Grande Ronde Satellite Facilities O&M

Annual Report

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ABSTRACT

There was only one release group acclimated at the Catherine Creek Acclimation Facility (CCAF) in 2012. The fish arrived at the facility on 20 March and all were from the conventional program. The volitional release began on 22 March. It is estimated that 49.9% of the fish left the facility during the volitional release period. The total number of fish released was 106,882. Total mortality for the acclimation period was 57 (0.05%). No fish health problems were encountered this year. Average size of the force released fish was 20.3 fish/lb. There was a late group of 54,492 fish that were released directly into Catherine Creek near the facility on 16 April. This group was diagnosed with infectious hematopoietic necrosis (IHN) and managers decided it would be best to release these fish directly into the river from the hatchery.

There were three groups of spring Chinook acclimated at the upper Grande Ronde Acclimation Facility (UGRAF) in 2012. All groups were made up of smolts from the conventional program. The first acclimation period ran from 19 March to 2 April with volitional release beginning 21 March. It was estimated that 23.3% of the fish left during the volitional release period. The total number of fish released from the acclimation facility in the first group was 73,286. There were 116 mortalities during the first acclimation period (0.16%). The size of the fish that were forced from the facility was 20.8 fish/lb. The second group arrived on 19 March, was allowed to volitionally leave on 21 March, and was forced from the facility on 14 April. It was estimated that 7.9% of the fish left during the volitional release period. The total number of fish released from the acclimation facility in the second group was 73,303. There were 99 mortalities during the second acclimation period (0.13%). The size of the fish that were forced from the facility was 21.9 fish/lb. The third group arrived on 4 April, was allowed to volitionally leave on 9 April, and was forced from the facility on 14 April. It was estimated that 13.2% of the fish left during the volitional release period. The total number of fish released from the acclimation facility in the third group was 72,192. There were 19 mortalities during the third acclimation period (0.03%). The size of the fish that were forced from the facility was 20.5 fish/lb. No fish health problems were encountered this year for any group. There was a late group of 66,956 fish that were released directly into the upper Grande Ronde River about 5 miles below the facility on 16 April. This group was diagnosed with infectious hematopoietic necrosis (IHN) and managers decided it would be best to release these fish directly into the river from the hatchery.

The Catherine Creek Adult Capture Facility (CCACF) was put into operation on 1 March 2012. The first adult summer steelhead was captured on 14 March. A total of 329 unmarked adult summer steelhead were trapped and released from 14 March to 5 June 2012. Median arrival time at the trap was the week of 15 April. No adipose-clipped fish were captured at the trap. The first adult spring Chinook salmon was captured at CCACF on 25 May. A total of 982 (928 adult and 54 jack) spring Chinook salmon were trapped from 25 May to 1 August. The total catch was made up of 362 adults and 17 jacks of natural origin, 381 adults and 14 jacks of conventional broodstock progeny and 185 adult and 23 jacks of captive broodstock progeny. A total of 631 adult (314 natural, 215 conventional, 101 captive) and 26 jack (15 natural, 5 conventional, 6 captive) spring Chinook salmon were released above the weir to spawn naturally. Median arrival for adults at the trap was the week of 17 June.

Broodstock were collected systematically over the entire return from 4 June to 2 July. The adult broodstock collected and transported from CCACF consisted of 48 unmarked (13.3% of the natural return trapped) and 38 conventional broodstock (6.7% of the hatchery return trapped).

The trap was removed from Catherine Creek on 15 August. Trap efficiency in 2012 was estimated at 91.7%.

The UGRACF was put into operation on 1 March 2012. The first adult summer steelhead was captured on 12 March. A total of 13 unmarked adult summer steelhead were trapped and released from 12 March to 29 May. 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 30 May. A total of 674 (638 adult and 36 jack) spring Chinook salmon, were trapped from 30 May to 22 June. The total catch was made up of 168 adults and 19 jacks of natural origin, 108 adults and 14 jacks from conventional broodstock, and 362 adults and 3 jacks from captive broodstock. Median arrival for adults at the trap was the week of 17 June.

Broodstock were collected systematically over the entire return from 30 May to 22 June. A total of 79 adult and 2 jack natural fish, 81 adult and 6 jack hatchery fish (conventional broodstock) were transported to LGH for broodstock.

The trap and weir were removed from the upper Grande Ronde River on 22 June 2012 due to high stream temperatures (daily maximum >20 ^{o}C). Trap efficiency was estimated at 69.6% this year.

In 2012, a total of 45 females, 42 males and four jacks were spawned from the Catherine Creek stock. A total of 74 females, 72 males, and six jacks from the upper Grande Ronde stock were spawned. A total of 81 females, 80 males, and seven jacks from the Lookingglass Creek stock were spawned. Median spawning week was 16 August for Catherine Creek and 30 August for upper Grande Ronde and Lookingglass Creek. A total of 119 females, 88 males (plus an additional 182 cryo males), and 14 jacks from the Grande Ronde captive brood were spawned. Median spawning week for the captive brood was 24 September.

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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 (GRESCSSP) in order to prevent extinction and preserve options for use of endemic fish stocks in future artificial propagation programs. The GRESCSSP was implemented in three Grande Ronde River basin tributaries; the Lostine River, the upper Grande Ronde River, and Catherine Creek. The GRESCSSP 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 GRESCSSP 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 LSRCP 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 Wallowa 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 ft^3). 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 29 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/ft^3. 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. 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^oC 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 fed Bio-Oregon Bio-Vita Fry 2.5mm feed. Fish are allowed to volitionally leave the raceways beginning two 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 low light provides 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 volitional release drains (Figures 2 and 3) 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 by monitoring and evaluation personnel 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.

