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Grande Ronde Satellite Facilities O&M

Annual Report

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ABSTRACT

There were three different release groups of fish acclimated at the Catherine Creek Acclimation Facility (CCAF) in 2011. Groups 1 and 2, arrived at the facility on 14 March and Group 3, arrived at the facility on 30 March. Groups 1 and 3 were released on 14 April and Group 2 on 29 March. It is estimated that 37.4%, 7.0%, and 26.4% of the fish from groups 1-3, respectively left the facility during the volitional release period. The total number of fish released was 155,475, comprised of 58,737 conventional (Group 1) and 96,738 captive (48,343 Group 2, 48,395 Group 3). Total mortality for the acclimation period was 173 (0.12%). No fish health problems were encountered this year. Average size of the force released fish was 24.4, 23.6, and 23.5 fish/lb respectively.

There were two groups of spring Chinook acclimated at the upper Grande Ronde Acclimation Facility (UGRAF) in 2011. The first acclimation period ran from 15 March to 30 March. It was estimated that 7.6% of the fish left during the volitional release period. The total number of fish released from the acclimation facility in the first group was 107,994 (53,114 captive, 54,880 conventional). There were 332 mortalities during the first acclimation period (0.31%). The size of the captive and conventional fish that were forced from the facility was 20.3 and 25.4 fish/lb respectively. The second acclimation period ran from 31 March to 14 April. It was estimated that 11.4% of the fish left during the volitional release period. The total number of fish released from the acclimation facility in the second group was 134,388 (all conventional smolts). There were 494 mortalities during the second acclimation period (0.37%). No fish health problems were encountered this year. The size of the fish forced from the facility was 16.1 fish/lb.

The Catherine Creek Adult Capture Facility (CCACF) was put into operation on 3 March 2011. The first adult summer steelhead was captured on 16 March. A total of 348 unmarked adult summer steelhead were trapped and released from 16 March to 1 June 2011. Median arrival time at the trap was the week of 22 April. The first adult spring Chinook salmon was captured at CCACF on 31 May. A total of 393 spring Chinook salmon were trapped from 31 May to 2 August. The total catch was made up of 89 adults and 33 jacks of natural origin, 137 adults and 77 jacks of conventional broodstock progeny and 57 jacks of captive broodstock progeny. A total of 103 adult (51 conventional, 52 natural) and 32 jack (1 captive, 31 natural) spring Chinook salmon were released above the weir to spawn naturally. Median arrival for adults at the trap was the week of 1 July for the natural fish and 8 July for the conventional fish.

Broodstock were collected systematically over the entire return from 8 June to 21 July. The adult broodstock collected and transported from CCACF consisted of 37 unmarked (41.6 of the natural return trapped) and 45 conventional broodstock (32.8% of the hatchery return trapped).

Three spring Chinook spawning surveys were conducted below the weir on Catherine Creek. During these surveys no live fish or carcasses were observed. The trap was removed from Catherine Creek on 5 August. High flows and bed load movement during the spring resulted in a trap efficiency of only 8.7% this year.

The UGRACF was put into operation on 2 March 2011. The first adult summer steelhead was captured on 16 March. A total of 11 unmarked adult summer steelhead were trapped and released from 16 March to 29 April. No adipose-clipped fish were captured at the trap. Median

arrival time at the trap was the week of 6 May. The first adult spring Chinook salmon was captured at UGRACF on 22 June. A total of 230 (137 adult and 93 jack) spring Chinook salmon, were trapped from 22 June to 20 July. The total catch was made up of 16 adults and 5 jacks of natural origin, 74 adults and 43 jacks from conventional broodstock, and 47 adults and 45 jacks from captive broodstock. Median arrival for naturally produced adult fish at the trap was the week of 15 July. Median arrival for the conventional group was the week of 1 July and the captive fish was the week of 8 July.

Broodstock were collected systematically over the entire return from 22 June to 20 July. A total of 9 adult and 1 jack natural fish, and 73 adult and 3 jack hatchery fish (conventional broodstock) were transported to LGH for broodstock.

The trap and weir were removed from the upper Grande Ronde River on 20 July 2011 due to high stream temperatures (daily maximum $>20^{\circ}\text{C}$). High spring flows and bedload movement resulted in a trap efficiency of only 4.6% this year.

In 2011, a total of 39 females, 37 males and four jacks were spawned from the Catherine Creek stock. A total of 39 females, 40 males, and three jacks from the upper Grande Ronde stock were spawned. A total of 79 females, 73 males, and eight jacks from the Lookingglass Creek stock were spawned. Peak spawning dates were 1 September for Grande Ronde River and Lookingglass Creek and 22 September for Catherine Creek. A total of 155 females, 92 males, and 52 jacks from the Grande Ronde captive brood were spawned.

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INTRODUCTION

Anadromous salmonid stocks have declined in both the Grande Ronde River Basin (Lower Snake River Compensation Plan (LSRCP) Status Review Symposium 1998) and in the entire Snake River Basin (Nehlsen et al. 1991), many to the point of extinction. The Grande Ronde River Basin historically supported large populations of fall and spring Chinook (*Oncorhynchus tshawytscha*), sockeye (*O. nerka*), and coho (*O. kisutch*) salmon and steelhead trout (*O. mykiss*) (Nehlsen et al. 1991). The decline of Chinook salmon and steelhead populations and extirpation of coho and sockeye salmon in the Grande Ronde River Basin was, in part, a result of construction and operation of hydroelectric facilities, over fishing, and loss and degradation of critical spawning and rearing habitat in the Columbia and Snake River basins (Nehlsen et al. 1991).

Hatcheries were built in Oregon, Washington and Idaho under the Lower Snake River Compensation Plan (LSRCP) to compensate for losses of anadromous salmonids due to the construction and operation of the lower four Snake River dams. Lookingglass Hatchery (LGH) on Lookingglass Creek, a tributary of the Grande Ronde River, was completed under LSRCP in 1982 and has served as the main incubation and rearing site for spring Chinook salmon programs in the Grande Ronde and Imnaha rivers in Northeast Oregon. Despite these hatchery programs, natural spring Chinook populations continued to decline resulting in the National Marine Fisheries Service (NMFS) listing Snake River spring/summer Chinook salmon as "threatened" under the federal Endangered Species Act (1973) on 22 April 1992.

Continuing poor escapement levels and declining population trends indicated that Grande Ronde River basin spring Chinook salmon were in imminent danger of extinction. These continuing trends led fisheries co-managers in the basin to initiate the Grande Ronde Endemic Spring Chinook Salmon Supplementation Program (GRESCESSP) in order to prevent extinction and preserve options for use of endemic fish stocks in future artificial propagation programs. The GRESCESSP was implemented in three Grande Ronde River basin tributaries; the Lostine River, the upper Grande Ronde River, and Catherine Creek. The GRESCESSP employed two broodstock strategies utilizing captive and conventional brood sources. The captive brood program that began in 1995, with the collection of parr from the three tributary areas, has now been discontinued in Catherine Creek and the Lostine River. There is still a safety net program for the Upper Grande Ronde River. The conventional broodstock component of the program began in 1997 with the collection of natural adults returning to these tributary areas.

Although LGH was available as the primary production facility for spring Chinook programs in the Grande Ronde Basin, there were never any adult or juvenile satellite facilities developed in the tributary areas that were to be supplemented. An essential part of the GRESCESSP was the construction of adult traps and juvenile acclimation facilities in these tributary areas. Weirs were installed in 1997 for the collection of adult broodstock for the conventional component of the program. Juvenile facilities were built in 2000 for acclimation of the smolts produced by the captive and conventional broodstock programs as release sites within the natural production areas of their natal streams. The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) operate both the juvenile acclimation and adult trapping facilities located on Catherine Creek and the upper Grande Ronde River under this project. The Nez Perce Tribe (NPT) operate the facilities on the Lostine River under a sister project.

Hatcheries were also built in Oregon, Washington and Idaho under the LSRCF to compensate for losses of summer steelhead due to the construction and operation of the lowest four Snake River dams. Despite these harvest-driven hatchery programs, natural summer steelhead populations continued to decline as evidenced by declining counts at Lower Granite Dam since 1995 (Columbia River Data Access in Real Time, DART) and low steelhead redd counts on index streams in the Grande Ronde Basin. Because of low escapement the Snake River summer steelhead were listed as threatened under the Endangered Species Act of 1973 by the National Marine Fisheries Service (NMFS) on 18 August, 1997. Co-managers have also discontinued off-station releases of juvenile Willowa stock (non-endemic) hatchery summer steelhead into Catherine Creek in 1998 and the upper Grande Ronde River in 1999.

Data are lacking on summer steelhead adult return numbers, stray rates, and the genetic make-up of populations that return to tributaries of the Grande Ronde River basin, Catherine Creek and the upper Grande Ronde River specifically. The adult fish weirs in place on Catherine Creek and the upper Grande Ronde River are also used to collect data on summer steelhead populations in those areas.

METHODS

Juvenile Acclimation

The Catherine Creek Acclimation Facility (CCAF) is located at river mile (rm) 52.5 of Catherine Creek (Figure 1). Catherine Creek originates in the Wallowa Mountains and flows north to northwest entering the Grande Ronde River at rm 117. The Upper Grande Ronde Acclimation Facility (UGRAF) is located at rm 170.5 of the Grande Ronde River (Figure 1). The Grande Ronde River originates in the Elkhorn Mountains and flows north to northeast 183 rm, before entering the Snake River.

Each facility consists of 4 portable raceways lined with vinyl fabric (Figures 2 and 3). Each raceway is 86 ft long, 8 ft wide, and the water depth is kept at around 3.25 ft (2,236 ft³). The water supply for CCAF is pumped directly from Catherine Creek into the raceways using a screened submersible pump powered by a diesel powered electrical generator. The water supply for UGRAF is diverted from the Grande Ronde River into the raceways by gravity using a screened cement intake structure located about 600 ft upstream from the raceways. For both facilities the water is drained from each raceway through an 8 inch pipe back to the river below the water intake. A 26 ft travel trailer is placed at each facility to provide onsite housing for facility operators, who provide 24 hour watch and maintenance of the facility.

Each facility is designed to hold 42,475 fish per raceway at 25 fish/lb (169,900 total, 6,796 lbs), a density of 0.76 lbs/ft³. Flow measured at the facilities has been 330 gpm/raceway, a flow density of 5.15 lbs/gpm. The production goal for Catherine Creek is 150,000 smolts with an interim target of 130,000 smolts due to space constraints at LGH. Under this scenario, there would be only one acclimation period. At the UGRAF the plan is for two acclimation periods with the production goal at 250,000 smolts. The proposed acclimation period for CCAF runs from the mid-March to mid-April. To accomplish the two acclimation periods at UGRAF, the period is split in half with the first group released at the end of March. This time period is chosen to mimic the spring outmigration timing for natural smolts in the system.

Fish are transported to the facilities from LGH by Oregon Department of Fish and Wildlife (ODFW) in tanker trucks. The fish are fed daily when water temperatures are above 3°C at a rate ranging from 0.2 to 2.4 % body weight per day (BWD) depending on the water temperature during the acclimation period (Bio-Oregon feed rate guidelines, November 2006). Fish are allowed to voluntarily leave the raceways beginning six to seven days after delivery to the facilities. Fish remaining in the raceways at the end of the volitional period are forced from the raceway in the afternoon. The fish are released in the afternoon because flows are slightly higher and the coming darkness will give the fish cover as they move downstream.

A portion of the fish at both facilities are tagged with passive integrated transponders (PIT) each year by ODFW and CTUIR for survival estimation to Snake and Columbia River dams. PIT tag detectors are installed on the exit pipes before the volitional release to monitor the outmigration. Mortalities are removed daily, scanned for PIT tags, and saved for ODFW pathology. The total number of fish released is estimated using ODFW Fish Liberation Reports and acclimation mortality records. Lengths and weights are taken at both facilities at arrival, before the volitional migration begins, and just before the force out, by netting 50 fish from each raceway. Project

personnel conduct maintenance and repair activities on the facility grounds and equipment as needed to operate each of the facilities.

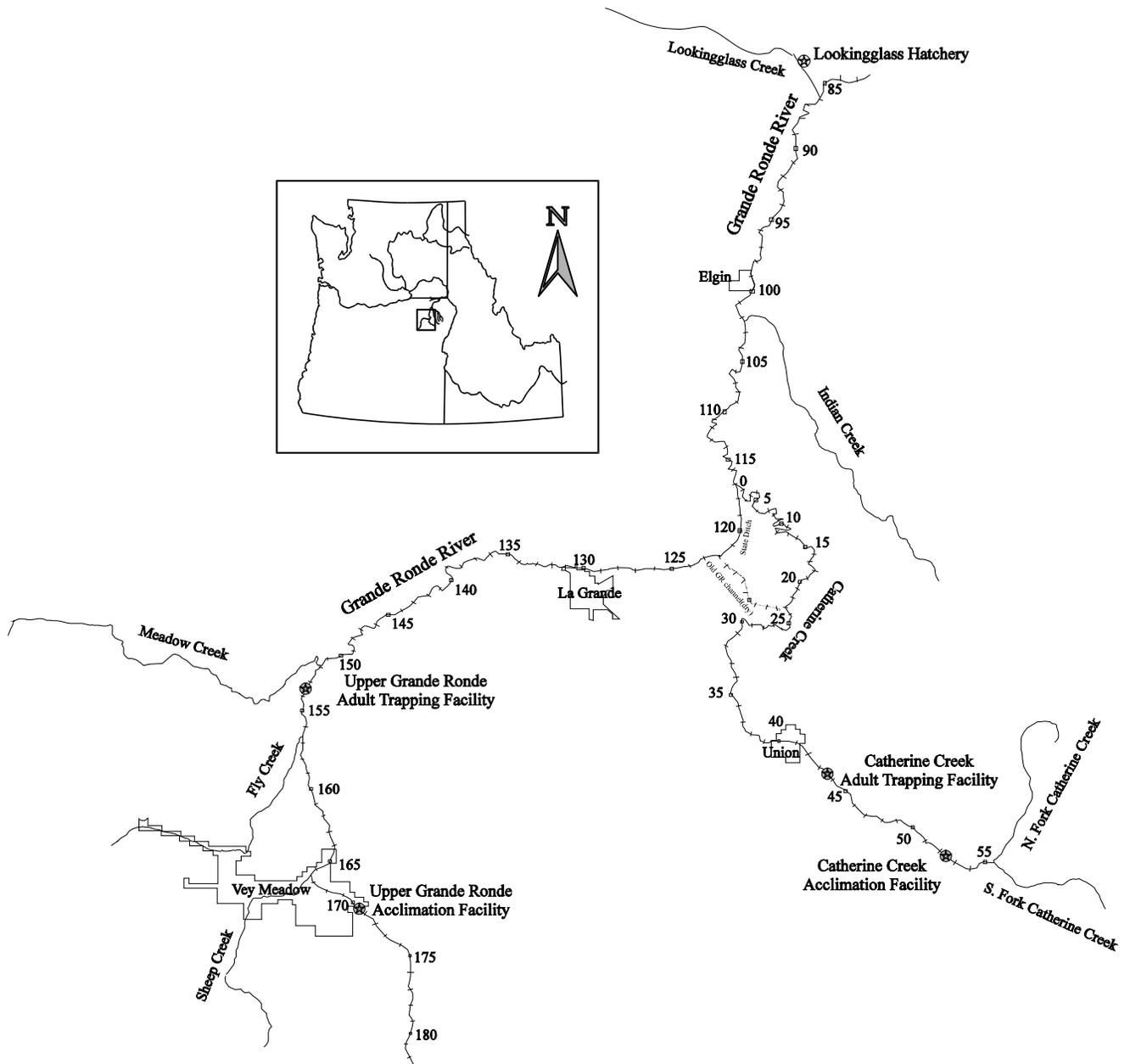


Figure 1. Map of the upper Grande Ronde River basin showing locations (rm) of Lookingglass Hatchery and Catherine Creek and Upper Grande Ronde juvenile acclimation and adult capture facilities.

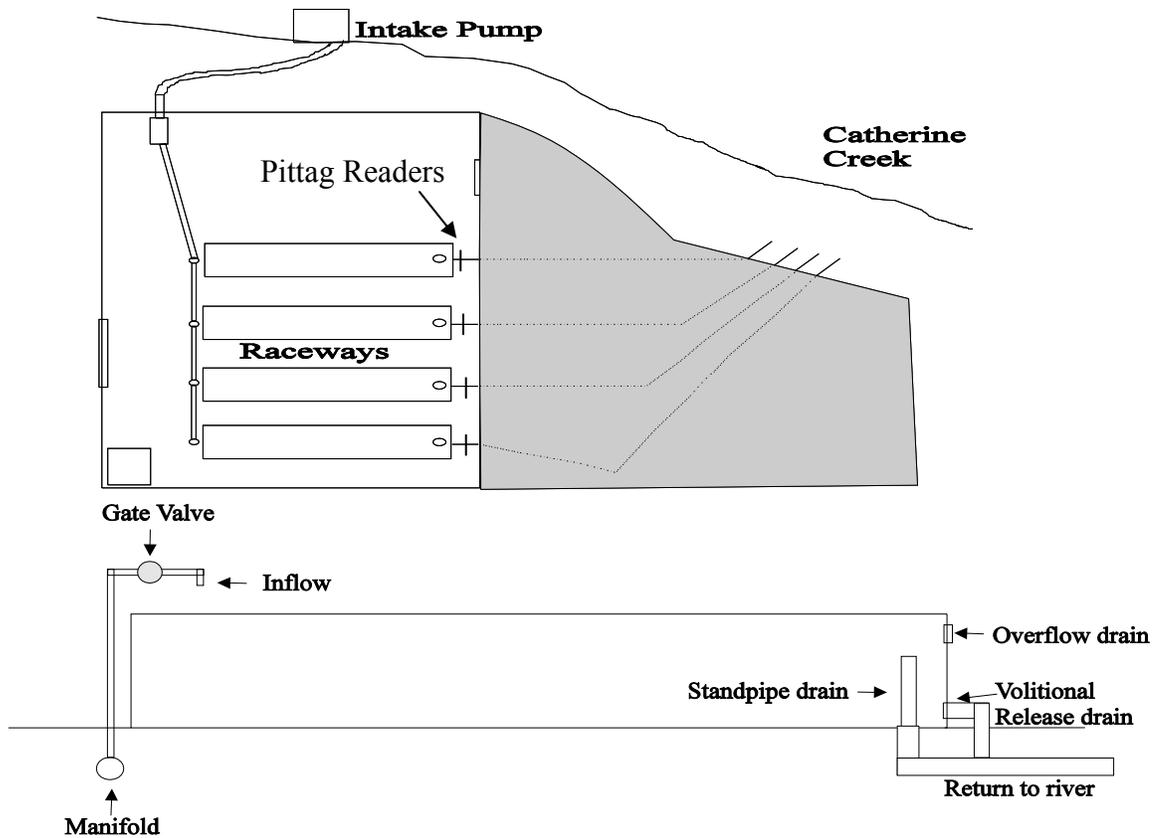


Figure 2. Photo and diagram of the Catherine Creek acclimation facility. The lines passing through the shaded area represent underground return pipes.

