.91	0.05	0.75–1.14
	13	3	161	12.3	144–185	3	43.0	10.4	26.8–62.5	3	0.99	0.05	0.90–1.09
	14	0				0				0			
	15	5	177.6	3.8	174–183	5	50.8	1.9	44.5–56.2	5	0.90	0.04	0.83–1.07
	16	5	164.6	11.6	135–199	5	48.0	9.0	29.2–77.7	5	1.04	0.04	0.97–1.19
	17	2	169	9.0	160–178	2	50.1	3.1	47.0–53.1	2	1.04	0.10	0.94–1.15
	18	7	175.9	7.4	155–205	7	49.1	7.1	33.4–81.4	7	0.87	0.02	0.80–1.00
	19	14	176.6	4.2	154–200	14	60.3	4.8	37.7–90.8	14	1.07	0.02	0.87–1.19
	20	5	185	8.2	160–211	5	68.1	7.4	47.5–91.4	5	1.06	0.03	0.97–1.16