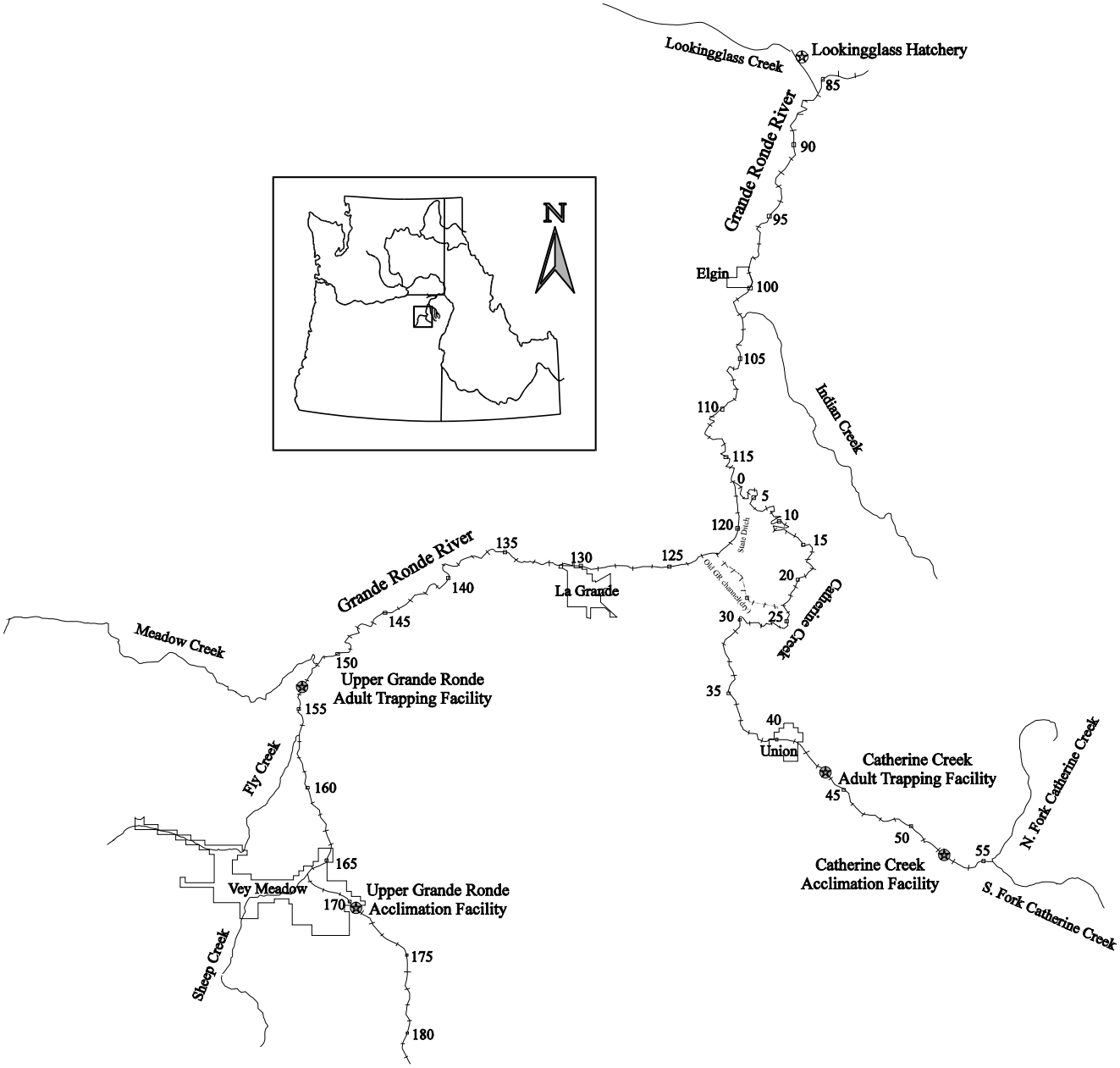

Figure 1. Map of the upper Grande Ronde River basin showing locations (rm) of Lookingglass Hatchery and Catherine Creek and Upper Grande Ronde juvenile acclimation and adult capture facilities.

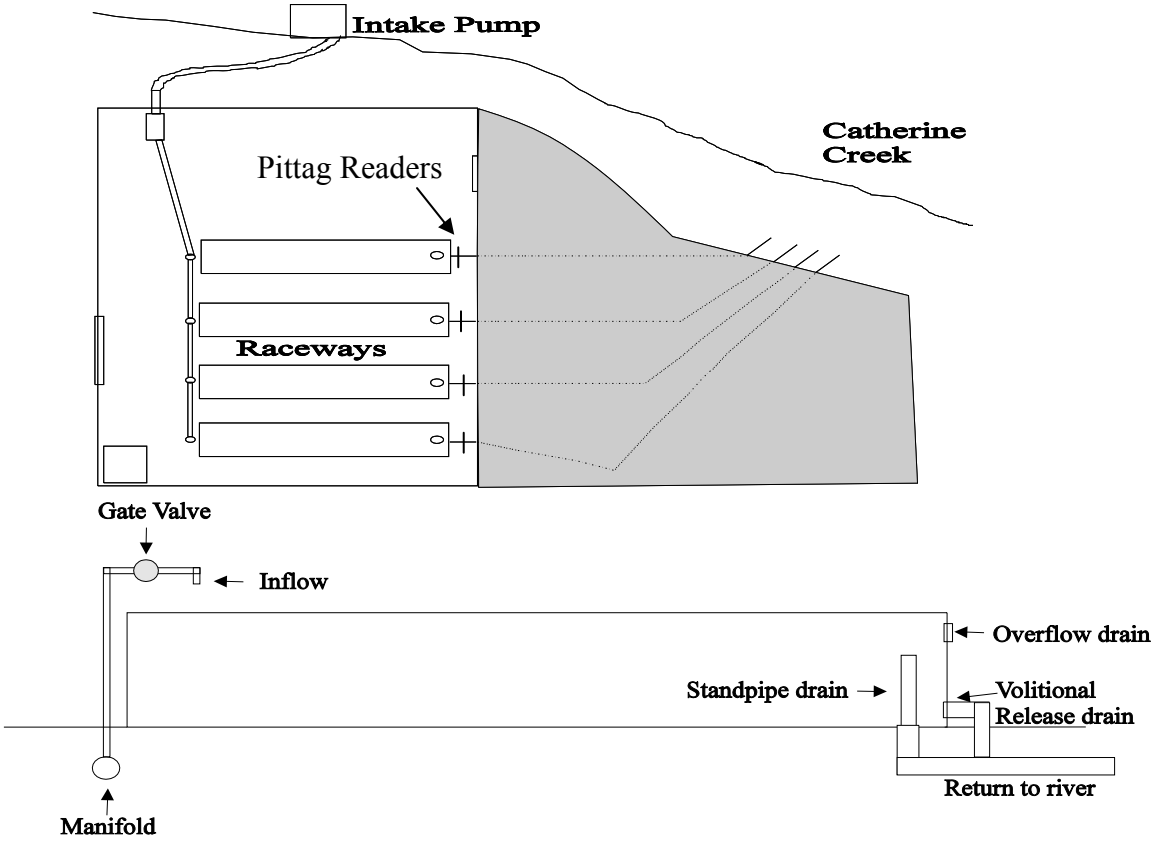

Figure 2. Photo and diagram of the Catherine Creek acclimation facility. The lines passing through the shaded area represent underground return pipes.