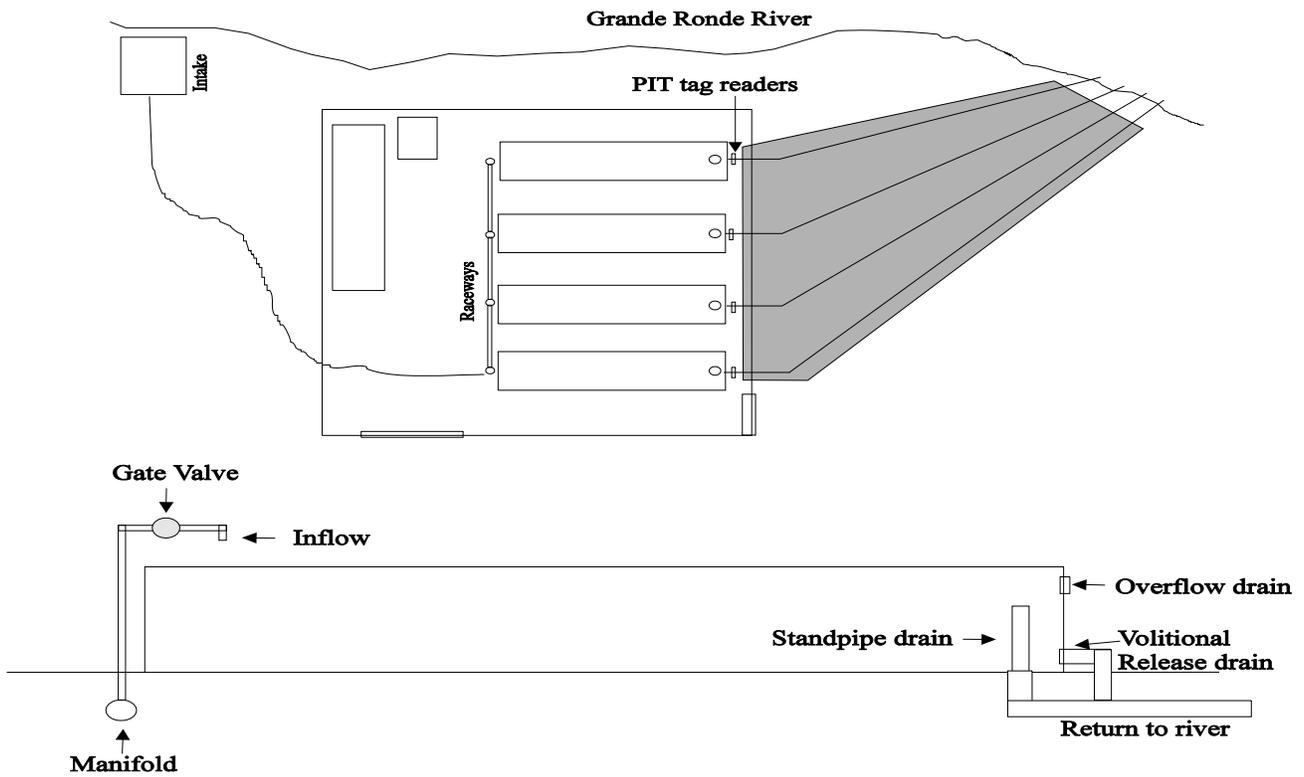


Figure 3. Photo and diagram of the Upper Grande Ronde acclimation facility. The main intake line and the lines passing through the shaded area represent underground pipes.

Adult Collections

The Catherine Creek Adult Collection Facility (CCACF) is located at rm 43.5 of Catherine Creek (Figure 1). The facility consists of a hydraulic weir which is attached at the bottom sill of a full channel width pool and chute type ladder (Figure 4). Trapping of adult summer steelhead and spring Chinook salmon is accomplished by directing adults into an off channel trap with a fyke opening and holding area that is 25 ft long and 6 ft wide. The depth is operated at about 6 ft (900 ft³). The designed adult spring Chinook salmon holding capacity for this facility is 90 using 10 ft³/adult. There is also a recovery area in the ladder above the trap that the fish can remain in until ready to continue upstream.

The Upper Grande Ronde Adult Collection Facility (UGRACF) is located at rm 153.5 of the Grande Ronde River (Figure 1). The facility consists of a floating weir and trapbox that spans the entire stream effectively blocking upstream passage (Figure 4). Trapping of summer steelhead and spring Chinook salmon is accomplished by directing adults into the trapbox. The trapbox is located in the main channel near the bank and is 11 ft long and 10 ft wide. There are two openings in the trapbox, one in the front of the box with a fyke attached and the other a trap door on the side under the weir panels. The depth of the water in the trapbox is normally about 2.5 ft (275 ft³). The designed adult spring Chinook salmon holding capacity for this facility is 28 using 10 ft³/adult. There is a structure on the upstream side of the trap that reduces the flow of the river on the trap side and allows an area of recovery for the passed fish.

A travel trailer is placed at each facility after the completion of the acclimation periods to allow for 24 hour/7 day a week operation during the peak trapping periods. Each of the traps is checked daily and water temperatures are taken with a pocket thermometer before the trap is operated. An Onset™ recording thermometer is also installed in the trap boxes for hourly temperature readings. Handling events only occur when water temperatures are below 20.0°C. Later in the season, as water temperatures rise, fish are processed earlier in the day when water temperatures are lower, in order to reduce stress. At the upper Grande Ronde facility, if and when the daily maximum water temperature exceeds 20.0°C the trap is opened and the weir is removed from the stream for the year (2011 LSRCP AOP).

During the trap checks no anesthetic is used due to possible harvest of the fish above the weir. Fork lengths from both summer steelhead and spring Chinook salmon are measured to the nearest mm. A paper punch is used to mark fish and collect tissues for genetic samples. A single punch on the right opercle plate is used to mark the fish that are released upriver as having been trapped. Tissue from opercle punches and one additional caudal punch are collected for genetics evaluation. Tissue samples are preserved in labeled vials with 95% ethanol. Each fish is examined externally for marks, injuries or other physical conditions, and a preliminary determination of sex is made. Naturally produced summer steelhead are enumerated and passed upstream, while the hatchery produced fish are removed. Spring Chinook salmon are collected and transported to LGH for broodstock, outplanted in another stream, or enumerated and passed upstream. Summer steelhead kelts encountered are counted and allowed to pass downstream over the weir if alive and sampled (length, weight, and otolith) if dead. Any spring Chinook salmon mortality recovered is also sampled. Fish species captured incidentally are released upstream.

Spring Chinook broodstock collection at the Catherine Creek facility is based on a sliding scale developed by co-managers in the basin (Appendix Table 1). The sliding scale was developed to allow for increases and decreases in the number of returning naturally- and hatchery-produced fish and to provide a basin specific approach to broodstock and natural escapement management. The scale is based on pre-season population estimates and regulates the percentage of natural and hatchery broodstock to be retained and hatchery/wild ratio above the weir. When the ratio is applied above the weir and surplus fish are the result, these fish can be used for Lookingglass Hatchery broodstock or outplanted in Lookingglass Creek and/or Indian Creek. Fish collected for broodstock are taken systematically (adult/jack) from across the run. Progeny from the captive broodstock program are not to be incorporated into the Catherine Creek conventional hatchery broodstock but may be used for broodstock in the Lookingglass Creek program.

This sliding scale management does not apply to the upper Grande Ronde River. For the upper Grande Ronde River, escapement and broodstock collection guidelines were agreed to by the co-managers as part of the Grande Ronde Spring Chinook Hatchery Management Plan (GRSCHMP 2002). Up to 50% of the natural fish returning to the weir may be retained for brood and as many conventional origin adults as needed to meet the broodstock goal. No captive brood progeny adults are used for broodstock. There are no restrictions on hatchery/wild ratio above the weir.

Hatchery jack management above the weirs is the same for both Catherine Creek and the upper Grande Ronde River. The goal is not to exceed a total of one jack for every ten adult male spring Chinook passed (10%). All natural origin jacks are passed upriver along with enough conventional jacks to meet the target. Surplus jacks that arrive at the weirs are sacrificed for data collection (coded wire tag) and distributed for ceremonial and subsistence uses. Preferred jack management in the Catherine Creek broodstock is 1 jack for every 10 males (10%) while the Grande Ronde broodstock can be as high as 1 jack for every 5 adult fish. The high percentage allowed in the Grande Ronde broodstock is due to the historical very low adult numbers when the GRSCHMP was being developed and the possible need for more males in the brood.

All fish collected for broodstock and transported to LGH received prophylactic dorsal sinus injections of oxytetracycline and erythromycin upon loading. Dosage of each antibiotic is based on estimated age length data (3 year fish <601mm, 4 year fish 601-799mm, 5 year fish >799). For the erythromycin injection (100mg/ml), 3-year-old fish received 0.50cc, 4-year-old fish 1.0cc, and 5-year-old fish 2.0cc. The oxytetracycline (200mg/ml) is given at one-quarter the dose of the erythromycin injections.

Adults that are to be transported to LGH for holding and spawning are given tags that will identify individual fish at the time of spawning. The fish are marked with a thin flexible tag (Floy Laminated Flex Tag™) stapled to the operculum. The fish are transferred from the trap to the CTUIR transport vehicle by using a water-filled tube. Broodstock are transported from each weir site to LGH using 300 gallon fiberglass tanks mounted on flatbed trailers. The tanks are each equipped with an aerator and oxygen tank. Transport time to LGH from the weir site is about 1.0 to 1.5 hours. Target dissolved oxygen level in the tank during transport is 11 mg/l. Dissolved oxygen levels are checked mid way through the transport.

The possible effects of the weirs on fish behavior is evaluated by walking or snorkeling a one-mile segment of the stream immediately downstream of the weirs once a week when water levels and clarity allow for viewing fish. Live fish, carcasses, and evidence of spawning activities (redds, test digs) are recorded. ODFW and CTUIR staff conducts standard spawning ground surveys (Monzyk et al. 2006) on segments upstream and downstream of the weir in August and September and the same information is collected.

Project personnel conduct maintenance and repair activities on facility grounds and equipment as needed to operate the facilities.

Broodstock Activities

Assistance is provided to ODFW for the spawning of the Lookingglass Creek, Catherine Creek and Upper Grande Ronde River conventional broodstocks held at LGH and for the Grande Ronde captive brood at Bonneville Hatchery (BOH). All stocks at LGH are checked for ripeness once a week over a five week period beginning around the middle of August. At Bonneville Hatchery, the captive brood is checked once a week over a six week period beginning in September. Any surplus eggs from this spawning are outplanted into Meadow or Sheep Creeks (upper Grande Ronde tributaries) after eye up in the fall.



Figure 4. Photos of the Catherine Creek (top) and the Upper Grande Ronde (bottom) adult broodstock collection facilities.

RESULTS AND DISCUSSION

Juvenile Acclimation

There were three different release groups of fish acclimated at the CCAF in 2011 (Table 1). Group 1, 58,887 conventional smolts, arrived at the facility on 14 March and would be acclimated until release on 14 April. Group 2, 48,355 captive smolts, also arrived on 14 March and would be acclimated until release on 29 Mar. Group 3, 48,406 captive smolts, arrived at the facility on 30 March and would be acclimated until release on 14 April. The average size of the Group 1 conventional fish at delivery was 26.6 fish/lb and the captive fish in Groups 2 and 3 was 25.6 and 24.9 fish/lb respectively (Table 2). The densities in the raceways ranged from 0.43 to 0.54 lbs/ft³. The variability in the raceway densities was due to the densities at LGH and the way they were loaded onto the transport truck. Fish from Group 2 began a nine day volitional release on 21 March, followed by Group 1 with a 16 day volitional release beginning 30 March, and Group 3 with a 10 day volitional release beginning 5 April. Fish remaining after each groups volitional release period were forced out of the raceways.

During the volitional release period for Group 1 there were a total of 2,606 PIT-tagged fish scanned. Based on the number of PIT-tagged fish in this group (11.8%, 6,967), an estimated 22,027 fish left. This was 37.4% of the fish released from this group (Table 3). PIT-tagged fish scanned during the volitional release period for Group 2 was 487. Based on the number of PIT-tagged fish in this group (14.4%, 6,961), an estimated 3,383 fish left. This was only 7.0% of the fish released from this group. PIT-tagged fish scanned during the volitional release period for Group 3 was 1,842. Based on the number of PIT-tagged fish in this group (14.4%, 6,984), an estimated 12,767 fish left. This was 26.4% of the fish released from this group. Migration timing for groups 1-3 showed that of the fish that volitionally migrated, 84.8%, 75.36%, and 62.1% left the first 4 days of the volitional release (Figure 5). The low volitional outmigration seen for Group 2 may have been due to the earlier force out of this group. Group 3 was released later in April and had higher volitional migration percentages with similar volitional release time. The large volitional migration for Group 1 may have been due to the longer volitional release time.

The total number of fish that were released from the acclimation facility was 155,475, comprised of 58,737 conventional (Group 1) and 96,738 captive (48,343 Group 2, 48,395 Group 3). The size of the fish from Groups 1-3 just before the volitional release began was 24.5, 25.6, and 24.9 fish/lb respectively. The size of the fish that were forced from the facility from Groups 1-3 was 24.4, 23.6, and 23.5 fish/lb respectively. Based on these sizes it appears that the smaller fish left the raceways volitionally leaving the larger fish to be forced out. A total of 599 pounds of food was fed during the acclimation period. The water temperature at CCAF ranged from 1.2°C to 6.9 °C during the acclimation period and was usually at the lowest temperature around 0700 with the peak temperatures around 1600 (Figures 6 and 7).

The total mortality for the acclimation period was 173 (0.12). There was no substantial fish health problems detected in Catherine Creek conventional smolt mortalities. ODFW Fish Health Services examined a total of 10 mortalities (ponds 1 and 2). No significant levels of systemic bacteria were detected. All ELISA values were ≤ 0.059 OD units indicating that these fish did not have a BKD problem at release. All samples collected for culturable viruses were negative.

It is likely that some of these fish may have had some level of Erythrocytic Inclusion Body Syndrome (EIBS) virus since this virus was detected in 40% of the grab-sampled fish from raceway 1 at LGH during the pre-transfer examination in March 2011. Since only frozen mortalities were examined from CCAF, it was not possible to determine the level of EIBS for this group during acclimation. There were no substantial fish health problems detected in Catherine Creek captive broodstock smolt mortalities from the acclimation site. Oregon Fish Health Services examined a total of 10 mortalities from the second (N=5) and third (N=5) acclimation release groups combined (ponds 3 and 4). No significant levels of systemic bacteria were detected and all samples collected for culturable viruses were negative. All ELISA values were ≤ 0.098 OD units indicating that these fish did not have a BKD problem at release. No EIBS virus was detected in this group of fish prior to transfer to acclimation.

There were two acclimation groups at the UGRAF in 2011 (Table 1). Group 1 was made up of a total of 108,326 smolts (53,166 captive smolts and 55,160 conventional smolts). Group 1 was delivered to the facility from LGH on 15 March 2011. The average size of the captive and conventional fish at delivery was 24.0 and 27.7 fish/lb respectively (Table 2). The densities in the raceways ranged from 0.49 to 0.54 lbs/ft³. The variability in the raceway densities was due to the densities at LGH and the way they were loaded onto the transport truck. Volitional release began on 22 March and force out on 30 March.

There was a total of 30 captive fish scanned (RW 1 and RW 2). Based on the number of PIT-tagged fish in this group (0.74 %, 394), an estimated 4,048 fish left during the volitional release period. This was 7.6% of the total fish released from this group (Table 3). The PIT tag reader on raceway 2 appeared to have malfunctioned during the volitional release period. This would decrease the estimate of volitional release for the captive fish. There was a total of 15 conventional fish scanned (RW 3 and RW 4). Based on the number of PIT-tagged fish in this group (0.73 %, 400), an estimated 2,069 fish left during the volitional release period. This was 3.8% of the total fish released from this group. Migration timing for Group 1 showed that 80.0 and 73.3% of the captive and conventional fish respectively, left the first 4 days of the 8 day volitional release (Figure 8).

The total number of fish that were released from the acclimation facility in the first group was 107,994 (53,114 captive, 54,880 conventional). The size of the captive and conventional fish that were forced from the facility was 20.3 and 25.4 fish/lb respectively. Based on these sizes it appears that the smaller fish left the raceways volitionally leaving the larger fish to be forced out. A total of 46.4 pounds of food was fed during the first acclimation period. The water temperature at UGRAF for the early acclimation ranged from -0.1°C to 3.2 °C and was lowest around 0800 and highest around 1700 (Figures 9 and 10).

There were a total of 332 mortalities from Group 1 (0.31%). There were 52 captive (0.10%) and 280 conventional (0.51%) mortalities. There was no substantial fish health problems detected in mortalities from the first acclimation group of Grande Ronde conventional smolts. ODFW Fish Health Services examined a total of 10 mortalities from the first acclimation group (ponds 3 and 4). No significant levels of systemic bacteria were detected. All ELISA values were ≤ 0.058 OD units indicating that these fish did not have a BKD problem at release. All samples collected for culturable viruses were negative. It is likely these fish had some level of EIBS virus since this virus was detected at LGH in 60% of the grab-sampled fish from raceway 6 at the pre-transfer

examination in February 2011. Since only frozen mortalities were examined from the first acclimation it was not possible to determine the level of EIBS at acclimation for this group. There was no substantial fish health problems detected in the Grande Ronde captive broodstock smolt mortalities from the acclimation site. Oregon Fish Health Services examined a total of 10 mortalities (ponds 1 and 2). No significant levels of systemic bacteria were detected. All ELISA values were ≤ 0.057 OD units indicating that these fish did not have a BKD problem at release. All samples collected for culturable viruses were negative. It is likely that some of these fish may have had some level of EIBS virus since this virus was detected in 40% of the grab-sampled fish from raceway 4 at LGH during the pre-transfer examination in February 2011. Since only frozen mortality were examined from this group it was not possible to determine the level of EIBS at acclimation.

Group 2 was made up of a total of 134,882 conventional smolts. Group 2 was delivered to the facility from LGH on 31 March 2011 (Table 1). The average size of the fish at delivery was 17.7 fish/lb (Table 2). The fish in Group 2 were considerably larger than the fish from Group 1 making the densities in three of the raceways higher than desired pond loading criteria. The densities in the raceways ranged from 0.75 to 0.83 lbs/ft³. The variability in the raceway densities was due to the size of the fish and densities at LGH and the way they were loaded onto the transport truck. Volitional release began on 6 April and force out on 14 April.

There were a total of 133 conventional fish scanned for PIT-tags. Based on the number of PIT-tagged fish in this group (0.89 %, 1195), an estimated 15,413 fish left during the volitional release period. This was 11.4% of the total fish released from this group (Table 3). Migration timing for Group 2 showed that only 54.4% of the fish left the first 4 days of the 8 day volitional release (Figure 7). This was slightly lower than what was observed for Group 1.

The total number of conventional fish that were released from the acclimation facility in the second group was 134,388. The size of the fish that were forced from the facility was 16.1 fish/lb. Based on this size it appears that the smaller fish left the raceways volitionally leaving the larger fish to be forced out. A total of 242.0 pounds of food was fed during the second acclimation period. The water temperature at UGRAF for the late acclimation ranged from -0.1°C to 4.0°C and was lowest around 0800 and highest around 1700 (Figures 9 and 10).

There were a total of 494 mortalities from Group 2 (0.37%). On 5 April, 2011, as follow-up to finding EIBS virus at Lookingglass Hatchery, Oregon Fish Health Services conducted an on site examination for the second acclimation group of Grande Ronde conventional smolts. A total of 10 mortalities and 12 grab-sampled fish (ponds 1-4) were examined. One of 10 (10%) mortalities had a low level of *Flavobacterium psychrophilum* (CWD bacteria). All ELISA values were ≤ 0.068 OD units indicating that these fish did not have a BKD problem at release. All samples collected for culturable viruses were negative (EIBS is not a culturable virus). Blood work from three grab-sampled fish per pond confirmed that EIBS virus was still present near release time. Five of 12 (41.7%) grab-sampled fish were positive for EIBS virus at a low level. Positive EIBS fish were found in ponds 1, 2 and 3; none were found from pond 4. These results correlate well with results from Lookingglass Hatchery where EIBS was detected in ponds 5, 6 and 7 but not pond 8 at the pre-transfer examination in February 2011. Though EIBS virus was detected in fish from the acclimation site it appears the infection levels were dropping compared to the levels detected in February at Lookingglass Hatchery.

Maintenance and repair activities were conducted at both acclimation facilities in 2011. Facility maintenance work at the CCAF consisted of snow removal, work on the intake site, and overhaul of the travel trailer. Facility maintenance work at the UGRAF consisted of snow removal, removal of gravel from intake area, and setup of the new travel trailer.

Table 1. Raceway fish density and flow data for the Catherine Creek and Upper Grande Ronde acclimation facilities before volitional release in 2011.

Catherine Creek	Group 1 raceway		Group 2 raceway		Group 3 raceway	
	1	2	3	4	3	4
No. of fish	29,444	29,443	24,178	24,177	24,203	24,203
Total lbs.	1,200	1,200	916	916	1,108	1,108
Mortality	53	97	3	9	3	8
Density lbs/ft ³	0.54	0.54	0.41	0.41	0.50	0.50
lbs/gpm	3.64	3.64	2.78	2.78	3.36	3.36
Flow gpm	330	330	330	330	330	330
Treatment	Conv.	Conv.	Capt.	Capt.	Capt.	Capt.

Grande Ronde Group 1	Raceway			
	1	2	3	4
No. of fish	26,583	26,583	27,580	27,580
Total lbs.	1,197	1,197	1,099	1,099
Mortality	21	31	154	126
Density lbs/ft ³	0.54	0.54	0.49	0.49
lbs/gpm	3.63	3.63	3.33	3.33
Flow gpm	330	330	330	330
Treatment	Capt.	Capt.	Conv.	Conv.
Grande Ronde Group 2	Raceway			
	1	2	3	4
No. of fish	35,248	35,427	30,361	33,846
Total lbs.	1,841	1,850	1,668	1,860
Mortality	122	168	134	70
Density lbs/ft ³	0.82	0.83	0.75	0.83
lbs/gpm	5.26	5.29	4.77	5.31
Flow gpm	350	350	350	350
Treatment	Conv.	Conv.	Conv.	Conv.

Table 2. Group, number, size, raceways, mortality, feed fed, and numbers released from Catherine Creek and the Upper Grande Ronde acclimation facilities in 2011.

Facility/ rel. yr	Group	Number Received	Size fish/lb.	Raceways used	Density lbs/ft ³	Total mortality (%)	Feed Fed (lbs)	Number released
CC 11	1 Conv.	58,887	26.6	2	0.54	0.25	300	58,737
CC 11	2 Capt.	48,355	25.6	2	0.41	0.02	126	48,343
CC 11	3 Capt.	48,406	24.9	2	0.50	0.02	173	48,395
GR 11	1 Capt.	53,166	24.0	2	0.54	0.10	23	53,114
GR 11	1 Conv.	55,160	27.7	2	0.49	0.51	23	54,880
GR 11	2 Conv.	134,882	17.7	4	0.81	0.37	242	134,388

Table 3. Group, acclimation dates, temperature, dissolved oxygen, and estimated volitional migration of fish acclimated at Catherine Creek and the Upper Grande Ronde facilities in 2011.

Facility/ rel. yr	Group	Acclimation Period	Volitional began	Temp.°C		DO mg/l		Volitional	
				Min.	Max.	Min.	Max.	migration	%
CC 11	1 Conv.	3/14 – 4/14	3/30	1.2	6.9	9.7	11.5	22,027	37.4
CC 11	2 Capt.	3/14 – 3/29	3/21	1.2	5.9	9.8	11.5	3,383	7.0
CC 11	3 Capt.	3/30 – 4/14	4/5	1.5	6.9	10.0	10.9	12,767	26.4
GR 11	1 Capt	3/15 – 3/30	3/22	-0.1	3.2	10.8	13.3	2,069	3.8
GR 11	1 Conv	3/15 – 3/30	3/22	-0.1	3.2	10.8	13.3	4,048	7.6
GR 11	2 Conv.	3/31 – 4/14	4/5	-0.1	4.0	10.0	12.0	15,413	11.4

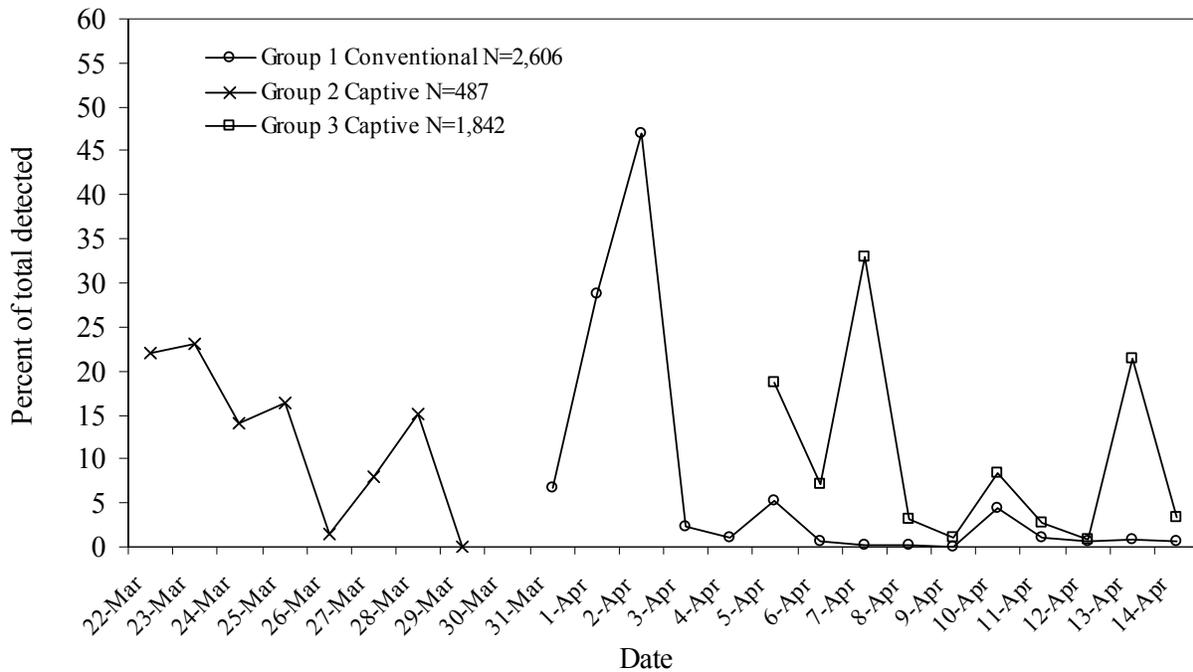


Figure 5. Daily PIT tag detections of fish leaving the raceways during the volitional release periods at the Catherine Creek acclimation facility in 2011.

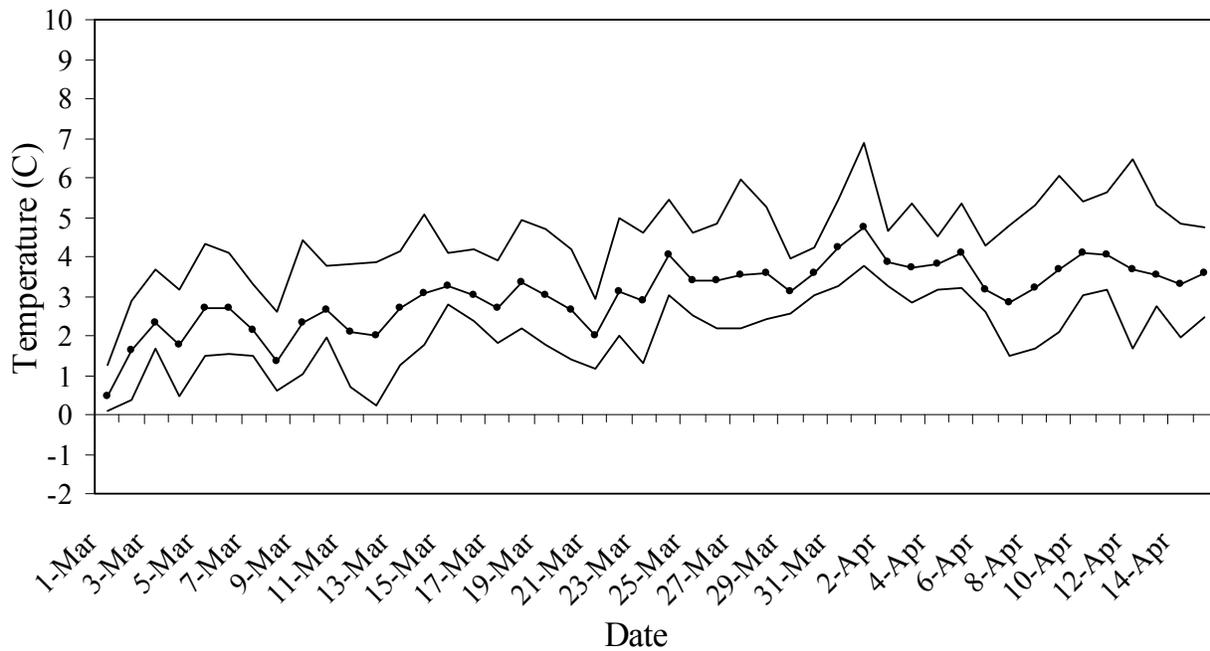


Figure 6. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Catherine Creek juvenile acclimation facility in 2011.

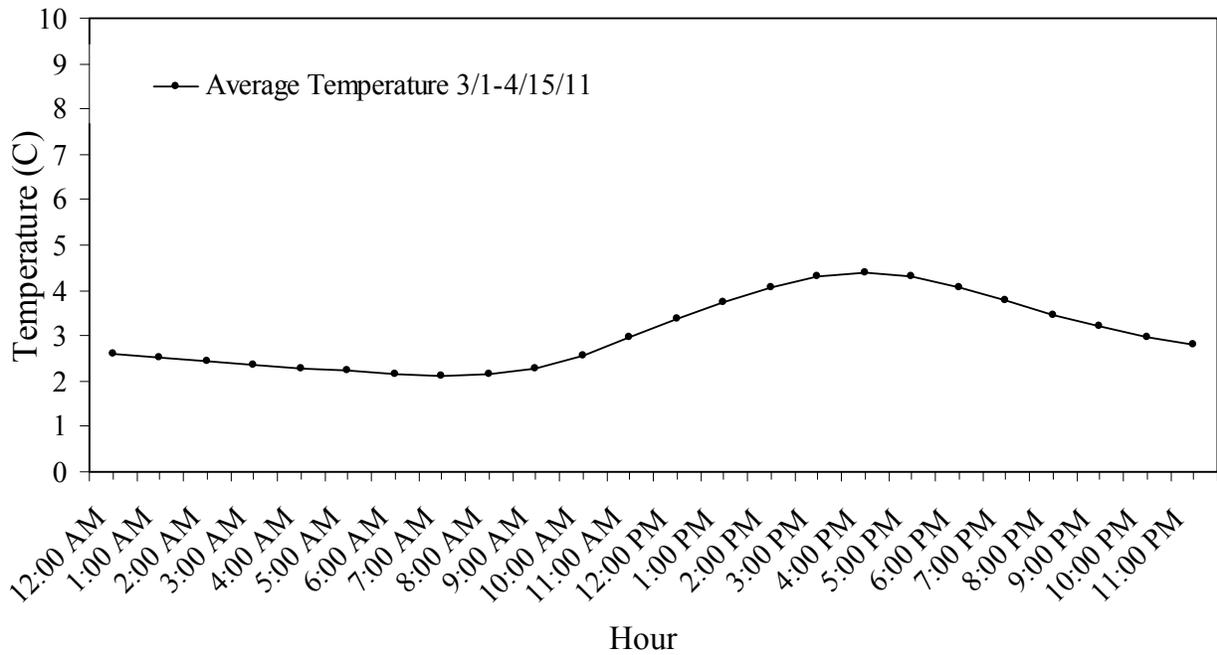


Figure 7. Average hourly water temperature at the Catherine Creek juvenile acclimation facility in 2011.

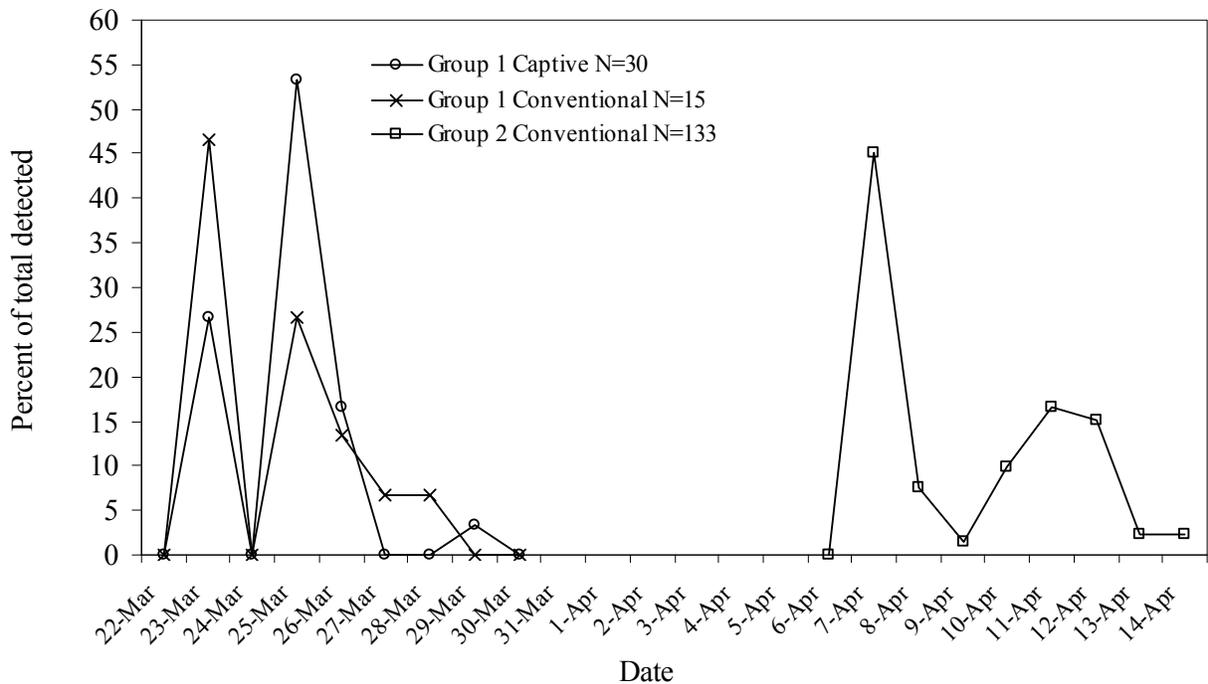


Figure 8. Daily PIT tag detections of fish leaving the raceways during the early volitional release periods at the Grande Ronde acclimation facility in 2011.

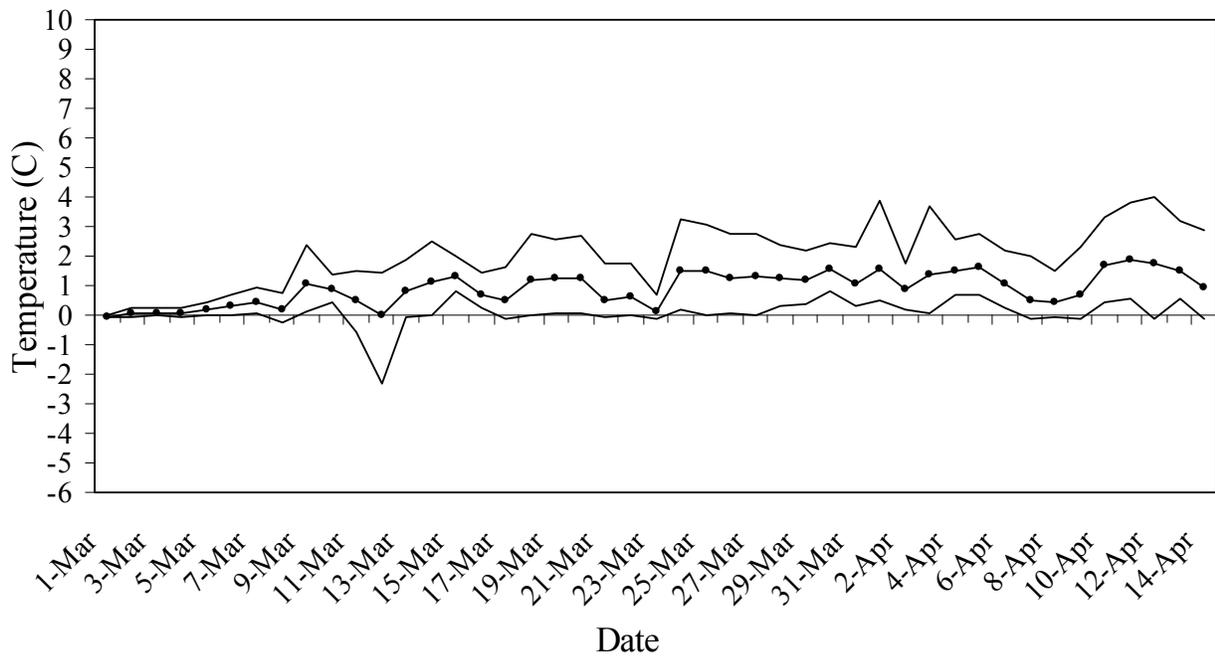


Figure 9. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Upper Grande Ronde juvenile acclimation facility in 2011.