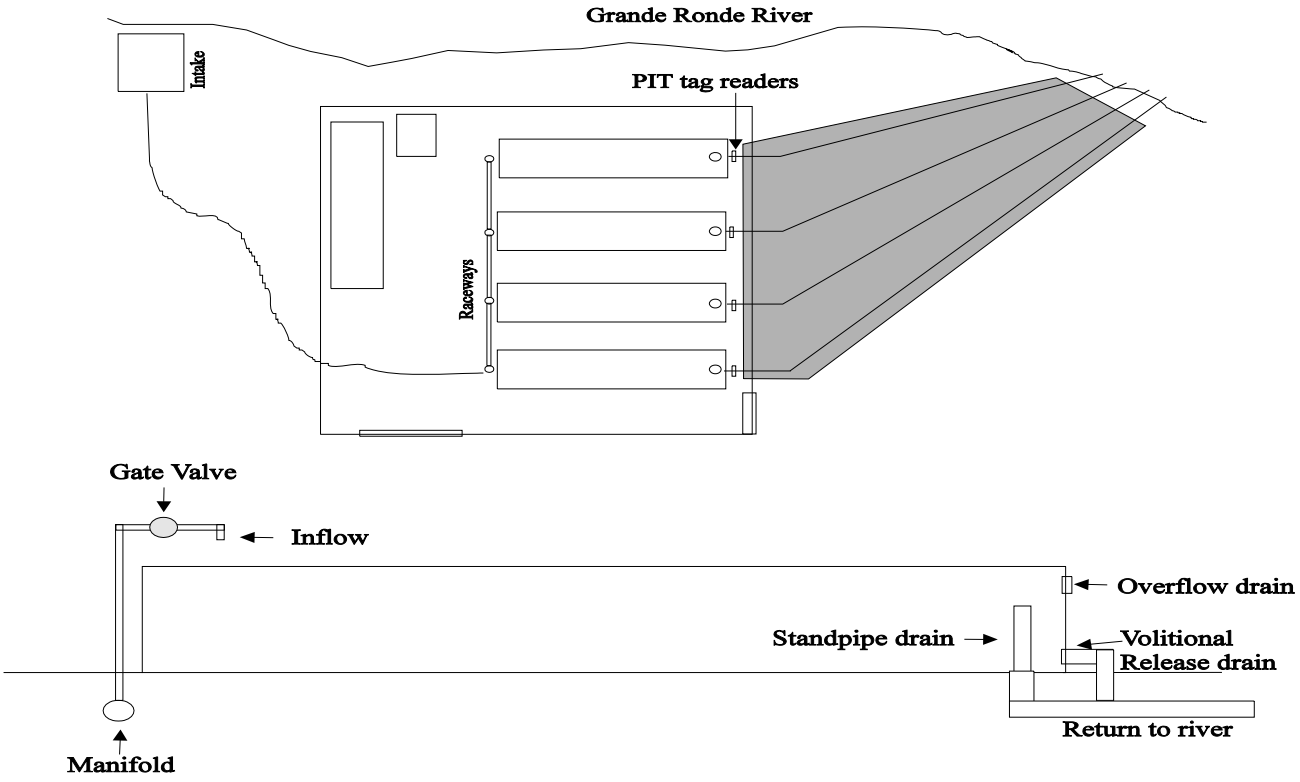

Figure 3. Photo and diagram of the Upper Grande Ronde acclimation facility. The main intake line and the lines passing through the shaded area represent underground pipes.

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 ft^3). The designed adult spring Chinook salmon holding capacity for this facility is 90 using 10 ft^3/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 ft^3). The designed adult spring Chinook salmon holding capacity for this facility is 28 using 10 ft^3/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 fish that are passed.

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^oC. 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^oC the trap is opened and the weir is removed from the stream for the year (2012 LSRCP AOP).

In the past, during trap checks, no anesthetic was used to sedate the fish prior to handling due to possible harvest of the fish above the weir. At the CCACF, in 2012, electro-narcosis (EN) was used for the first time. We were not able to set up an EN system at the UGRACF in 2012 so the fish were still worked un-anesthetized. The EN system consisted of a 75 gallon trough with an 18 in. x 18 in. aluminum plate attached at each end of the trough. The plates were covered with a plastic mesh to eliminate contact of the fish on the plates. The plates were wired to the power system which was a variable 0 – 60 volt; 3 amp DC power source.

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 (all steelhead, and only Chinook from CCAF). 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 preseason 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. Fish collected for broodstock are to be taken systematically (adult/jack) from across the run. However, due to temperature concerns in the upper Grande Ronde, a contingency collection schedule is developed and agreed to as part of the LSRCP Annual Operating Plan (AOP) in case of early, high temperature conditions.

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. Generally the same rate (1:10) is used as for the Catherine Creek 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 <600mm, 4 year fish 600-799mm, 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.

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 the captive brood 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 was only one group of fish acclimated at the CCAF in 2012 (Table 1). The CCAF received 106,939 conventional smolts on 20 March. The volitional release began on 22 March, and would continue until force release on 14 April. The average size of the fish at delivery was 21.8 fish/lb (Table 2). The densities in the raceways ranged from 0.54 to 0.56 lbs/ft^3. The variability in the raceway densities was due to the densities at LGH and the way they were loaded onto the transport truck.

During the volitional release period there were a total of 6,939 PIT-tagged fish scanned. Based on the number of PIT-tagged fish in this group (13.0%, 13,943), an estimated 53,377 fish left. This was 49.9% of the fish released from this group (Table 3). Migration timing of the fish that volitionally migrated showed that 81.2% left in the first five days (Figure 5).