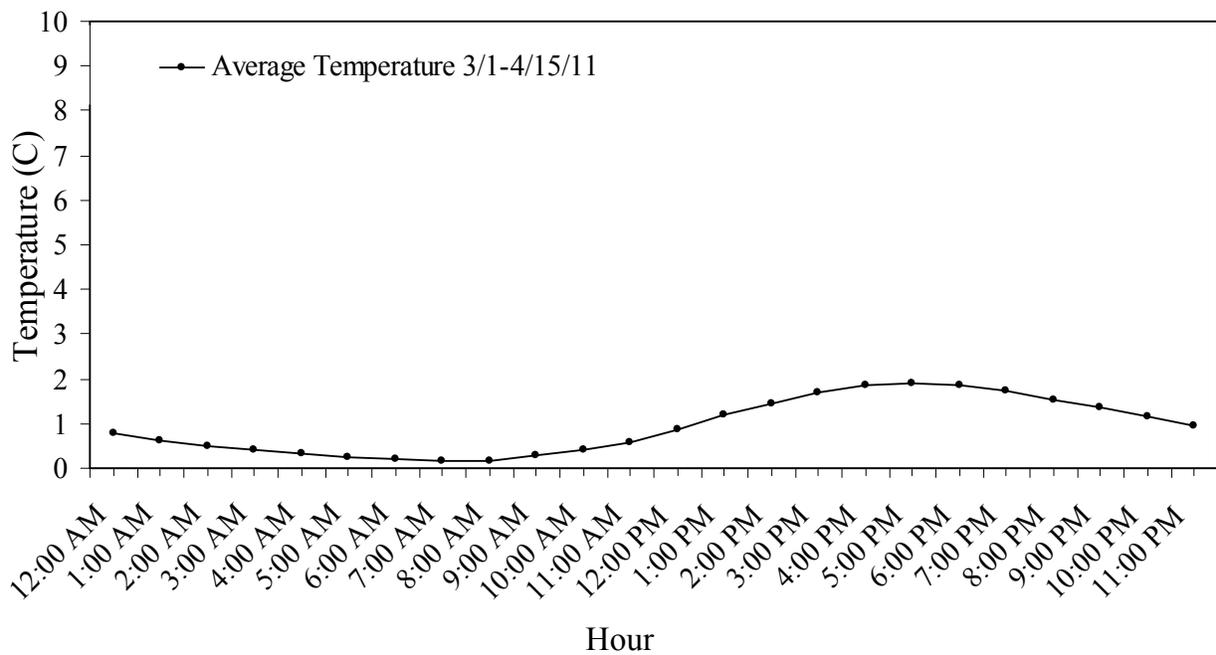


Figure 10. Average hourly water temperature at the Upper Grande Ronde juvenile acclimation facility in 2011.

Adult Collections

The CCACF was put into operation on 3 March 2011. The first adult summer steelhead was captured on 16 March. A total of 348 unmarked adult summer steelhead were trapped and released from 16 March to 1 June 2011 (Table 4). No hatchery adults were trapped, Median arrival for unmarked fish at the trap was the week of 22 April (Figure 11). Sixty nine previously trapped fish, as indicated by the presence of an opercle mark, were re-trapped and released, and 40 previously trapped kelts were recovered dead on the weir. There was one kelt recovered on the weir that was not previously punched. There were seven kelts that were passed downstream over the weir that were still alive.

The first adult spring Chinook salmon was captured at CCACF on 31 May 2011. A total of 393 spring Chinook salmon were trapped from 31 May to 2 August 2011 (Table 5). The total catch was made up of 89 adults and 33 jacks of natural origin, and 137 adults and 77 jacks of conventional broodstock progeny, and 57 jacks of captive broodstock progeny. No captive broodstock adults returned in 2011. A total of 103 adult (51 conventional, 52 natural) and 32 jack (1 captive, 31 natural) spring Chinook salmon were released above the weir to spawn naturally. Median arrival for adults at the trap was the week of 1 July for the natural fish and the week of 8 July for the conventional fish (Figure 12). By the week of 22 July 90% of the adult fish had been trapped for both groups. This was four weeks later than the mean timing for the 2002 to 2010 run years. This is likely a misrepresentation of the actual run timing since our weir was not very efficient during the entire trapping season. The median arrival for jacks was the week of 8 July for the conventional, captive, and natural groups. There were no mortalities in the trap in 2011 and no carcasses were recovered on the weir.

Three spring Chinook spawning surveys were conducted below the weir on Catherine Creek on 5, 12, and 19 July 2011. During these surveys no live fish or carcasses were observed below the weir. The trap was removed from Catherine Creek on 5 August. Surveys conducted by ODFW in 2011 resulted in 444 redds counted above the weir and no redds below the weir. A total of 526 adult carcasses were recovered above the weir which was 510.7% of the total adults passed above the weir (103). Of the 526 carcasses recovered above the weir, 46 were punched fish resulting in a trap efficiency of 8.7%. The population estimate above the weir in 2011 was 1,238 adult fish (2011 Spawning Ground Survey Results, ODFW, unpublished). The spring runoff in 2011 was extremely high (Figure 13). The high flows began around the first week of May and continued until mid July requiring a high level of maintenance just to keep the weir operating at the inefficient level that was calculated.

The sliding scale management plan (Appendix Table 1) is a tool used to determine spring Chinook salmon disposition in Catherine Creek. There are, however, some concerns with the implementation of the scale and its application to Catherine Creek as discussed in McLean et al. 2004 and 2005. Weir management decisions regarding broodstock collection percentages and wild:hatchery escapement ratios are made using preseason forecasts and total returns to the tributary. There is substantial error associated with these forecasts which can change these percentages or ratios during the return. It is difficult to make mid-season changes without seriously affecting the cross section of the run collected for brood or released above the weir.

The predicted adult spring Chinook salmon return to Catherine Creek for 2011 was 516 (310 natural + 0 captive + 206 conventional). Based on these predictions the sliding scale called for retaining <20% of the adult returning natural population for broodstock. Since the predicted total return was more than 500 fish, the percent of adults released above the weir that can be of hatchery origin should be less than or equal to 50%. Adults that are not passed above the weir or taken for Catherine Creek broodstock have three possible dispositions: transported to Lookingglass Creek for a fishery/natural spawning, taken as broodstock for the Lookingglass Hatchery program, or outplanted into Indian Creek for natural spawning. The natural adult return trapped was 89 fish which was 3.5% of the predicted number. The conventional adult return trapped was 137 fish which was 66.5% of the predicted number. The hatchery percentage of adult fish released above the weir in 2011 was 49.5% (103). Jacks were released above the weir at a rate of 32 jacks for every 46 males (69.6%). The high percentage of jacks above the weir went over the 10% target due to a large number of natural jacks returning and the low number of adults captured due to poor weir efficiency.

In order to maintain the wild:hatchery ratio of fish handled and passed above the weir, surplus hatchery adults and jacks were outplanted to Indian Creek. There were 18 adults and no jacks outplanted into Indian Creek. No fish were transported to Lookingglass Creek or LGH.

The broodstock collected and transported from CCACF consisted of 37 unmarked (41.6% of the natural return trapped) and 45 conventional broodstock adults (32.8% of the hatchery return) and two natural and two conventional jacks. Broodstock was collected systematically over the entire return from 8 June to 21 July. The 2011 AOP called for the adult broodstock to be made up of 56% natural origin fish. The natural return trapped in 2011 was well below the predicted value (due to weir problems), so agreements were made to collect as many natural origin fish as possible in order to get to 50% composition in the broodstock. The unmarked portion in the broodstock ended up at 45.1%. The fish collected for broodstock at the weir were tagged in the opercle plate with a Floy Flex Tag. Tag retention until death was 39.5% (34). Gender classification at spawning was compared to gender classification at the weir using the Floy Flex Tags. The estimation of gender for adult fish at the weir was 87.9% accurate (30/34).

During trapping in 2009 and 2010, unmarked fish were scanned for a code wire tag (CWT). It was discovered that 6.9% and 10.8% of the unmarked fish had a CWT. During trapping in 2011, unmarked fish were scanned for a code wire tag (CWT). None of the 122 unmarked fish scanned had a CWT.

Hourly water temperatures were taken at the CCACF in 2011 (Figures 14 and 15). Water temperatures ranged from 0.1°C on 1 March to 20.1°C on 1 August. Lowest temperature usually occurred around 0700 with the peak temperature around 1700. The period of low water temperature set the time of day that the trap was checked and the fish worked up.

Maintenance work conducted at the CCACF in 2011 consisted of hydraulic weir component maintenance, rebuild of the weir after total destruction, and weed abatement.

Table 4. Summer steelhead trap capture data from the Catherine Creek adult collection facility in 2011. Trapping began 3 March and ended 5 August.

Week	Trap capture		Kelt	
	First time	Reruns	Not punched ^a	Punched
4-Mar	0			
11-Mar	0			
18-Mar	28			
25-Mar	28	2		1
1-Apr	60	3	1	1
8-Apr	44	11		11
15-Apr	3	10		10
22-Apr	26	15		11
29-Apr	25	3		3
6-May	61	7		1
13-May	63	14		1
20-May	3	2		
27-May	5	2		1
3-Jun	2			
	348	69	1	40

^a *These fish were kelts recovered on or near the weir that were not previously opercle punched at the weir. Punched fish were previously trapped then recovered as a kelt carcass on or near the weir.*

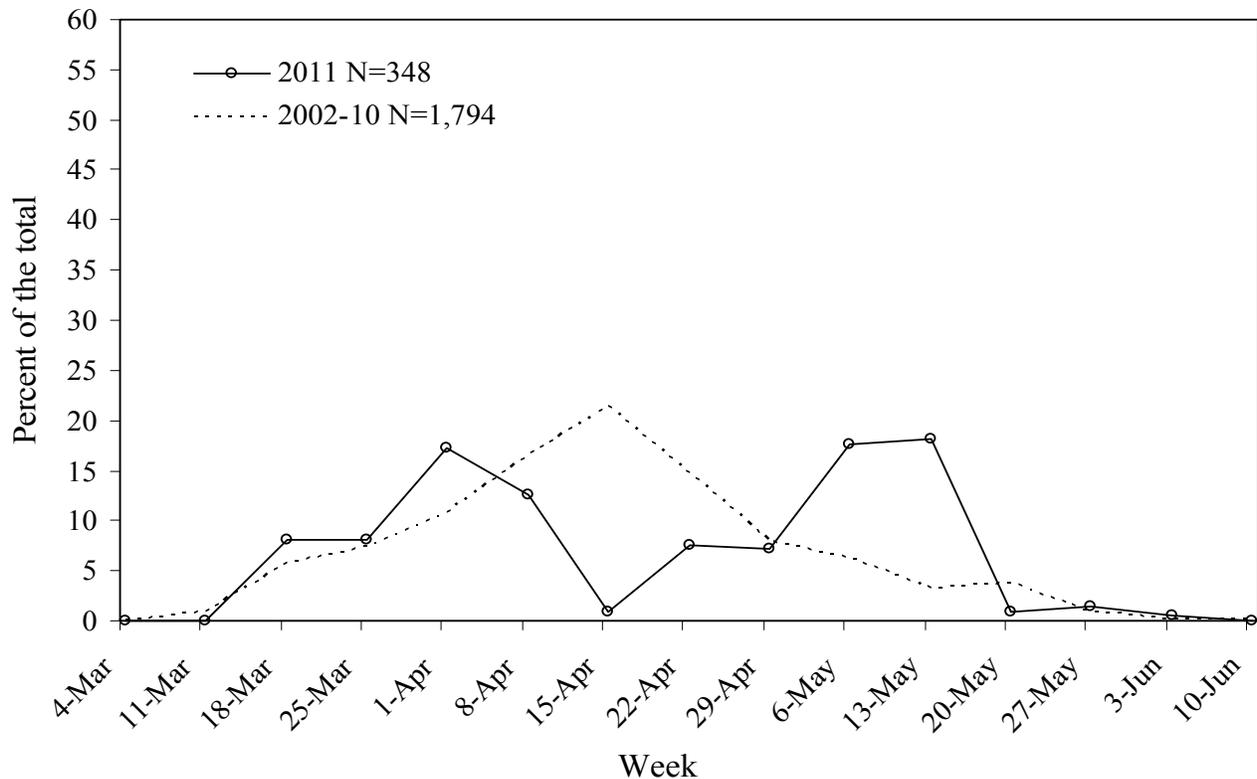


Figure 11. Summer steelhead arrival timing at the Catherine Creek adult collection facility in 2011 and mean arrival timing from 2002 to 2010.

Table 5. Spring Chinook salmon trap capture, transport, and mortality data for the Catherine Creek stock at the adult collection facility in 2011. Trapping began 3 March and ended 5 August.

Week	Trap capture ^a						Broodstock hauled				Trap mort
	Nat.	(jack)	Capt.	(jack)	Conv.	(jack)	Nat.	(jack)	Conv.	(jack)	
13-May	0	0	0	0	0	0					
20-May	0	0	0	0	0	0					
27-May	0	0	0	0	0	0					
3-Jun	3	1	0	0	0	0					
10-Jun	4	0	0	0	1	0	2		1		
17-Jun	7	0	0	1	10	0	2		2		
24-Jun	21	1	0	3	25	4	6		5		
1-Jul	11	7	0	8	13	10	7	1	7	1	
8-Jul	7	12	0	29	21	31	6	1	17		
15-Jul	20	3	0	5	30	11	10		9	1	
22-Jul	9	6	0	9	23	17	4		4		
29-Jul	4	3	0	1	12	1					
5-Aug	3	0	0	1	2	3					
	89	33	0	57	137	77	37	2	45	2	0

^a Age 4 and 5 spring Chinook salmon (age 3 fish). Nat. = Naturally-produced, Capt. = Captive broodstock program, Conv. = Conventional broodstock program.

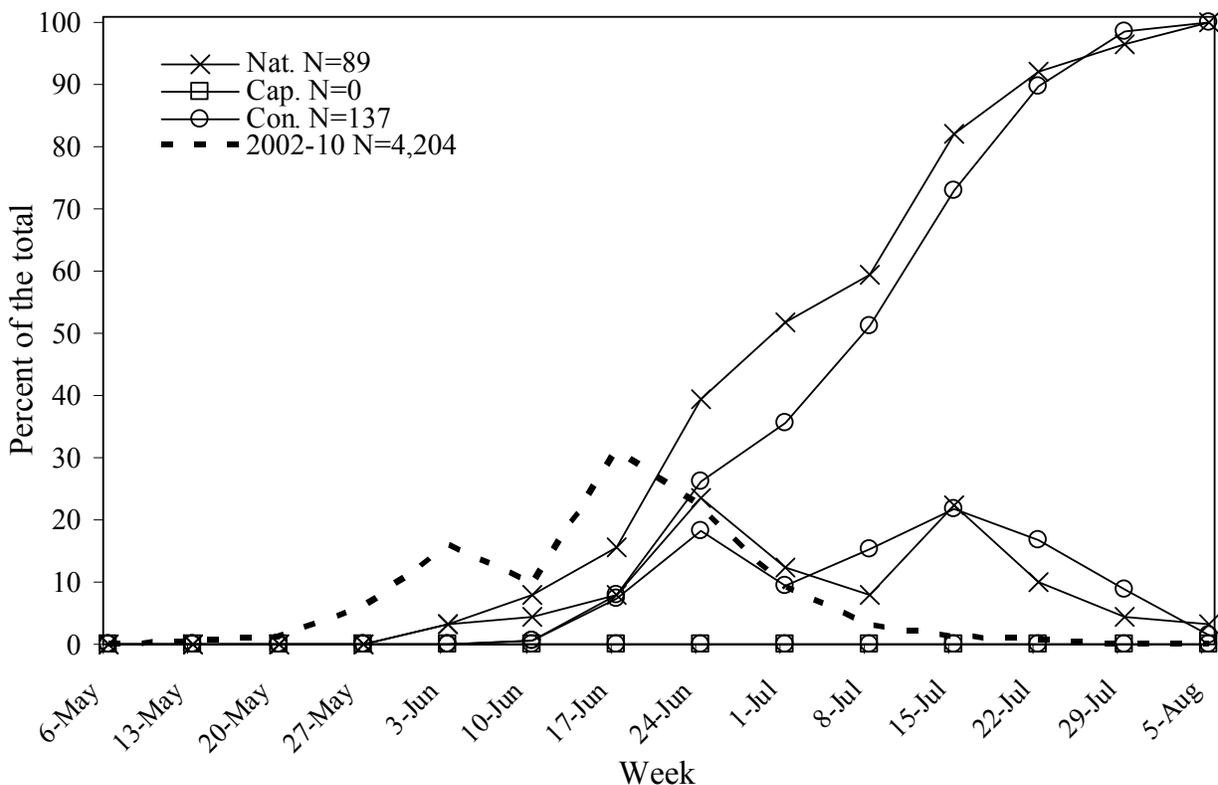


Figure 12. Arrival timing of age 4 and 5 spring Chinook salmon at the Catherine Creek adult collection facility in 2011 and mean arrival timing from 2002 to 2010.

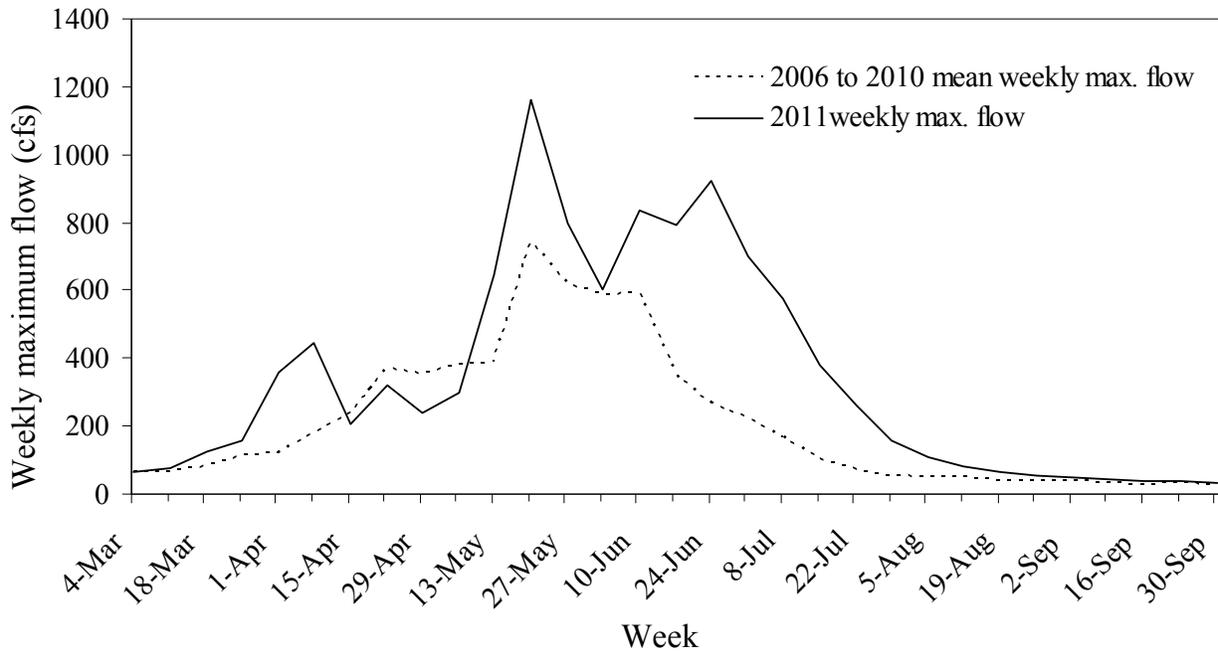


Figure 13. Weekly maximum flow (recorded daily) near the town of Union, OR in 2011 (data from Oregon Water Resources Department (OWRD) website). Also shown is the mean weekly maximum flow for 2006 to 2010.

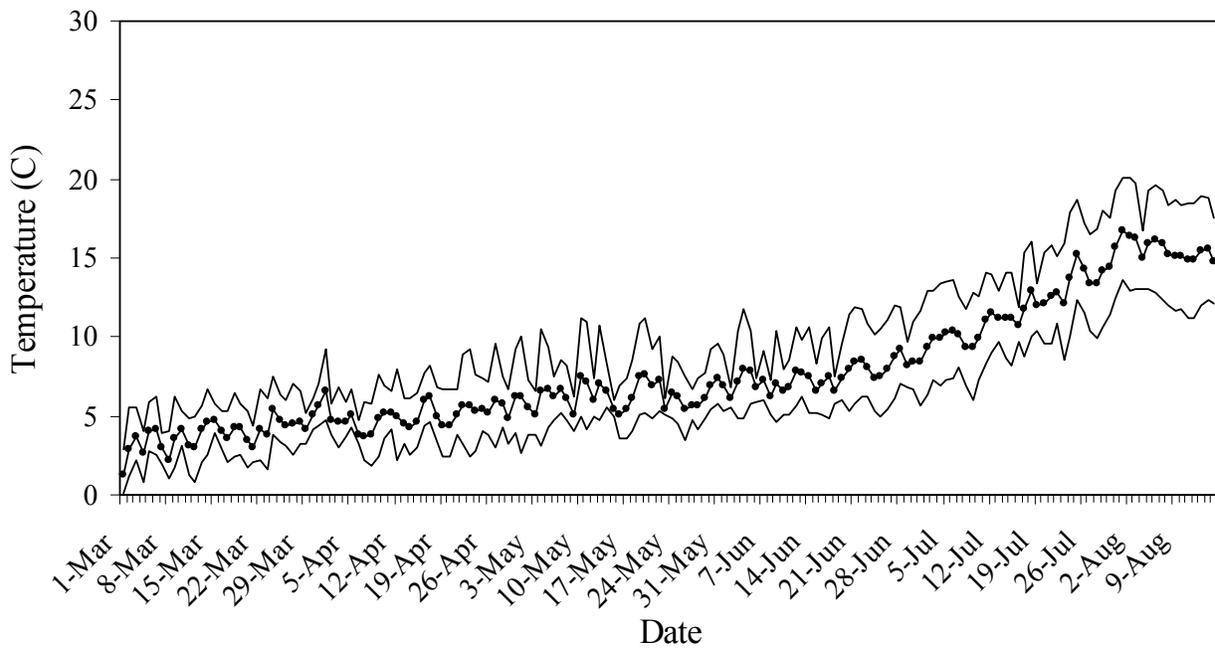


Figure 14. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Catherine Creek adult collection facility in 2011.

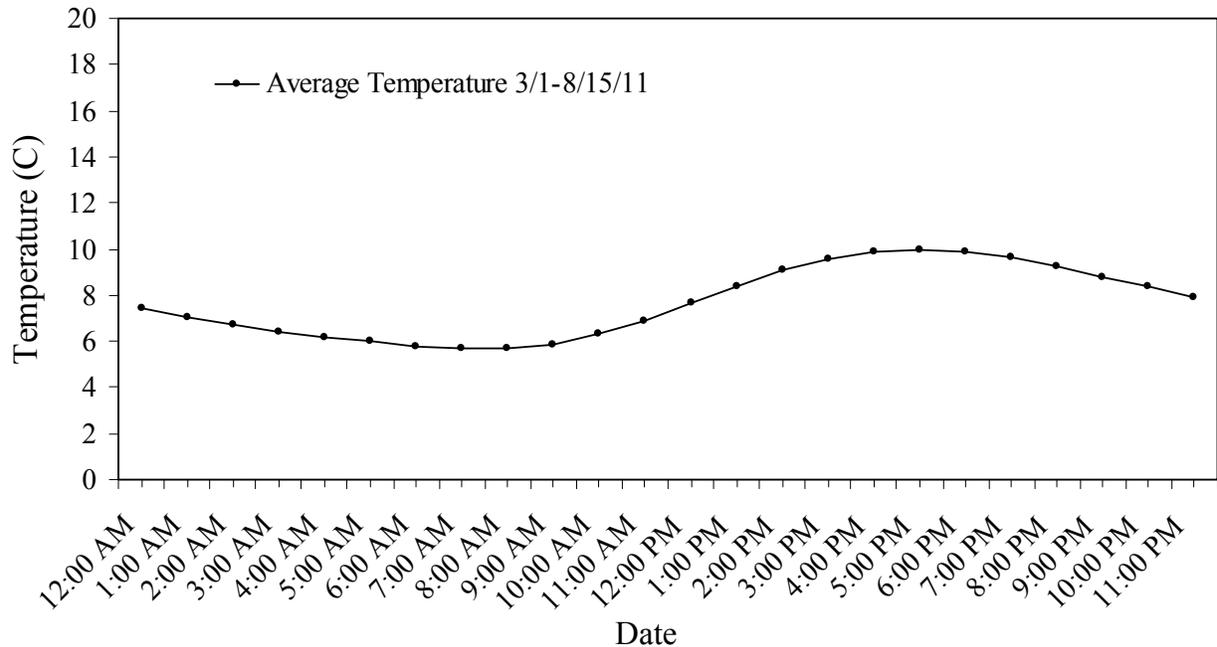


Figure 15. Average hourly water temperature at the Catherine Creek adult collection facility in 2011.

The UGRACF was moved ten miles downstream after the 2006 trapping season. This is the fifth season of trapping at the new location. There are about ten miles of spawning habitat located below the old weir location that was being utilized by returning fish. By moving the trap downstream below this spawning habitat a more representative sample of the entire population could be trapped. The UGRACF was put into operation on 2 March 2011. The first adult summer steelhead was captured on 16 March. A total of 11 unmarked adult summer steelhead were trapped and released from 16 March to 29 April (Table 6, Figure 16). No adipose-clipped fish were captured at the trap. Median arrival for unmarked fish at the trap was the week of 6 May. No kelts were passed over the weir alive or recovered dead on the weir.

The first adult spring Chinook salmon was captured at UGRACF on 22 June 2011. A total of 230, 137 adult and 93 jack spring Chinook salmon, were trapped from 22 June to 20 July (Table 7). The daily maximum water temperature rose above 20.0°C on 17 July prompting removal of the weir for the season after the trap check on 20 July. The total catch was made up of 16 adults and five jacks of natural origin, 74 adults and 43 jacks from conventional broodstock, and 47 adults and 45 jacks from captive broodstock. A total of 51 adult (7 natural, 0 conventional, 44 captive) and 15 jack (4 natural, 0 conventional, 11 captive) spring Chinook salmon were released above the weir to spawn naturally. Median arrival for naturally produced adult fish actually trapped was the week of 15 July (Figure 17). Median arrival for the conventional group trapped was the week of 1 July and the captive fish was the week of 8 July. The median arrival for the jacks trapped of all origins was the week of 15 July.

The trap and weir was removed from the upper Grande Ronde River on 20 July 2011 due to high stream temperature (daily maximum >20 °C). Surveys conducted by ODFW resulted in 221 redds above the weir and 4 below the weir. Vey Meadow, which is privately owned and contains about four miles of spawning habitat, was not surveyed in 2011 (landowner denied permission).

There were a total of 240 adult carcasses recovered above the weir which was 470.6% of the total trapped and passed (51). Eleven of the 240 fish recovered were opercle punched for a trap efficiency of 4.6%. The population estimate above the weir for 2011 was 956 (2011 Spawning Ground Survey Results, ODFW, unpublished). The spring runoff this year was extremely high (Figure 18). The high flows began around the first week of April and continued until mid May. These flows caused the trap to move downstream (15 May) and bend the weir. The trapbox and weir could not be reset and repaired until the flow decreased to a workable level on 22 June. The removal of the weir early coupled with the wash out of the weir does not allow for a true trap efficiency estimate because there is no way to distinguish between the fish that escaped past the weir due to holes or fish that passed the weir after it was removed. Based on past arrival timing at the trap it appears that we may have missed the first 38% of the return and only the last 1%.

The predicted adult spring Chinook salmon return to the upper Grande Ronde River for 2011 was 622 (162 natural + 121 captive + 339 conventional). There is no sliding scale used for the upper Grande Ronde River. Up to 50% of the natural return and up to 100% of the conventional hatchery return can be collected for broodstock. The actual number of hatchery adults trapped was 121 (74 conventional, 47 captive) which was 26.3% of the predicted number and 44 were passed upstream (36.4%). The number of natural adults trapped was 16 fish which was 9.9% of the predicted number and 7 were released upstream (43.8%). Jacks were released above the weir at a rate of 15 jacks (4 natural, 11 hatchery) for every 21 males (4 natural, 17 hatchery) (71.4%). The number of jacks passed upstream was increased due to the fact that a large number of adults most likely escaped above the weir after high water washed away the trapsite.

The broodstock collected and transported from UGRACF consisted of both natural and conventional hatchery fish. Broodstock was collected systematically over the entire return (while the trap was in operation) from 22 June to 20 July 2011. A total of nine adult and one jack of natural origin and 73 adult and three jack conventional hatchery fish were transported to LGH for broodstock. The natural adults collected for broodstock comprised 56.3% of the total adult natural return trapped while 60.3% of the adult hatchery fish trapped were collected for broodstock. The broodstock collected were tagged in the opercle plate with a Floy Flex Tag. Tag retention until death was 60.5% (52). Gender classification at spawning was compared to gender classification at the weir using the Floy Flex Tags. The estimation of gender for adult fish at the weir was 96.2% accurate (50/52). An additional 45 (24 adult, 21 jack) spring Chinook salmon with no-clip and wire returned to Lookingglass Hatchery and were retained for broodstock. These fish were assumed to be upper Grande Ronde stock spring Chinook salmon based on the fact this is the marking strategy for the upper Grande Ronde conventional program. In the past, CWTs were read from unclipped fish with wire at LGH and all were found to be from the upper Grande Ronde.

Hourly water temperatures were taken at the UGRACF in 2011. The water temperature during the period of operation ranged from -0.1°C to 21.0°C on 12 March and 17 July, respectively (Figure 19). The hourly temperatures at the adult trap during the period of operation showed that the lowest water temperature usually occurred at 0700 and the highest water temperature usually occurred at 1600 hours (Figure 20). The time of day that the trap was checked and the fish were handled was based on water temperature.

Maintenance and repair activities conducted at the facility in 2011 consisted of installation, removal, and repair of the floating weir panels and trap, and gravel removal from under the weir panels and in front of the trapbox during the instream work window.

Table 6. Summer steelhead trap capture data from the Upper Grande Ronde adult collection facility in 2011. Trapping began 2 March and ended 20 July.

Week	Trap capture		Kelt	
	First time	Reruns	Not punched ^a	Punched
4-Mar	0			
11-Mar	0			
18-Mar	1			
25-Mar	4			
1-Apr	4			
8-Apr	0			
15-Apr	0			
22-Apr	0			
29-Apr	2			
6-May	0			
13-May	0			
20-May	0			
27-May	0			
3-Jun	0			
	11	0	0	0

^a *These fish are kelts recovered on or near the weir that were not previously opercle punched at the weir. Punched fish were previously trapped then recovered as a kelt carcass on or near the weir.*

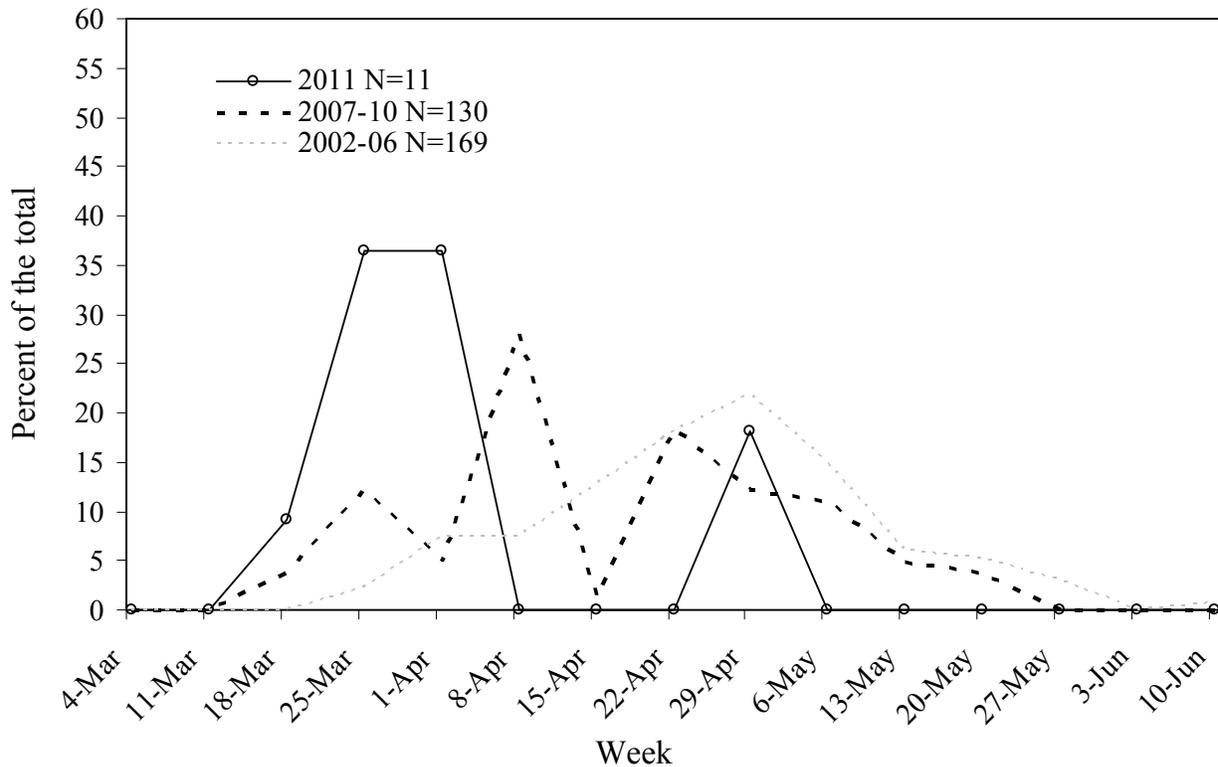


Figure 16. Summer steelhead arrival timing at the Grande Ronde adult collection facility in 2011 and for 2007-10 (rm 153.5) and mean arrival timing for 2002-06 (rm 163).

Table 7. Spring Chinook salmon trap capture, transport, and mortality data for the Grande Ronde River stock at the adult collection facility in 2011. Trapping began 2 March and ended 20 July. Trap was not operational from 15 May to 21 June.

Week	Trap capture ^a						Broodstock hauled				Trap Mort
	Nat.	(jack)	Capt.	(jack)	Conv.	(jack)	Nat.	(jack)	Conv.	(jack)	
6-May	0		0		0						
13-May	0		0		0						
20-May	Not	Trapping									
27-May	Not	Trapping									
3-Jun	Not	Trapping									
10-Jun	Not	Trapping									
17-Jun	Not	Trapping									
24-Jun	2		9	2	11	1	2		11	1	
1-Jul	4	1	14	16	33	4	1		32	2	1
8-Jul	1		5	3	8	6	1		8		
15-Jul	5	4	11	18	15	25	3	1	15		
22-Jul	4		8	6	7	7	2		7		
29-Jul											
5-Aug											
	16	5	47	45	74	43	9	1	73	3	1

^a Age 4 and 5 spring Chinook salmon (age 3 fish). Nat. = Naturally-produced, Capt. = Captive broodstock program, Conv. = Conventional broodstock program.

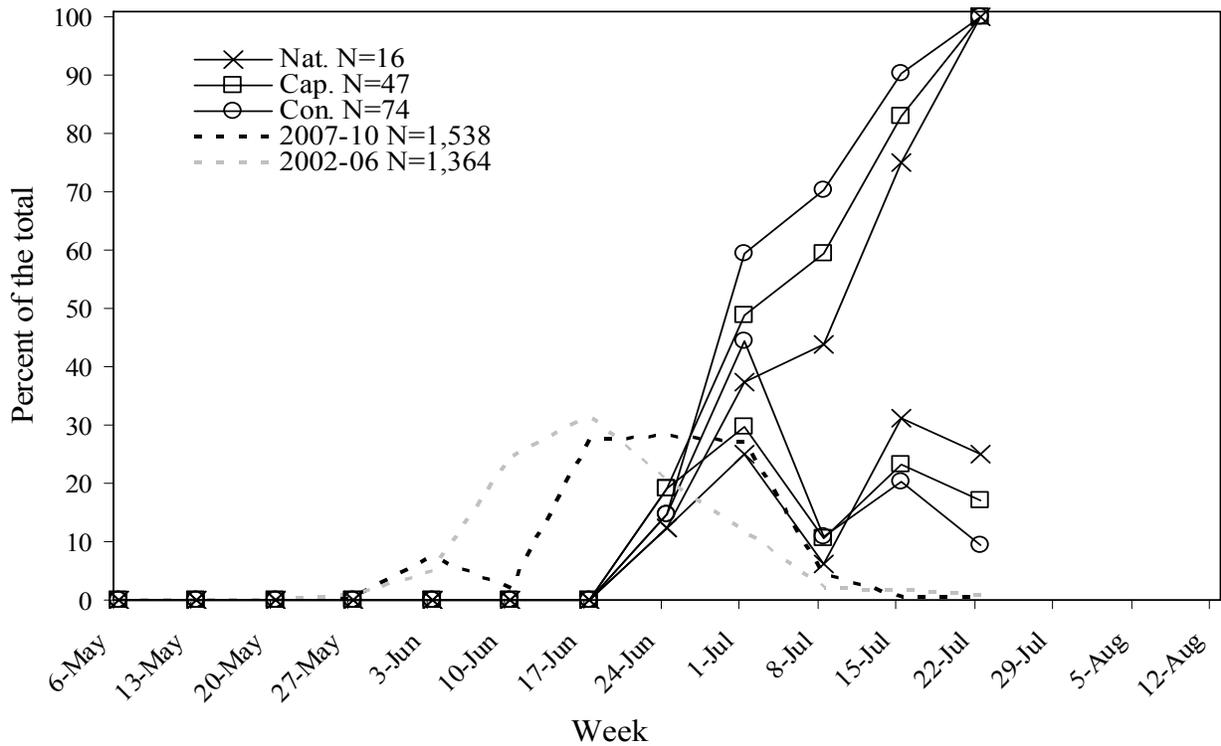


Figure 17. Arrival timing of age 4 and 5 spring Chinook salmon at the Upper Grande Ronde adult collection facility in 2011 and mean arrival timing for 2007-10 (rm 153.5) and 2002-06 (rm 163).