The total number of fish that were released from the acclimation facility was 106,882. The size of the fish just before the volitional release began was 20.3 fish/lb. The size of the fish that were forced from the facility was 18.6 fish/lb. 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 278 pounds of food was fed during the acclimation period. The water temperature at CCAF ranged from 0.5^{o}C to 8.1 ^{o}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 57 (0.05%). There were no substantial fish health problems detected in this group. ODFW Fish Health Services examined a total of 10 mortalities (raceways 1-4). These represented fish from raceways 1 & 2 at Lookingglass Hatchery. No significant levels of systemic bacteria were detected. All ELISA values were ≤ 0.060 OD units indicating that these fish did not have a BKD problem at release. All samples collected for culturable viruses were negative. BKD was detected in 5/45 (11.1%) mort/moribund fish examined from raceways 1 and 2 while rearing at Lookingglass Hatchery. All of these BKD detections were in January-February 2012.

There was a second release group of 54,492 conventional smolts that were directly released into Catherine Creek from LGH at the CCAF on 16 April. This group was diagnosed with infectious hematopoietic necrosis (IHN) and managers decided it would be best to release these fish directly into the river from the hatchery after the acclimated fish were released in order to minimize interaction between the groups. The group was originally scheduled to be released on 19 April to provide more days of separation but was moved up as the mortality level began to increase. There were no BKD mortalities detected in this group during rearing at Lookingglass Hatchery.

Table 1. Raceway fish density and flow data for the Catherine Creek acclimation facility before volitional release in 2012.

Catherine Creek	Raceway				
	1	2	3	4	Direct stream
No. of fish	27,075	27,073	26,385	26,406	54,492
Total lbs.	1,242	1,242	1,207	1,208	2,595
Mortality	28	21	7	1	0
Density lbs/ft^3	0.56	0.56	0.54	0.54	-
lbs/gpm	3.76	3.76	3.66	3.66	-
Flow gpm	330	330	330	330	-
Treatment	Conv.	Conv.	Conv.	Conv.	Conv.

Table 2. Group, number, size, raceways, mortality, feed fed, and numbers released from the Catherine Creek acclimation facility in 2012.

Facility/ rel. yr	Group	Number Received	Size fish/lb.	Raceways used	Density lbs/ft^3	Total mortality (%)	Feed Fed (lbs)	Number released
CC 12	1 Conv.	106,939	21.8	4	0.55	0.05	278	106,882
CC 12	Dir. Conv.	54,492	21.0	0	-	0.00	-	54,492

Table 3. Group, acclimation dates, temperature, dissolved oxygen, and estimated volitional migration of fish acclimated at the Catherine Creek acclimation facility in 2012.

Facility/ rel. yr	Group	Acclimation Period	Volitional began	Temp.^oC		DO mg/l		Volitional	
				Min.	Max.	Min.	Max.	migration	%
CC 12	1 Conv.	3/20 – 4/14	3/22	0.5	8.1	11.0	13.6	53,377	49.9

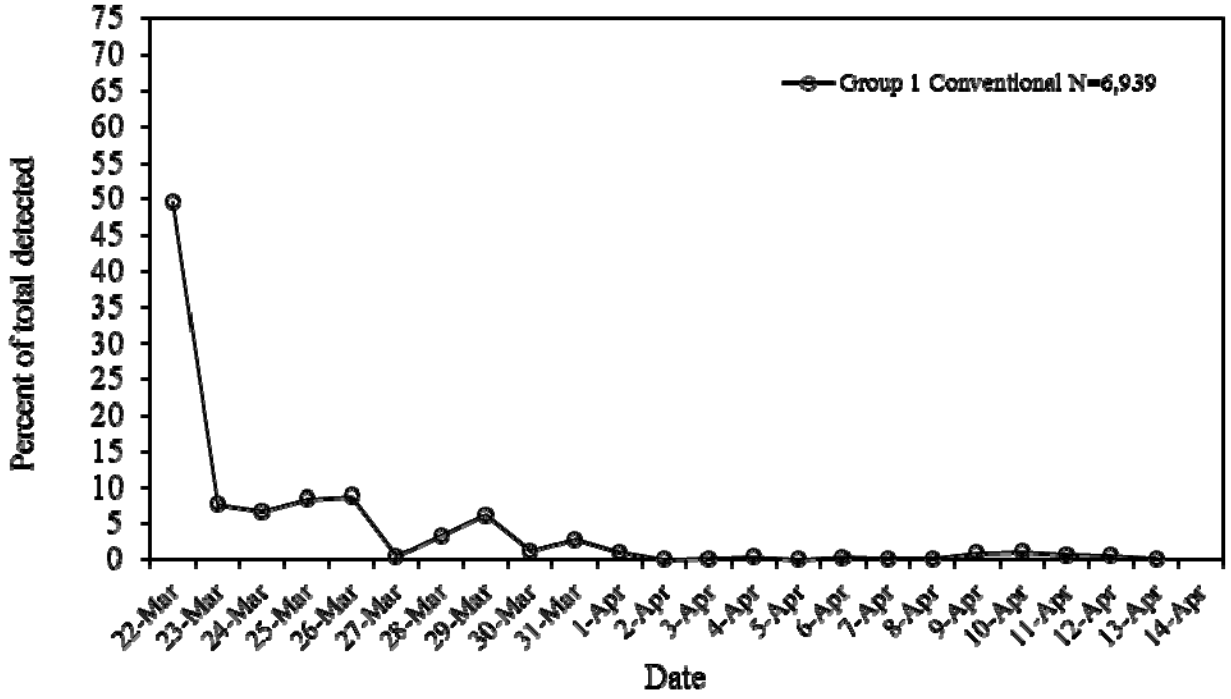

Figure 5. Daily PIT tag detections of fish leaving the raceways during the volitional release period at the Catherine Creek acclimation facility in 2012.