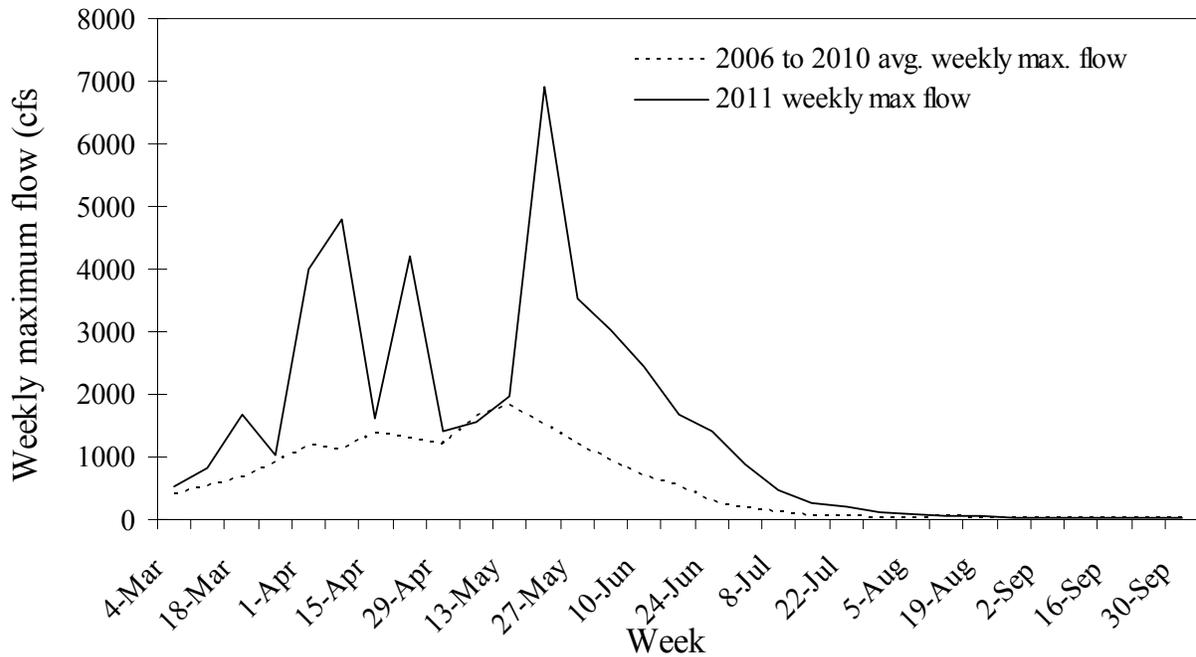


Figure 18. Weekly maximum flow (recorded daily) near the town of Perry, OR in 2011 (data from Oregon Water Resources Department (OWRD) website). Also shown is the mean weekly maximum flow for 2006 to 2010.

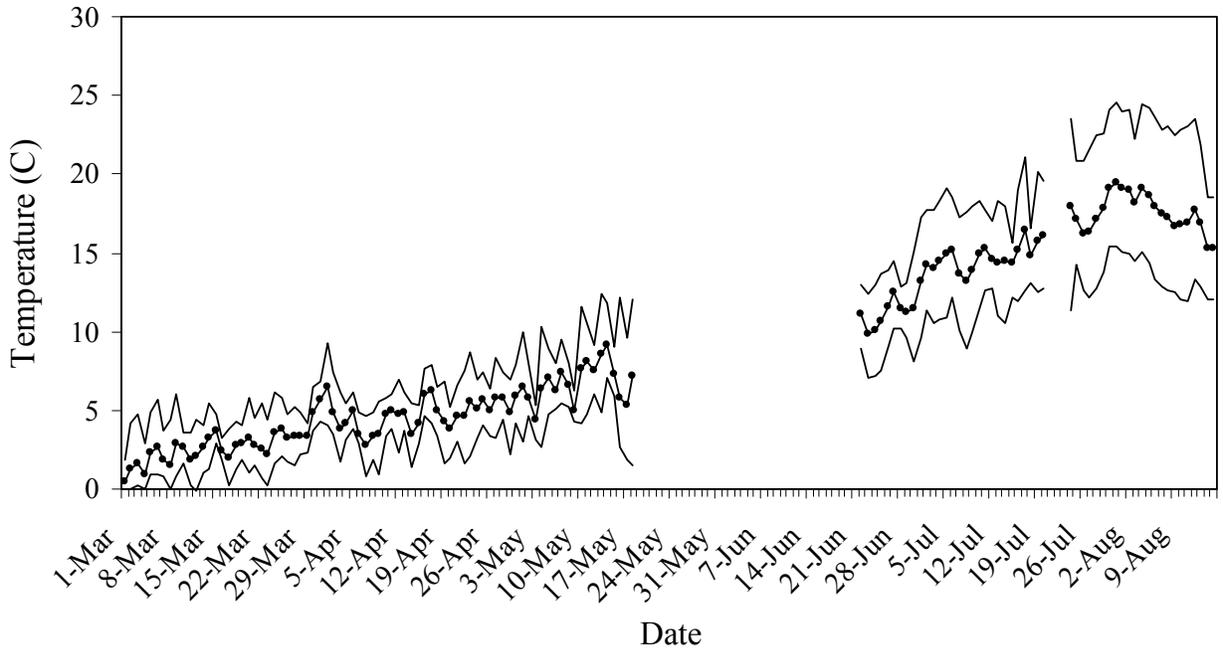


Figure 19. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Upper Grande Ronde adult collection facility in 2011.

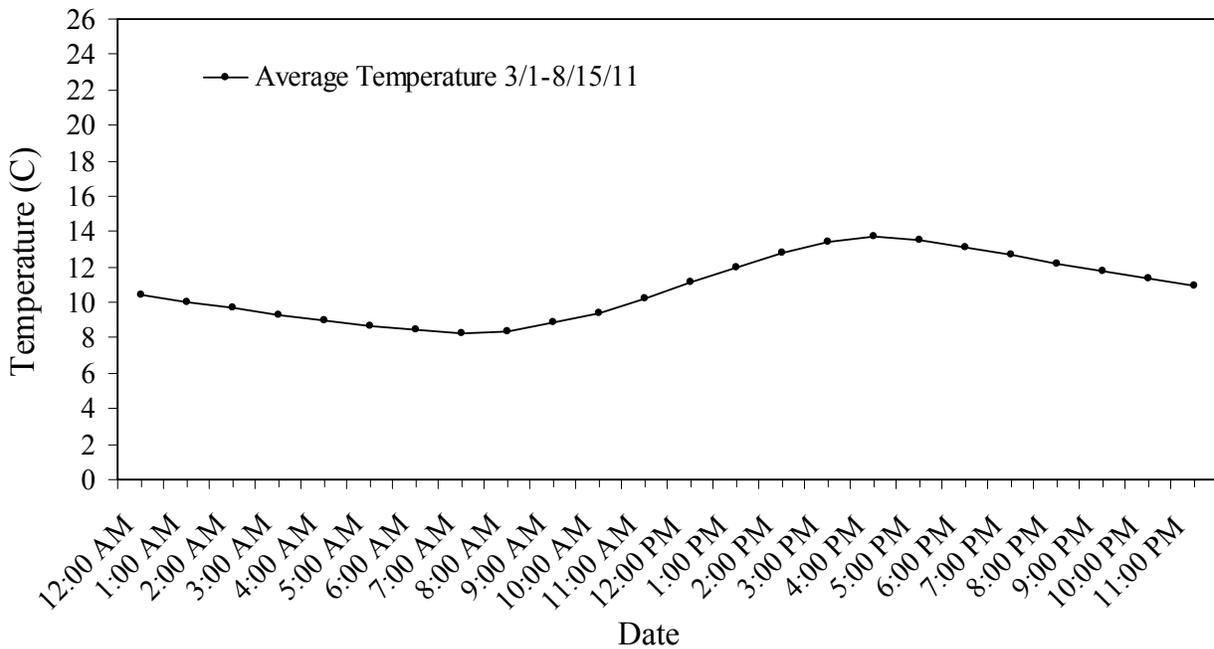


Figure 20. Average hourly water temperature at the Upper Grande Ronde adult collection facility in 2011.

Broodstock Activities

Lookingglass Hatchery

A total of 39 females, 37 males and four jacks were spawned from the Catherine Creek stock spring Chinook salmon at LGH in 2011 (Tables 8-10). There were five female (two wild, three hatchery) and five male (three wild, two hatchery) pre-spawning mortalities at the hatchery. Peak spawning date at LGH occurred on 22 September (35.9% of the females). The last spawning date was 29 September. This date was 20 days later than in 2010. The reason for this delay is unknown but the fact that this is the only stock held indoors, under artificial lighting, and in a circular pond may have something to do with it. All 39 females spawned had ELISA values of 0.164 OD units or less.

A total of 39 females, 40 males, and three jacks were spawned from the upper Grande Ronde stock in 2011 (Tables 11-13). There were 21 pre-spawn mortalities at the hatchery (17 females, four males). Peak spawning date at LGH occurred on 1 September 2011 (45.1%). All 39 females spawned had ELISA values of 0.182 OD units or less.

A total of 79 females, 73 males, and eight jacks were spawned for the Lookingglass Creek program in 2011 (Tables 14-16). There were 13 pre-spawn mortalities (four female, nine male) and 32 killed not spawned (14 female, 14 male, four jacks) at the hatchery. Peak spawning date occurred on 1 September (64.6%). One female spawned had an ELISA value of 0.206 OD units, while the remaining females had ELISA values of 0.165 OD units or less. A total of 500 fish (361 hatchery, 78 wild adults, 43 hatchery and 18 wild jacks) were outplanted above the hatchery weir to spawn naturally.

Captive Broodstock

A total of 155 females, 92 males (age 3), and 52 jacks (age 2) were spawned from the Upper Grande Ronde captive brood at BOH in 2011 (Table 17). There were two female pre-spawn mortalities at the hatchery and four males that were killed not spawned. Peak spawning date at BOH occurred on 26 September (44.4% of the females). The last spawn date was 10 October.

Surplus eggs from the upper Grande Ronde captive brood safety net program were outplanted by the project into Sheep and Meadow Creeks from 28 October to 29 November 2011. A total of 129,726 eyed eggs were outplanted into Sheep Creek at locations ranging from rm 9.10 to 9.25 and 70,524 eggs into Meadow Creek at rm 2.71.

Lookingglass Hatchery transferred 300 eggs from Upper Grande Ronde stock females spawned at LGH in 2011 to Wallowa Hatchery for the captive broodstock program.

Table 8. Spawning information from Catherine Creek spring Chinook salmon female broodstock at Lookingglass Hatchery in 2011.

Date	Natural n=21					Hatchery n=24				
	Morts	Spawned	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/18										
18-Aug		0					0			
25-Aug		0					0			
1-Sep		0					1			
8-Sep		5				1	6			
15-Sep		3					5			
22-Sep	2	7					7			
29-Sep		4				2	1			1
Totals	2	19	0	0	0	3	20	0	0	1

Table 9. Spawning information from Catherine Creek spring Chinook salmon male broodstock at Lookingglass Hatchery in 2011.

Date	Natural n=14					Hatchery n=23				
	Morts	Spawned ^a	DPS	KPS	KNS	Morts	Spawned ^a	DPS	KPS	KNS
Till 8/18										
18-Aug		0					0			
25-Aug		0					0			
1-Sep		1					1			
8-Sep		5					7			
15-Sep		1	1				6			
22-Sep	1	4	2			2	8 (2)	5		
29-Sep	2	2 (2)	3	3			2 (1)	5	8	
Totals	3	13	6	3	0	2	24	10	8	0

^a The number in parentheses indicates the number of recycled fish used in the total.

Table 10. Spawning information from Catherine Creek spring Chinook salmon jack broodstock at Lookingglass Hatchery in 2011.

Date	Natural n=2					Hatchery n=2				
	Morts	Spawned	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/18										
18-Aug		0					0			
25-Aug		0					0			
1-Sep		0					0			
8-Sep		0					0			
15-Sep		1					0			
22-Sep		1		1			1		1	
29-Sep		0					1			
Totals	0	2	0	1	0	0	2	0	1	0

Table 11. Spawning information from Grande Ronde spring Chinook salmon female broodstock at Lookingglass Hatchery in 2011.

Date	Natural n=5					Hatchery n=53				
	Morts	Spawned	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/18	3					13				
18-Aug		0					2			
25-Aug		0					5			
1-Sep		1				1	26			1
8-Sep		0					4			1
15-Sep		1					0			
22-Sep										
29-Sep										
Totals	3	2	0	0	0	14	37	0	0	2

Table 12. Spawning information from Grande Ronde spring Chinook salmon male broodstock at Lookingglass Hatchery in 2011.

Date	Natural n=4					Hatchery n=44				
	Morts	Spawned ^a	DPS	KPS	KNS	Morts	Spawned ^a	DPS	KPS	KNS
Till 8/18						1				
18-Aug		2					0			
25-Aug		2					2			
1-Sep		4 (4)				2	23 (2)			11
8-Sep		0	1	2			4 (1)	4	9	
15-Sep		0		1		1	3		9	
22-Sep										
29-Sep										
Totals	0	8	1	3	0	4	32	4	18	11

^a The number in parentheses indicates the number of recycled fish used in the total.

Table 13. Spawning information from Grande Ronde spring Chinook salmon jack broodstock at Lookingglass Hatchery in 2011.

Date	Natural n=1					Hatchery n=24				
	Morts	Spawned ^a	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/18										
18-Aug		0					0			20
25-Aug		1					0			1
1-Sep		1 (1)					0			
8-Sep		0		1			0			
15-Sep		0					1			2
22-Sep										
29-Sep										
Totals	0	2	0	1	0	0	1	0	0	23

^a The number in parentheses indicates the number of recycled fish used in the total.

Table 14. Spawning information from Lookingglass Creek spring Chinook salmon female broodstock at Lookingglass Hatchery in 2011.

Date	Natural n=29					Hatchery n=68				
	Morts	Spawned	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/18						2				
18-Aug		0				1	3			
25-Aug		3					10			
1-Sep		16					35			
8-Sep		10				1	2			14
15-Sep										
22-Sep										
29-Sep										
Totals	0	29	0	0	0	4	50	0	0	14

Table 15. Spawning information from Lookingglass Creek spring Chinook salmon male broodstock at Lookingglass Hatchery in 2011.

Date	Natural n=29					Hatchery n=55				
	Morts	Spawned ^a	DPS	KPS	KNS	Morts	Spawned ^a	DPS	KPS	KNS
Till 8/18	1									
18-Aug		3					0			
25-Aug	1	9				1	5			
1-Sep	1	19 (6)	2				30 (3)		1	1
8-Sep	2	1	6	15		3	6	4	13	13
15-Sep										
22-Sep										
29-Sep										
Totals	5	32	8	15	0	4	41	4	14	14

^a The number in parentheses indicates the number of recycled fish used in the total.

Table 16. Spawning information from Lookingglass Creek spring Chinook salmon jack broodstock at Lookingglass Hatchery in 2011.

Date	Natural n=11					Hatchery n=1				
	Morts	Spawned	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/18										
18-Aug		0					0			
25-Aug		0					0			
1-Sep		3					0			1
8-Sep		5			3		0			
15-Sep										
22-Sep										
29-Sep										
Totals	0	8	0	0	3	0	0	0	0	1

Table 17. Spawning information from Grande Ronde captive broodstock at Bonneville Hatchery in 2011^a.

Spawn week	Females n=155			Age 3+ males n=92			Age 2 males n=59		
	Morts	Spawned	KNS	Morts	Spawned ^b	KNS	Morts	Spawned	KNS
5-Sep		3			2	1		2	
12-Sep		7			5			2	
19-Sep	2	40			29			11	
26-Sep		68			36			32	1
3-Oct		30			15			9	
10-Oct		5			7 (2)	1		1	1
Totals	2	153	0	0	92	2	0	57	2

^a All production from captive brood was released as eyed eggs into Sheep and Meadow creeks.

^b The number in parentheses indicates the number of recycled fish used in the total.

LITERATURE CITED

- GRSCHMP. 2002. Grande Ronde Spring Chinook Hatchery Management Plan. Co-manager signed agreement dealing with management of spring Chinook in the Grande Ronde Basin. Signed by CTUIR, NPT, LSRCP, and ODFW in 2002.
- LSRCP AOP. 2010. Lower Snake River Compensation Plan Annual Operations Plan.
- McLean, M. L., R. Seeger, and L. Hewitt. 2004. Grande Ronde Satellite Facility O&M Annual Report for 1 January-31 December 2004 to Bonneville Power Administration. BPA Project 9800703. CTUIR Project 410. Pendleton, Oregon.
- McLean, M. L., R. Seeger, and L. Hewitt. 2005. Grande Ronde Satellite Facility O&M Annual Report for 1 January-31 December 2005 to Bonneville Power Administration. BPA Project 9800703. CTUIR Project 410. Pendleton, Oregon.
- Monzyk, F. M., G. Vonderohe, T. L. Hoffnagle, R. W. Carmichael, D.L. Eddy and P.J. Keniry. 2006. Lower Snake River Compensation Plan: Oregon Spring Chinook Salmon Evaluation Studies. 1999 Annual Progress Report, Oregon Department of Fish and Wildlife, Salem.
- Nehlsen, W., J. E. Williams, and J. A. Lichatowich. 1991. Pacific salmon at a crossroads: stocks at risk from California, Oregon, Idaho and Washington. *Fisheries* 16(2):4-20.

APPENDIX TABLES

Appendix Table 1. Sliding Scale Management Plan for the Catherine Creek and Upper Grande Ronde Spring Chinook Artificial Propagation Program.

Estimated total adult escapement to the Catherine Creek mouth (hatchery plus natural) ^a	Ratio of hatchery to natural adults at the mouth	Maximum % of natural adults to retain for broodstock	% of conventional hatchery adults to retain for broodstock ^b	% of adults released above the weir that can be of hatchery origin	Minimum % of broodstock of natural origin	% Strays allowed above the weir ^c
UGR	Any	Up to 50	Up to 100	Up to 100	^d	≤5
CC						
<250	Any	40	40	^d	^d	≤5
251-500	Any	20	20	≤70	≥20	≤5
>500	Any	≤20	d	≤50	≥30	≤5

a Pre-season estimate of total escapement
b Conventional hatchery adults only, all captive brood adults released to spawn naturally or outplanted
c For hatchery adults originating from different gene conservation groups (Rapid River stock or strays from outside the Grande Ronde basin)
d Not decision factor at this level of escapement, percentage determined by other criteria
e Not to exceed 130,000 smolt production initially

Appendix Table 2. Group, number, size, raceways, mortality, feed fed, and numbers released from the Catherine Creek acclimation facility 2000 to 2010 release years.

Facility/ rel. yr	Group ^a	Number received	Size fish/lb.	Raceways used	Density lbs/ft ³	Total Mortality (%)	Feed fed	Number released
CC 00	Single cap	38,009	23.6	4	0.20	0.10	474	37,980
CC 01	Single cap	137,588	19.6	4	0.85	0.70	1,296	136,902
CC 02	Single cap	180,912	17.4	4	1.26	0.30	1,968	180,343
CC 03	Early cap	105,352	12.8	4	1.00	0.04	345	105,313
CC 03	Late con	24,404	12.6	2	0.47	0.05	73	24,392
CC 04	Early cap	92,475	23.1	4	0.49	0.07	179	92,413
CC 04	Late con	70,539	23.4	4	0.37	0.03	115	70,521
CC 05	Early con	61,743	23.6	2	0.63	0.03	100	61,717
CC 05	Early cap	69,005	24.4	2	0.70	0.23	109	68,827
CC 05	Late con	59,100	21.8	2	0.66	0.11	60	59,036
CC 06	Single con	23,227	33.7	1	0.33	0.05	65	23,216
CC 06	Single cap	45,667	26.1	2	0.42	0.14	132	45,604
CC 07	Single con	49,709	27.4	3	0.29	0.03	202	49,696
CC 07	Single cap	21,584	24.9	1	0.42	0.06	86	21,572
CC 08	Single con	116,967	19.9	4	0.71	0.07	549	116,882
CC 09	Single con	93,240	27.4	3	0.58	0.07	229	93,176
CC 09	Early con	25,436	22.7	1	0.48	0.06	18	25,422
CC 09	Late con	20,254	20.6	1	0.44	0.04	35	20,245
CC 10	Single con	110,445	20.8	3	0.79	0.18	248	110,242
CC 10	Single cap	34,215	21.0	1	0.73	0.32	83	34,111
CC 11	Single con	58,887	26.6	2	0.54	0.25	300	58,737
CC 11	Single cap	50,194	25.6	2	0.41	0.02	126	48,343
CC 11	Single cap	50,246	24.9	2	0.50	0.02	173	48,395

Appendix Table 3. Group, number, size, raceways, mortality, feed fed, and numbers released from the Upper Grande Ronde acclimation facility 2000 to 2010 release years.