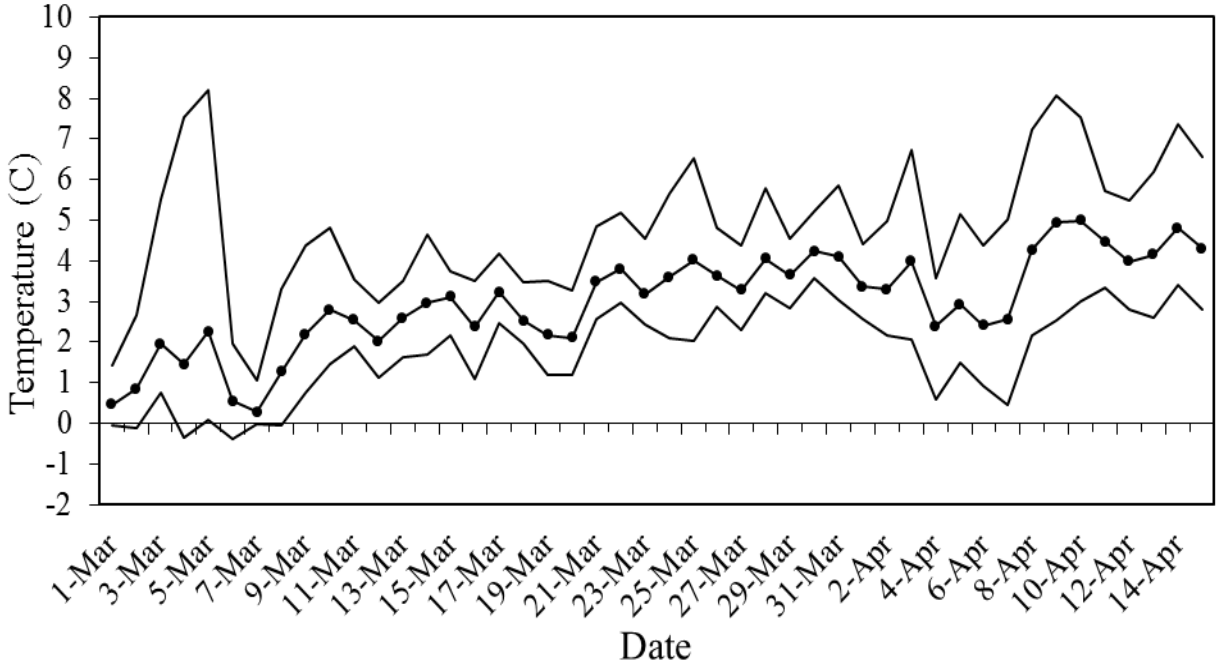

Figure 6. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Catherine Creek juvenile acclimation facility in 2012.

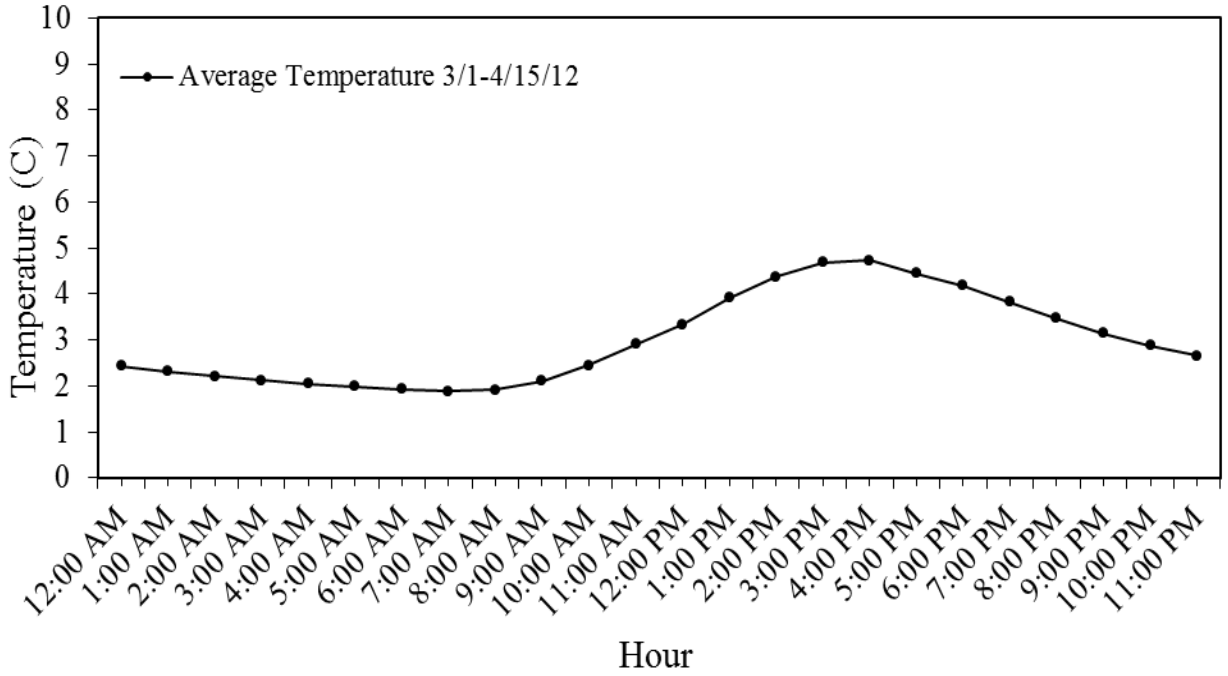

Figure 7. Average hourly water temperature at the Catherine Creek juvenile acclimation facility in 2012.

There were three acclimation groups at the UGRAF in 2012 (Table 4). Group 1, 73,402 conventional smolts, arrived at the facility on 19 March 2012. Group 2, 73,303 conventional smolts, also arrived on 19 March. Volitional release for both groups began on 21 March with force out for Group 1 on 2 April and for Group 2 on 14 April. Group 1 was forced out early to make space at the facility for Group 3. The average size of the fish at delivery was 23.0 fish/lb for both groups (Table 5). The densities in the raceways ranged from 0.68 to 0.75 lbs/ft^3. The variability in the raceway densities was due to the densities at LGH and the way they were loaded onto the transport truck. Group 3, 72,211 conventional smolts, arrived on 4 April with volitional release beginning 9 April. The average size of the fish in Group 3 was 20.5 fish/lb with raceway densities at 0.79 lbs/ft^3 (Table 5). Force out for Group 3 and Group 2 was 14 April.

One of the readers malfunctioned on raceway 4 (1/2 of Group 2) and data was not collected from that raceway. Due to continuing problems with the readers and the low numbers of tagged fish in the ponds we will only operate readers on one raceway and extrapolate the number of migrants from all the raceways in the coming year. During the volitional release period for Group 1 there were a total of 171 PIT-tagged fish scanned. Based on the number of PIT-tagged fish in this group (1.0%, 746), an estimated 17,100 fish left. This was 23.3% of the fish released from this group (Table 6). Migration timing of the fish that volitionally migrated from Group 1, showed that 77.1% left during the first five days (Figure 8). There were an estimated 58 PIT-tagged fish scanned for Group 2 (29 from RW 1 doubled to account for RW 4 which did not have a reader on it). Based on the number of PIT-tagged fish in this group (1.0%, 747), an estimated 5,800 fish left. This was 7.9% of the fish released from this group (Table 6). Migration timing of the fish that volitionally migrated from Group 2 showed that only 41.4% left during the first 5 days

of release (Figure 8). There were a total of 105 PIT-tagged fish scanned for Group 3. Based on the number of PIT-tagged fish in this group (1.1%, 790), an estimated 9,545 fish left. This was 13.2% of the fish released from this group (Table 6). The volitional release for Group 3 was only five days and the migration timing showed that 90.5% left after the first 2 days (Figure 8).

The total number of fish that were released from the acclimation facility was 218,781 (73,286 Group 1, 73,303 Group 2, 72,192 Group 3). The size of the fish just before the volitional release began for groups 1 to 3 was 21.9, 21.9, and 20.6 fish/lb, respectively. The size of the fish that were forced from the facility was 20.8, 21.9, and 20.5 fish/lb, 1 to 3 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 171.0 pounds of food was fed during the acclimation period. The water temperature at UGRAF for the acclimation ranged from 0.0^{o}C to 6.2 ^{o}C and was lowest around 0700 and highest around 1600 (Figures 9 and 10).

There were a total of 234 mortalities during the acclimation (Group 1 116 (0.16%), Group 2 99 (0.13%), Group 3 19 (0.03%)). There were no substantial fish health problems detected in any of the acclimated groups. ODFW Fish Health Services examined a total of 10 mortalities (raceways 1-4) that had died on April 9-12. These represented fish from raceways 4, 7 and 6 at Lookingglass Hatchery. Three of 10 (30%) had low levels of aeromonad-pseudomonad bacteria. All ELISA values were ≤ 0.058 OD units indicating that these fish did not have a BKD problem at release. All samples collected for infectious hematopoietic necrosis virus (IHNV) testing and other viruses were negative. BKD was detected in 6/39 (15.4%) mort/moribund fish examined from raceway 6 & 7 while rearing at Lookingglass Hatchery mostly during the last four months of rearing before transfer to acclimation. Additionally, fish in raceway 4 at Lookingglass Hatchery experienced chronic low level IHN loss prior to transfer.

There was a fourth release group of 66,956 conventional smolts that were directly released into the upper Grande Ronde River approximately four miles below the acclimation site on 16 April. This group was diagnosed with IHN and managers decided it would be best to release these fish directly into the river from the hatchery after the acclimated fish were released in order to minimize interaction between the groups.. The group was originally scheduled to be released on 19 April in order to provide more separation between the groups but was moved up as the mortality level began to increase. There were no BKD mortalities detected in this group during rearing at Lookingglass Hatchery.

Maintenance and repair activities were conducted at both acclimation facilities in 2012. Facility maintenance work at the CCAF consisted of snow removal, work on the intake site, and fence repair. Facility maintenance work at the UGRAF consisted of snow removal and removal of gravel from intake area.

Table 4. Raceway fish density and flow data for the Upper Grande Ronde acclimation facility before volitional release in 2012.

	Raceway			
Grande Ronde Group 1		2	3	
No. of fish		38,188	35,214	
Total lbs.		1,673	1,525	
Mortality		45	71	
Density lbs/ft^3		0.75	0.68	
lbs/gpm		5.07	4.62	
Flow gpm		330	330	
Treatment		Conv.	Conv.	
	Raceway			
Grande Ronde Group 2	1			4
No. of fish	38,188			35,214
Total lbs.	1,673			1,525
Mortality	27			72
Density lbs/ft^3	0.75			0.68
lbs/gpm	5.07			4.62
Flow gpm	330			330
Treatment	Conv.			Conv.
	Raceway			
Grande Ronde Group 3		2	3	Direct stream
No. of fish		36,106	36,105	71,956
Total lbs.		1,761	1,761	3,575
Mortality		7	12	5,000
Density lbs/ft^3		0.79	0.79	-
lbs/gpm		5.34	5.34	-
Flow gpm		330	330	-
Treatment		Conv.	Conv.	Conv.
Treatment	Conv.	Conv.	Conv.	Conv.

Table 5. Group, number, size, raceways, mortality, feed fed, and numbers released from the Upper Grande Ronde acclimation facility in 2012.

Facility/ rel. yr	Group	Number Received	Size fish/lb.	Raceways used	Density lbs/ft^3	Total mortality (%)	Feed Fed (lbs)	Number released
GR 12	1 Conv.	73,402	23.0	2	0.72	0.16	86	73,286
GR 12	2 Conv.	73,402	23.0	2	0.72	0.13	38	73,303
GR 12	3 Conv.	72,211	20.5	2	0.79	0.03	47	72,192
GR 12	Dir. Conv.	71,956	20.1	0	-	6.95	-	66,956

Table 6. Group, acclimation dates, temperature, dissolved oxygen, and estimated volitional migration of fish acclimated at the Upper Grande Ronde facility in 2012.

Facility/ rel. yr	Group	Acclimation Period	Volitional began	Temp.°C		DO mg/l		Volitional	
				Min.	Max.	Min.	Max.	migration	%
GR 12	1 Conv.	3/19 – 4/2	3/21	0.0	5.0	7.9	9.2	17,100	23.3
GR 12	2 Conv.	3/19 – 4/14	3/22	0.0	6.2	7.9	9.3	5,800	7.9
GR 12	3 Conv.	4/4 – 4/14	4/9	-0.1	6.2	8.1	9.3	9,545	13.2