Facility/ rel. yr	Group ^a	Number received	Size fish/lb.	Raceways used	Density lbs/ft ³	Total Mortality (%)	Feed fed	Number released
GR 00	Single cap	1,512	19.4	1	0.04	0.30	1	1,508
GR 01	Single cap	2,570	13.9	1	0.09	1.01	8	2,544
GR 02	Single cap	201,958	18.4	4	1.33	25.01	568	151,444
GR 03	Early cap	110,169	14.2	4	1.14	0.05	24	110,114
GR 03	Late con	26,946	13.7	1	0.90	0.09	50	26,923
GR 03	Late cap	100,685	13.6	3	1.10	0.16	150	210,637
GR 04	Early cap	77,418	20.3	4	0.48	0.27	58	77,204
GR 04	Late con	70,098	22.4	3	0.50	0.01	79	70,088
GR 05	Single con	105,418	21.0	4	0.61	0.05	10	105,369
GR 06	Single con	18,986	29.3	2	0.16	0.05	3	18,977
GR 07	Early cap	20,620	23.2	2	0.22	0.00	9	20,620
GR 07	Late con	118,840	21.7	4	0.67	0.03	120	118,803
GR 08	Early con	127,552	21.8	4	0.71	0.05	0	127,491
GR 08	Late con	132,501	20.9	4	0.77	0.05	38	132,441
GR 09	Single con	94,203	22.7	3	0.72	0.06	28.2	94,148
GR 09	Early cap	28,080	22.0	1	0.63	0.04	0	28,068
GR 09	Late cap	24,340	20.2	1	0.66	0.03	7.5	24,332
GR 10	Early cap	125,951	28.3	4	0.50	0.07	0	125,868
GR 10	Late con	41,873	23.0	2	0.41	0.13	63	41,819
GR 10	Late cap	64,721	21.4	2	0.68	0.09	63	64,663
GR 11	Early cap	53,166	24.0	2	0.54	0.10	23	53,114
GR 11	Early con	55,160	27.7	2	0.49	0.51	23	54,880
GR 11	Late con	134,882	17.7	4	0.81	0.37	242	134,388

^a Single= one acclimation period. Early=1st of 2 groups. Late= 2nd of 2 groups.

Appendix Table 4. Group, acclimation dates, temperature, dissolved oxygen, and estimated volitional migration of fish acclimated at the Catherine Creek facility 2000 to 2011 release years.

Facility/ rel. yr	Group ^a	Acclimation period	Volitional began	Temp. °C		DO mg/l		Volitional	
				Min.	Max.	Min.	Max.	migration	%
CC 00	Single cap	2/28-4/18	4/2	0.2	9.3	8.2	14.4	6,842	18.0
CC 01	Single cap	3/8-4/16	4/2	0.5	9.6	8.9	13.9	^b	
CC 02	Single cap	2/26-4/15	4/2	0.0	10.5	7.0	13.3	68,948	38.1
CC 03	Early cap	3/7-3/23	3/13	1.1	6.2	10.3	12.2	25,092	23.8
CC 03	Late con	3/24-4/14	3/31	0.7	8.2	9.7	12.6	16,218	66.4
CC 04	Early cap	3/8-3/22	3/15	1.8	7.9	10.5	11.7	8,785	9.5
CC 04	Late con	3/24-4/12	3/30	2.1	8.2	10.5	12.4	49,147	69.2
CC 05	Early mix	3/7-3/27	3/14	0.1	5.8	9.6	15.4	29,402	22.5
CC 05	Late con	3/28-4/7	4/4	0.6	8.7	8.9	12.7	None	
CC 06	Single mix	3/13-4/12	3/27	0.2	7.6	9.0	11.4	28,311	41.1
CC 07	Single mix	3/12-4/11	3/26	0.3	8.8	9.6	12.3	23,761	33.3
CC 08	Single con	3/10-4/14	3/24	0.0	9.1	9.0	12.4	43,128	35.2
CC 09	Single con	3/9 – 4/13	3/23	0.0	7.5	8.9	11.8	48,442	52.0
CC 09	Early con	3/9 – 3/23	3/16	0.0	6.7	10.0	11.8	18,059	71.0
CC 09	Late con	3/24 – 4/13	4/1	0.6	7.5	9.9	11.3	8,613	42.5
CC 10	Single mix	3/15 – 4/12	3/29	0.2	7.6	8.5	12.6	21,357	14.8
CC 11	Single con	3/14 – 4/14	3/30	1.2	6.9	9.7	11.5	22,027	37.4
CC 11	Early cap	3/14 – 3/29	3/21	1.2	5.9	9.8	11.5	3,383	7.0
CC 11	Late cap	3/30 – 4/14	4/5	1.5	6.9	10.0	10.9	12,767	26.4

^a Single= one acclimation period. Early=1st of 2 groups. Late= 2nd of 2 groups.

^b Problems with PIT tag readers made it impossible to estimate accurately the number of PIT tagged fish leaving volitionally or during forceout from the Catherine Creek facility. Actual PIT tags detected during the volitional release period were 290; tags detected during the forceout were 6,862.

Appendix Table 5. Group, acclimation dates, temperature, dissolved oxygen, and estimated volitional migration of fish acclimated at the Upper Grande Ronde facility 2000 to 2011 release years.

Facility/ rel. yr	Group ^a	Acclimation period	Volitional began	Temp. °C		DO mg/l		Volitional	
				Min.	Max.	Min.	Max.	migration	%
GR 00	Single cap	2/28-3/14	None	-0.5	2.7	-	-	None	
GR 01	Single cap	2/27-3/27	None	-0.7	3.8	8.7	12.1	None	
GR 02	Single cap	2/27-4/15	4/2	0.0	3.5	9.2	12.7	68,200	44.9
GR 03	Early cap	3/10-3/23	3/17	0.0	4.4	10.0	11.9	31,900	30.0
GR 03	Late mix	3/24-4/14	3/30	0.0	6.6	9.0	11.9	37,900	29.7
GR 04	Early cap	3/9-3/22	3/15	-0.1	5.9	11.3	14.7	12,889	16.3
GR 04	Late con	3/25-4/12	3/31	-0.1	7.1	10.6	12.3	34,085	48.6
GR 05	Single con	3/8-3/14	None	-0.1	3.4	10.3	11.9	None	
GR 06	Single con	3/13-4/12	3/27	-0.7	4.5	10.3	12.3	10,461	55.1
GR 07	Early cap	3/12-3/25	3/19	-0.1	5.4	8.7	12.7	2,932	11.6
GR 07	Late con	3/26-4/11	4/2	-0.1	6.9	8.5	11.9	28,718	24.2
GR 08	Early con	3/11-3/24	3/17	-5.8	2.6	na	na	29,065	22.8
GR 08	Late con	3/25-4/14	4/7	-5.9	4.3	na	na	10,880	8.2
GR 09	Single con	3/16 – 4/13	3/23	-0.1	4.0	11.3	13.5	54,859	58.3
GR 09	Early cap	3/16 – 3/23	3/18	-0.1	1.8	11.3	13.5	3,013	10.7
GR 09	Late cap	3/24 – 4/13	4/1	-0.1	4.0	11.7	13.5	10,264	42.2
GR 10	Early cap	3/8 – 3/22	3/15	-5.5	3.5	9.4	14.7	20,000	15.9
GR 10	Late mix	3/23 – 4/13	3/30	-3.6	5.6	10.0	12.5	16,000	15.0
GR 11	Early cap	3/15 – 3/30	3/22	-0.1	3.2	10.8	13.3	2,069	3.8
GR 11	Early con	3/15 – 3/30	3/22	-0.1	3.2	10.8	13.3	4,048	7.6
GR 11	Late con	3/31 – 4/14	4/5	-0.1	4.0	10.0	12.0	15,413	11.4

^a Single= one acclimation period. Early=1st of 2 groups. Late= 2nd of 2 groups.

^b Problems with PIT tag readers made it impossible to estimate accurately the number of PIT tagged fish leaving volitionally or during forceout from the Catherine Creek facility. Actual PIT tags detected during the volitional release period were 290; tags detected during the forceout were 6,862.

Appendix Table 6. Release and return summary for spring Chinook salmon from Catherine Creek 1998 to 2009 broodyears.

Brood year	Release location	Life stage	Rearing type	Number released	Returns trapped ^a			Min. SAR
					3	4	5	
1998	Acc.	Smolt	Captive ad	37,980	29	132	54	0.57
1999	Acc.	Smolt	Captive ad	136,902	10	181	19	0.15
2000	Acc.	Smolt	Captive ad	180,343	70	564	24	0.36
2001	Acc.	Smolt	Captive ad	105,313	30	84	2	0.11
2001	Acc.	Smolt	Conventional ad vie	24,392	22	28	3	0.22
2002	Acc.	Smolt	Captive ad	92,413	19	118	15	0.16
2002	Acc.	Smolt	Conventional ad vie	70,521	11	59	4	0.10
2003	Acc.	Smolt	Captive ad	68,827	0	63	8	0.10
2003	Acc.	Smolt	Conventional ad vie	120,753	7	55	2	0.05
2004	Acc.	Smolt	Captive ad	45,604	24	102	4	0.29
2004	Acc.	Smolt	Conventional ad vie	23,216	4	35	1	0.17
2005	Acc.	Smolt	Captive ad vie Blue	21,572	4	22	0	0.12
2005	Acc.	Smolt	Conventional ad	49,696	99	117	79	0.59
2006	Acc.	Smolt	Conventional ad	116,882	351	774	22	0.98
2007	IndianCr	Egg	Captive	46,727	Unk	Unk		
2007	Acc.	Smolt	Conventional ad	138,843	90	115		
2008	Acc.	Smolt	Captive ad	34,111	57			
2008	Acc.	Smolt	Conventional ad vie	110,242	77			
2009	Acc.	Smolt	Captive ad	96,738				
2009	Acc.	Smolt	Conventional ad vie	58,737				

a Age structure calculated using length data. Adult returns are actual numbers trapped at the weir.

Appendix Table 7. Release and return summary for spring Chinook salmon from the upper Grande Ronde River 1998 to 2009 broodyears.

Brood year	Release location	Life stage	Rearing Type	Number released	Returns trapped ^a			Min. SAR
					3	4	5	
1998	Acc.	Smolt	Captive ad	1,508	0	3	0	0.20
1999	Acc.	Smolt	Captive ad	2,544	0	4	4	0.31
2000	Acc.	Smolt	Captive ad	151,444	35	321	15	0.24
2000	River	Parr	Captive ad	76,941	2	51	2	0.07
2001	Acc.	Smolt	Captive ad	210,637	48	180	7	0.11
2001	Acc.	Smolt	Conventional ad,cwt	26,923	9	60	0	0.26
2001	River	Parr	Captive ad	32,800	0	0	0	0.00
2002	Acc.	Smolt	Captive ad	77,204	0	1	0	0.00
2002	Acc.	Smolt	Conventional cwt	70,088	6	140	9	0.22
2003	Acc.	Smolt	Captive ad	1,022	0	0	0	0.00
2003	Acc.	Smolt	Conventional cwt	104,347	2	28 ^b	1 ^c	0.03
2004	Acc.	Smolt	Captive ad	76	0	0	5 ^d	6.58
2004	Acc.	Smolt	Conventional cwt	18,901	18 ^b	8 ^c	48 ^d	0.39
2005	Acc.	Smolt	Captive ad	20,620	5	49 ^d	21 ^e	0.36
2005	Acc.	Smolt	Conventional cwt	118,803	98	328 ^d	33 ^e	0.39
2006	Acc.	Smolt	Conventional ad cwt	259,932	382 ^d	1,080 ^e	14	0.57
2006	MeadowCr	Egg	Captive	1,263	Unk	Unk	Unk	--
2007	Acc.	Smolt	Captive ad	52,404	12 ^e	47		
2007	Acc.	Smolt	Conventional cwt	94,148	13 ^e	60		
2008	Acc.	Smolt	Captive ad	190,531	45			
2008	Acc.	Smolt	Conventional cwt	41,819	43			
2009	MeadowCr	Egg	Captive	143,349				
2009	Acc.	Smolt	Captive ad	53,114				
2009	Acc.	Smolt	Conventional cwt	189,268				
2010	MeadowCr	Egg	Captive	251,107				
2011	MeadowCr	Egg	Captive	96,885				
2011	SheepCr	Egg	Captive	103,365				

a Age structure calculated using length data. Adult returns are actual numbers trapped at the weir. When life stage release from the same broodyear could not be determined at the trap (similar marks), CWT data was used to divide the returns by group.

b Two of the 28 fish were recovered just below the weir. Thirteen of the 18 jacks were recovered just below the weir. Two of the 3 fish were recovered below the weir.

c The weir was blown out in 2008, resulting in very low weir catch.

d Approximately 379 fish held below the weir in 2009. We salvaged 130 adults and 10 jacks and released above the weir. We recovered 140 adults and 99 jacks dead below the weir (high water temps). Age and origin of live fish released based on carcass recovery below the weir.

e The weir was pulled from the stream early in 2010 due to high stream temperatures (28 June). A portion of the later returning fish is unknown.

Appendix Table 8. Release and return summary for spring Chinook salmon from Lookingglass Creek 2000 to 2009 broodyears.

Brood year	Release location	Life stage	Rearing type	Number released	Returns trapped ^a			Min. SAR
					3	4	5	
2000	LGC	Parr	Captive	51,864	3	37	2	0.08
2001	LGC	Parr	Captive	17,880	11	24	1	0.20
2002	Hat.	Smolt	Captive	53,333	11	42	10	0.12
2003	Hat.	Smolt	Captive	98,023	22	97	21	0.14
2004	Hat.	Smolt	Cap/Conv	149,857	57	253	17	0.22
2005	Hat.	Smolt	Cap/Conv	0	0	0	0	--
2006	Hat.	Smolt	Captive	43,218	185	350	34	1.32
2007	Hat.	Smolt	Cap/Conv	150,477	116	448		
2008	Hat.	Smolt	Cap/Conv	262,911	639			
2009	Hat.	Smolt	Conv.	103,000				

a Age structure calculated using length data. Adult returns are actual numbers trapped at the weir. Trap operated by ODFW Lookingglass Hatchery.

Appendix Table 9. Adult trapping, broodstock and redd counts for spring Chinook salmon from Catherine Creek 1997 to 2011 (does not include jack salmon).

Year	Adults captured			Passed above	Est. above	Trap eff.	Redds		Adult broodstock taken		
	Nat.	Capt.	Conven.				Above	Below	Nat.	Capt.	Conven.
1997	2	--	--	2	--	--	40	6	0	0	0
1998	28	--	--	28	85	23.5	34	0	0	0	0
1999	16	--	--	16	58	27.8	38	2	0	0	0
2000	22	--	--	22	45	33.3	26	8	0	0	0
2001	78	--	--	57	459	14.8	131	2	21	0	0
2002	161	132	--	247	413	61.2	156	2	35	0	0
2003	248	235	--	431	474	95.1	165	2	50	0	0
2004	83	575	--	190	209	94.6	94	2	16	0	0
2005	56	108	28	131	155	98.0	72	2	10	0	20
2006	103	120	62	221	266	83.3	115	2	20	0	43
2007	70	78	59	142	159	90.0	57	2	28	0	37
2008	90	110	37	186	198	94.4	100	1	18	0	33
2009	115	26	118	175	197	88.9	87	2	31	1 ^a	52 ^b
2010	438	0	853	818	907	89.5	373	11	28	0	40
2011	89	0	137	103	1,238	8.7	444	0	37	0	45

a This fish was taken because the mark that distinguishes captive brood from conventional brood was not present. The fish was PIT tagged and later read discovering it was captive brood. The fish was placed in the Lookingglass stock rather than trucking all the way back to Catherine Creek.

b Two females from this group were captives (CWT) and transferred to Lookingglass stock.

Appendix Table 10. Adult trapping, broodstock and redd counts for spring Chinook salmon from the upper Grande Ronde River 1997 to 2011 (does not include jack salmon).

Year	Adults captured			Passed above	Est. above	Trap eff.	Redds		Adult broodstock taken		
	Nat.	Capt.	Conven.				Above	Below	Nat.	Capt.	Conven.
1997	9	--	--	9	--	--	19	6	0	0	0
1998	33	--	--	39	88	30.4	31	2	0	0	0
1999	1	--	--	1	--	--	0	0	0	0	0
2000	17	--	--	15	30	50.0	8	12	0	0	0
2001	38	--	--	29	29	85.7	7	8	21	0	0
2002	101	3	--	54	54	88.9	16	2	48	0	0
2003	120	4	--	63	95	78.9	19	19	71	0	0
2004	30	376	--	386	453	91.1	134	51	15	0	0
2005	14	197	60	204	205	100.0	52	38	7	0	59
2006	51	8	140	50	51	100.0	18	4	26	0	123
2007	33	0	37	16	16	100.0	1	0	17	0	34
2008	17	0	9	8	117	4.0	37	5	9	0	9
2009	37	27	183	84	241	87.3	50	2	21	0	142
2010	63	21	1,113	1,023	2,160	46.9	316	16	29	0	141
2011	16	47	74	51	956	4.6	221	4	9	0	73

Appendix Table 11. Adult trapping, broodstock and redd counts for spring Chinook salmon from Lookingglass Creek 2004 to 2011 (does not include jack salmon)(Trap operated by ODFW Lookingglass Hatchery).

Year	Adults captured			Passed above	Est. above	Trap eff.	Redds		Adult broodstock taken	
	Nat.	Hat.	Stray				Above	Below	Nat.	Hat.
2004	73	37	0	100	100	100.0	49	49	0	136
2005	24	26	5	45	45	100.0	29	10	0	0
2006	10	41	17	41	44	76.5	28	28	0	0
2007	13	108	17	66	66	100.0	32	21	0	41
2008	49	274	9	179	185	97.0	102	40	11	135
2009	82	15	24	83	83	100.0	67	30	27	11
2010	138	422	46	347	347	100.0	170	89	68	99
2011	133	483	24	439	443	99.4	212	129	58	123

Appendix Table 12. Daily summer steelhead trapping data from the Catherine Creek adult collection facility in 2011.