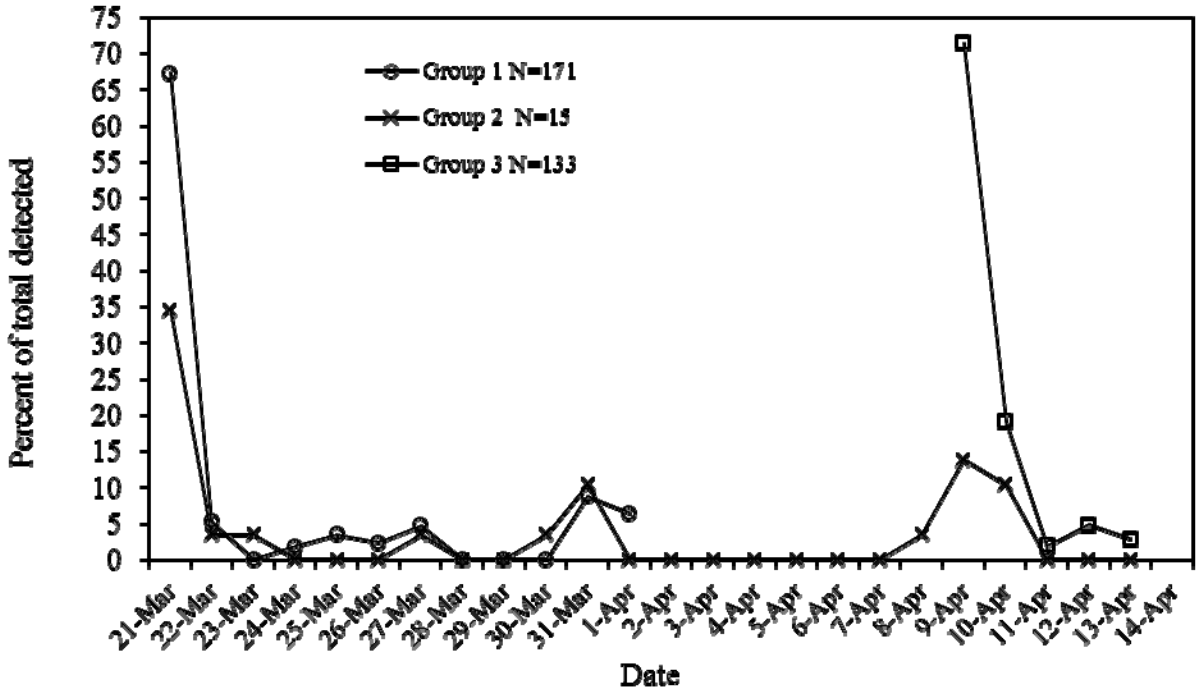

Figure 8. Daily PIT tag detections of fish leaving the raceways during the early volitional release periods at the Grande Ronde acclimation facility in 2012.

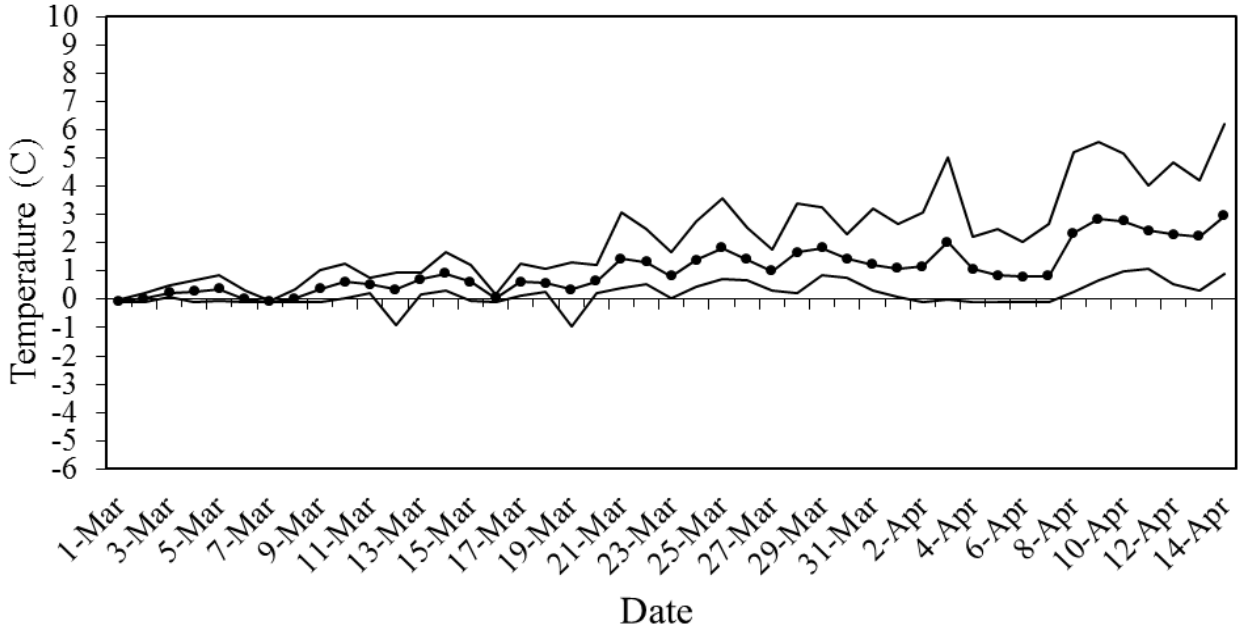

Figure 9. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Upper Grande Ronde juvenile acclimation facility in 2012.