DATE	TOTAL	Trapped		Sacrificed/mortality		Recaptures at trap	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
16-Mar	17	0	17	0	0	0	0
18-Mar	11	0	11	0	0	0	0
21-Mar	15	0	15	0	0	0	0
22-Mar	0	0	0	0	0	0	0
23-Mar	2	0	2	0	0	0	1
25-Mar	11	0	11	0	0	0	0
28-Mar	9	0	9	0	0	0	0
30-Mar	2	0	2	0	0	0	0
MAR	67	0	67	0	0	0	1
1-Apr	49	0	49	0	0	0	2
2-Apr	0	0	0	0	0	0	0
3-Apr	29	0	29	0	0	0	0
4-Apr	5	0	5	0	0	0	0
5-Apr	0	0	0	0	0	0	0
6-Apr	7	0	7	0	0	0	0
8-Apr	3	0	3	0	0	0	0
11-Apr	1	0	1	0	0	0	0
12-Apr	0	0	0	0	0	0	0
13-Apr	2	0	2	0	0	0	0
14-Apr	0	0	0	0	0	0	0
15-Apr	0	0	0	0	0	0	0
16-Apr	0	0	0	0	0	0	0
17-Apr	0	0	0	0	0	0	0
18-Apr	19	0	19	0	0	0	2
19-Apr	3	0	3	0	0	0	1
20-Apr	0	0	0	0	0	0	0
21-Apr	0	0	0	0	0	0	0
22-Apr	4	0	4	0	0	0	1
23-Apr	0	0	0	0	0	0	0
25-Apr	14	0	14	0	0	0	0
27-Apr	1	0	1	0	0	0	0
29-Apr	10	0	10	0	0	0	0
APR	147	0	147	0	0	0	6

Appendix Table 12 (cont.). Daily summer steelhead trapping data from the Catherine Creek adult collection facility in 2011.

DATE	TOTAL	Trapped		Sacrificed/mortality		Recaptures at trap	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
2-May	5	0	5	0	0	0	2
4-May	12	0	12	0	0	0	0
5-May	25	0	25	0	0	0	1
6-May	19	0	19	0	0	0	3
7-May	26	0	26	0	0	0	2
8-May	24	0	24	0	0	0	1
9-May	6	0	6	0	0	0	2
11-May	7	0	7	0	0	0	4
13-May	0	0	0	0	0	0	4
17-May	1	0	1	0	0	0	1
18-May	1	0	1	0	0	0	0
20-May	1	0	1	0	0	0	1
23-May	3	0	3	0	0	0	0
25-May	1	0	1	0	0	0	0
27-May	1	0	1	0	0	0	1
31-May	1	0	1	0	0	0	0
MAY	133	0	133	0	0	0	22
1-Jun	1	0	1	0	0	0	0
9-Jun	0	0	0	0	0	0	1
JUN	1	0	1	0	0	0	1
Total	348	0	348	0	0	0	30

Appendix Table 13. Daily spring Chinook salmon trapping data from the Catherine Creek adult collection facility in 2011.

Date	Total	Trapped				Sacrificed/mortality				Brood collected			
		Adults		Jacks		Adults		Jacks		Adults		Jacks	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
31-May	1	0	1	0	0	0	0	0	0	0	0	0	0
MAY	1	0	1	0	0	0	0	0	0	0	0	0	0
2-Jun	3	0	2	0	1	0	0	0	0	0	0	0	0
4-Jun	1	0	1	0	0	0	0	0	0	0	0	0	0
7-Jun	1	0	1	0	0	0	0	0	0	0	0	0	0
8-Jun	3	1	2	0	0	0	0	0	0	1	2	0	0
13-Jun	3	2	1	0	0	0	0	0	0	0	0	0	0
14-Jun	6	4	2	0	0	0	0	0	0	2	2	0	0
15-Jun	2	1	1	0	0	0	0	0	0	0	0	0	0
17-Jun	7	3	3	1	0	0	0	0	0	0	0	0	0
20-Jun	18	11	7	0	0	0	0	0	0	5	6	0	0
21-Jun	12	7	5	0	0	0	0	0	0	0	0	0	0
22-Jun	9	3	5	0	1	0	0	0	0	0	0	0	0
23-Jun	2	1	1	0	0	0	0	0	0	0	0	0	0
24-Jun	13	3	3	7	0	0	0	7	0	0	0	0	0
27-Jun	4	2	0	1	1	0	0	0	0	2	0	1	1
28-Jun	9	4	3	0	2	0	0	0	0	2	2	0	0
29-Jun	14	4	1	8	1	0	0	8	0	0	0	0	0
30-Mar	9	3	5	0	1	0	0	0	0	3	5	0	0
JUN	116	49	43	17	7	0	0	15	0	15	17	1	1
1-Jul	13	0	2	9	2	0	0	9	0	0	0	0	0
4-Jul	31	0	0	27	4	0	0	27	0	0	0	0	0
5-Jul	43	17	6	16	4	0	0	16	0	17	6	0	1
7-Jul	13	0	0	13	0	0	0	13	0	0	0	0	0
8-Jul	13	4	1	4	4	0	0	4	0	0	0	0	0
12-Jul	16	7	7	1	1	0	0	0	0	7	7	1	0
13-Jul	39	16	7	15	1	0	0	15	0	0	0	0	0
15-Jul	14	7	6	0	1	0	0	0	0	2	3	0	0
18-Jul	25	2	2	17	4	0	0	17	0	2	2	0	0
20-Jul	23	18	3	1	1	0	0	0	0	0	0	0	0
21-Jul	16	3	4	8	1	0	0	8	0	2	2	0	0
25-Jul	19	12	3	2	2	0	0	2	0	0	0	0	0
27-Jul	2	0	1	0	1	0	0	0	0	0	0	0	0
JUL	267	86	42	113	26	0	0	111	0	30	20	1	1
2-Aug	9	2	3	4	0	0	0	0	0	0	0	0	0
AUG	9	2	3	4	0	0	0	0	0	0	0	0	0
Total	393	137	89	134	33	0	0	126	0	45	37	2	2

Appendix Table 14. Daily summer steelhead trapping data from the Upper Grande Ronde adult collection facility in 2011.

Date	Total	Trapped		Sacrificed/mortality		Recaptures at trap	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
16-Mar	1	0	1	0	0	0	0
23-Mar	1	0	1	0	0	0	0
25-Mar	3	0	3	0	0	0	0
MAR	5	0	5	0	0	0	0
1-Apr	4	0	4	0	0	0	0
27-Apr	1	0	1	0	0	0	0
29-Apr	1	0	1	0	0	0	0
APR	6	0	6	0	0	0	0
MAY	0	0	0	0	0	0	0
Total	11	0	11	0	0	0	0

Appendix Table 15. Daily spring Chinook salmon trapping data from the Upper Grande Ronde adult collection facility in 2011.

Date	Total	Trapped				Sacrificed/mortality				Brood collected			
		Adults		Jacks		Adults		Jacks		Adults		Jacks	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
17-Jun	0	0	0	0	0	0	0	0	0	0	0	0	0
20-Jun	0	0	0	0	0	0	0	0	0	0	0	0	0
22-Jun	19	16	2	1	0	3	0	0	0	9	2	0	0
23-Jun	6	4	0	2	0	0	0	0	0	2	0	1	0
27-Jun	23	19	1	3	0	1	0	0	0	12	1	0	0
29-Jun	33	22	3	8	0	0	0	0	0	15	0	2	0
JUN	81	61	6	14	0	4	0	0	0	38	3	3	0
1-Jul	16	6	0	9	1	0	0	9	0	5	0	0	0
3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0
5-Jul	2	0	1	1	0	0	0	1	0	0	1	0	0
6-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0
7-Jul	10	7	0	3	0	0	0	3	0	4	0	0	0
8-Jul	11	6	0	5	0	0	0	5	0	4	0	0	0
9-Jul	21	11	0	10	0	0	0	10	0	5	0	0	0
11-Jul	21	3	1	16	1	0	0	16	0	1	1	0	1
12-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0
13-Jul	19	7	4	8	0	0	0	8	0	6	2	0	0
14-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0
15-Jul	17	5	0	9	3	0	0	9	0	3	0	0	0
18-Jul	16	10	0	6	0	0	0	6	0	4	0	0	0
20-Jul	16	5	4	7	0	0	0	7	0	3	2	0	0
JUL	149	60	10	74	5	0	0	74	0	35	6	0	1
Total	230	121	16	88	5	4	0	74	0	73	9	3	1

Appendix Table 16. Daily summer steelhead trapping data from the Lookingglass Creek adult collection facility in 2011.

Date	Total	Trapped		Sacrificed/mortality		Recaptures at trap	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
4-Mar	1	1	0	1	0	0	0
14-Mar	2	0	2	0	0	0	0
16-Mar	4	0	4	0	0	0	0
18-Mar	13	0	13	0	0	0	0
21-Mar	2	0	2	0	0	0	0
23-Mar	1	0	1	0	0	0	0
25-Mar	9	0	9	0	0	0	1
27-Mar	10	0	10	0	0	0	0
30-Mar	1	0	1	0	0	0	0
31-Mar	9	0	9	0	0	0	1
MAR	52	1	51	1	0	0	2
1-Apr	14	0	14	0	0	0	1
2-Apr	8	0	8	0	0	0	1
4-Apr	7	0	7	0	0	0	0
5-Apr	3	0	3	0	0	0	0
6-Apr	3	0	3	0	0	0	0
7-Apr	1	0	1	0	0	0	0
11-Apr	10	0	10	0	0	0	0
12-Apr	3	0	3	0	0	0	0
15-Apr	5	0	5	0	0	0	0
18-Apr	16	1	15	1	0	0	1
21-Apr	11	1	10	1	0	0	0
25-Apr	11	0	11	0	0	0	1
29-Apr	15	0	15	0	0	0	3
APR	107	2	105	2	0	0	7

Appendix Table 16 (cont.). Daily summer steelhead trapping data from the Lookingglass Creek adult collection facility in 2011.

Date	Total	Trapped		Sacrificed/mortality		Recaptures at trap	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
3-May	9	0	9	0	0	0	2
6-May	19	0	19	0	0	0	3
8-May	7	0	7	0	0	0	0
9-May	5	0	5	0	0	0	0
11-May	19	0	19	0	0	0	4
13-May	12	0	12	0	0	0	0
15-May	6	0	6	0	0	0	1
20-May	21	0	21	0	0	0	3
22-May	7	0	7	0	0	0	0
23-May	2	0	2	0	0	0	0
27-May	1	0	1	0	0	0	0
29-May	2	0	2	0	0	0	2
MAY	110	0	110	0	0	0	15
1-Jun	2	0	2	0	0	0	2
6-Jun	7	0	7	0	0	0	2
10-Jun	1	0	1	0	0	0	0
13-Jun	2	0	2	0	0	0	0
JUN	12	0	12	0	0	0	4
Total	281	3	278	3	0	0	28

Appendix Table 17. Daily spring Chinook salmon trapping data from the Lookingglass Creek adult collection facility in 2011.

Date	Total	Trapped				Sacrificed/mortality				Brood collected			
		Adults		Jacks		Adults		Jacks		Adults		Jacks	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
1-Jun	2	0	2	0	0	0	0	0	0	0	2	0	0
3-Jun	1	0	1	0	0	0	0	0	0	0	1	0	0
6-Jun	24	14	7	3	0	0	0	0	0	14	7	0	0
7-Jun	1	1	0	0	0	0	0	0	0	0	0	0	0
8-Jun	11	4	6	1	0	0	0	0	0	0	1	0	0
9-Jun	1	1	0	0	0	0	0	0	0	0	0	0	0
10-Jun	7	3	1	3	0	0	0	0	0	1	1	0	0
13-Jun	40	23	9	7	1	0	0	0	0	7	3	0	1
14-Jun	39	20	11	8	0	0	0	0	0	3	0	0	0
15-Jun	8	3	2	2	1	0	0	0	0	2	1	0	1
16-Jun	4	2	1	1	0	0	0	0	0	2	1	0	0
17-Jun	88	50	16	20	2	0	0	0	0	3	1	0	2
20-Jun	61	35	5	21	0	0	0	0	0	15	3	0	0
21-Jun	49	17	11	20	1	0	0	0	0	6	4	0	1
22-Jun	94	34	9	49	2	0	0	0	0	3	1	0	2
23-Jun	28	12	1	14	1	0	0	0	0	5	0	0	1
24-Jun	4	0	1	3	0	0	0	0	0	0	1	0	0
27-Jun	32	11	3	18	0	0	0	0	0	6	2	0	0
28-Jun	109	36	3	69	1	0	0	0	0	5	1	0	1
29-Jun	24	7	1	15	1	0	0	0	0	3	1	0	1
30-Jun	4	2	0	2	0	0	0	0	0	2	0	0	0
JUN	631	275	90	256	10	0	0	0	0	77	31	0	10
1-Jul	30	6	2	22	0	0	0	20	0	3	2	0	0
3-Jul	67	22	2	42	1	0	0	37	0	2	2	0	0
5-Jul	26	8	0	16	2	0	0	14	0	2	0	0	0
6-Jul	72	23	4	45	0	0	0	39	0	3	2	0	0
7-Jul	2	1	0	1	0	0	0	1	0	0	0	0	0
8-Jul	11	4	0	7	0	0	0	7	0	1	0	0	0
11-Jul	28	12	1	14	1	0	0	10	0	1	0	0	0
12-Jul	28	11	1	16	0	0	0	13	0	0	0	0	0
13-Jul	29	9	1	16	3	0	0	14	0	0	0	0	0
14-Jul	21	8	1	11	1	0	0	9	0	2	0	0	0
15-Jul	6	2	0	4	0	0	0	3	0	0	0	0	0
18-Jul	27	9	1	16	1	0	0	13	0	1	0	0	0
19-Jul	14	4	2	8	0	0	0	8	0	0	0	0	0
21-Jul	33	6	1	24	2	0	0	21	0	0	0	0	0
25-Jul	53	19	2	30	2	0	0	24	0	2	2	0	0
26-Jul	31	15	3	13	0	0	0	11	0	1	2	0	0
27-Jul	46	11	0	34	1	0	0	32	0	0	0	0	0
28-Jul	16	6	2	8	0	0	0	5	0	0	0	0	0

Appendix Table 17 (cont.). Daily spring Chinook salmon trapping data from the Lookingglass Creek adult collection facility in 2011.

Date	Total	Trapped				Sacrificed/mortality				Brood collected			
		Adults		Jacks		Adults		Jacks		Adults		Jacks	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
1-Jul	30	6	2	22	0	0	0	20	0	3	2	0	0
3-Jul	67	22	2	42	1	0	0	37	0	2	2	0	0
5-Jul	26	8	0	16	2	0	0	14	0	2	0	0	0
6-Jul	72	23	4	45	0	0	0	39	0	3	2	0	0
7-Jul	2	1	0	1	0	0	0	1	0	0	0	0	0
8-Jul	11	4	0	7	0	0	0	7	0	1	0	0	0
11-Jul	28	12	1	14	1	0	0	10	0	1	0	0	0
12-Jul	28	11	1	16	0	0	0	13	0	0	0	0	0
13-Jul	29	9	1	16	3	0	0	14	0	0	0	0	0
14-Jul	21	8	1	11	1	0	0	9	0	2	0	0	0
15-Jul	6	2	0	4	0	0	0	3	0	0	0	0	0
18-Jul	27	9	1	16	1	0	0	13	0	1	0	0	0
19-Jul	14	4	2	8	0	0	0	8	0	0	0	0	0
21-Jul	33	6	1	24	2	0	0	21	0	0	0	0	0
25-Jul	53	19	2	30	2	0	0	24	0	2	2	0	0
26-Jul	31	15	3	13	0	0	0	11	0	1	2	0	0
27-Jul	46	11	0	34	1	0	0	32	0	0	0	0	0
28-Jul	16	6	2	8	0	0	0	5	0	0	0	0	0
29-Jul	3	0	1	2	0	0	0	2	0	0	1	0	0
JUL	543	176	24	329	14	0	0	283	0	18	11	0	0
1-Aug	20	3	2	15	0	0	0	12	0	0	0	0	0
2-Aug	2	2	0	0	0	0	0	0	0	0	0	0	0
3-Aug	4	0	2	2	0	0	0	2	0	0	1	0	0
4-Aug	3	0	1	1	1	0	0	0	0	0	1	0	0
5-Aug	1	1	0	0	0	0	0	0	0	1	0	0	0
8-Aug	8	4	0	4	0	0	0	3	0	2	0	0	0
15-Aug	8	5	2	1	0	0	0	0	0	5	2	0	0
17-Aug	7	4	2	1	0	0	0	1	0	3	2	0	0
19-Aug	12	5	1	6	0	0	0	5	0	5	1	1	0
22-Aug	24	13	4	7	0	0	0	7	0	9	4	0	0
24-Aug	8	4	0	4	0	0	0	4	0	0	0	0	0
25-Aug	16	3	3	8	2	0	0	8	0	0	0	0	0
29-Aug	30	10	0	19	1	0	0	18	0	0	0	0	0
30-Aug	9	1	1	7	0	0	0	7	0	1	1	0	0
31-Aug	6	1	1	4	0	0	0	4	0	1	1	0	0
AUG	158	56	19	79	4	0	0	71	0	27	13	1	0
2-Sep	2	0	0	2	0	0	0	2	0	0	0	0	0
Spawn adj.	0	0	0	0	0	0	0	0	0	1	3	0	1
SEP	2	0	0	2	0	0	0	2	0	1	3	0	1
Total	1334	507	133	666	28	0	0	356	0	123	58	1	11

Spawn adj. is added at the end of spawning to correct for fish that were recorded as passed but were actually collected for broodstock.

Appendix Table 18. Adult summer steelhead trapping summary from the Catherine Creek adult collection facility in 1997-2011.

Year	Total	Trapped		Sacrificed/mortality		Recaptures at trap	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
1997	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0
2000	17	7	10	1	1	0	0
2001	203	50	153	50	0	0	0
2002	267	1	266	1	0	0	5
2003	226	2	224	2	1	0	2
2004	181	0	181	0	0	0	7
2005	191	1	190	1	0	0	6
2006	171	0	171	0	0	0	4
2007	128	0	128	0	0	0	3
2008	121	0	121	0	0	0	0
2009	147	0	147	0	0	0	15
2010	298	3	295	3	0	0	8
2011	348	0	348	0	0	0	30

Appendix Table 19. Adult summer steelhead trapping summary from the Upper Grande Ronde River adult collection facility in 1997-2011.

Year	Total	Trapped		Sacrificed/mortality		Recaptures at trap	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
1997	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0
2001	11	0	11	0	0	0	0
2002	37	0	37	0	0	0	0
2003	56	0	56	0	0	0	1
2004	63	0	63	0	0	0	8
2005	41	0	41	0	0	0	0
2006	0	0	0	0	0	0	0
2007	63	0	63	0	0	0	3
2008	31	0	31	0	0	0	6
2009	36	0	36	0	0	0	2
2010	15	0	15	0	0	0	0
2011	11	0	11	0	0	0	0

Appendix Table 20. Adult summer steelhead trapping summary from the Lookingglass Creek adult collection facility in 1997-2011.

Year	Total	Trapped		Sacrificed/mortality		Recaptures at trap	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
1997	10	1	9	0	0	0	0
1998	15	4	11	0	0	0	0
1999	40	0	40	0	0	0	0
2000	11	0	11	0	0	0	0
2001	114	1	113	0	0	0	2
2002	260	2	258	2	0	1	42
2003	165	0	165	0	0	0	14
2004	135	3	132	3	0	0	14
2005	206	5	201	5	1	0	20
2006	196	3	193	3	0	0	19
2007	132	0	132	0	0	0	15
2008	135	6	129	6	0	0	10
2009	194	0	194	0	0	0	49
2010	334	23	311	14	0	10	11
2011	281	3	278	3	0	0	28



Appendix Table 21. High flow event at Upper Grande Ronde adult collection facility 15 May 2011.



Appendix Table 22. High flow event at Catherine Creek adult collection facility 15 May 2011.