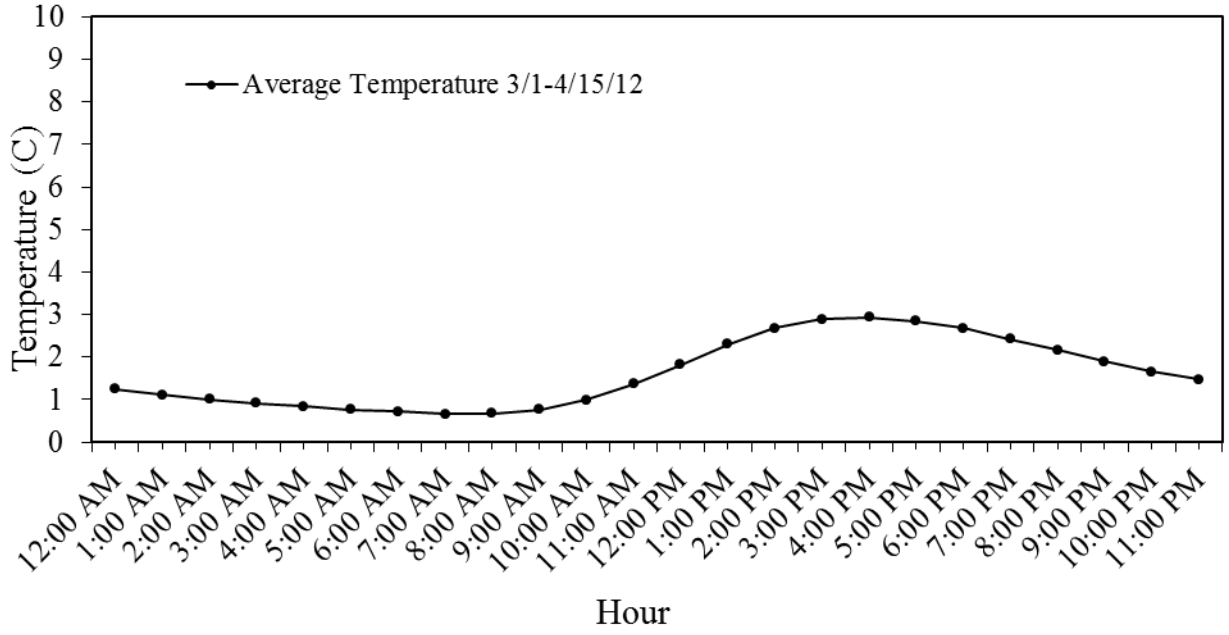

Figure 10. Average hourly water temperature at the Upper Grande Ronde juvenile acclimation facility in 2012.

Adult Collections

The CCACF was put into operation on 1 March 2012. The first adult summer steelhead was captured on 14 March. A total of 329 unmarked adult summer steelhead were trapped and released from 14 March to 5 June 2012 (Table 7). No hatchery adults were trapped, Median arrival at the trap was the week of 15 April (Figure 11). Thirteen previously trapped fish, as indicated by the presence of an opercle mark, were re-trapped and released, and 28 previously trapped kelts were recovered dead on the weir. There were five kelts recovered on the weir that was not previously punched. There were 21 kelts that were passed downstream over the weir that were still alive.

The first adult spring Chinook salmon was captured in the trap at CCACF on 25 May 2012. A total of 982 (928 adult and 54 jack) spring Chinook salmon were trapped from 25 May to 1 August 2012 (Table 8). The total catch was made up of 362 adults and 17 jacks of natural origin, and 381 adults and 14 jacks of conventional broodstock progeny, and 185 adults and 23 jacks of captive broodstock progeny. A total of 631 adult (314 natural, 215 conventional, 101 captive) and 26 jack (15 natural, 5 conventional, 6 captive) spring Chinook salmon were released above the weir to spawn naturally. Median arrival for all origins of adults at the trap was the week of 17 June (Figure 12). By the week of 24 June 90% of the adult fish had been trapped for all origins. This was a week earlier than the mean timing for the 2002 to 2011 run years. The median arrival for jacks was the week of 17 June for the natural fish and 24 June for the captive and conventional fish. There were three mortalities in the trap in 2012 and six recaptured carcasses were recovered on the weir.

We also recovered a dead natural Chinook adult on the weir on 16 April. This fish more than likely swam above the trap site late in the fall or winter of 2011/12 prior to the trap and weir being installed. Scales and tissue samples were taken and passed to researchers to determine race/origin.

The trap was removed from Catherine Creek on 15 August. Surveys conducted by ODFW in 2012 resulted in 238 redds counted above the weir and 1 redd below the weir. Based on the number of redds below the weir there did not appear to be a weir effect. A total of 97 adult carcasses were recovered above the weir which was 15.4% of the total adults passed (631). Of the 96 carcasses recovered above the weir, 88 were punched fish resulting in a trap efficiency of 91.7%. The population estimate above the weir in 2012 was 689 adult fish (2012 Spawning Ground Survey Results, ODFW, unpublished). The spring runoff in 2012 occurred about 1 month earlier than the mean flows from 2007 to 2011 (Figure 13). This early flow may have accounted for the earlier runtiming observed. This early flow also leads to very low summer flows in 2012 which may affect spawning distribution and juvenile rearing.

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 2012 was 2,562 (994 natural + 864 captive + 704 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 362 fish which was 36.4% of the predicted number. The conventional adult return trapped was 381 fish which was 54.1% of the predicted number. The captive adult return trapped was 185 fish which was 21.4% of the predicted number. The hatchery percentage of adult fish released above the weir in 2012 was 50.3% (317). There were 26 jacks released above the weir and 299 males (8.7% jacks).

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 and Lookingglass Creek. There were 101 adults and 5 jacks outplanted into Indian Creek and 107 adults and 9 jacks to Lookingglass Creek.

The broodstock collection goal for 2012 was 88 adults (50 natural, 38 hatchery) and 4 jacks (2 natural and 2 hatchery). The broodstock collected and transported from CCACF consisted of 48 unmarked (13.3% of the natural return trapped) and 38 conventional broodstock adults (6.7% of the hatchery return) along with two natural and two conventional jacks. We were 2 adults short of the goal because the run ended abruptly and these fish were to be taken at the end of the run. Broodstock was collected systematically over the entire return from 4 June to 2 July. The 2012 AOP called for the adult broodstock to be made up of between 51% to 56% natural origin fish. The unmarked portion in the broodstock ended up at 52.7%. Gender classification of adults at spawning was compared to gender classification at the weir to estimate the accuracy of sex determination at the weir. The determination of gender at the weir was 94.2% accurate (81/86). The fish that were missed were called males at the weir so we ended up with more females in the broodstock than were said to be collected.

The EN unit was operated for the first time at the CCACF in 2012. The unit performed well and did not appear to injure the fish (no mortalities in the recovery area).

Hourly water temperatures were taken at the CCACF in 2012 (Figures 14 and 15). Water temperatures ranged from 0.1^{o}C on 7 March to 23.5^{o}C on 6 August. Lowest temperature usually occurred around 0800 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 2012 consisted of hydraulic weir component maintenance, rebuild of the weir to better handle the rock load, and weed abatement.

Table 7. Summer steelhead trap capture data from the Catherine Creek adult collection facility in 2012. Trapping began 1 March and ended 15 August.

	Trap capture		Kelt	
Week	First time	Reruns	Not punched[a]	Punched
4-Mar	0			
11-Mar	0			
18-Mar	7			
25-Mar	22			2
1-Apr	69	1		
8-Apr	19			
15-Apr	87	3		5
22-Apr	48			5
29-Apr	30	4		
6-May	13	2		
13-May	18	2	1	1
20-May	8	1		1
27-May	1		1	2
3-Jun	5		1	8
10-Jun	2		2	2
17-Jun	0			1
24-Jun	0			
1-Jul	0			1
	329	13	5	28

[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.*

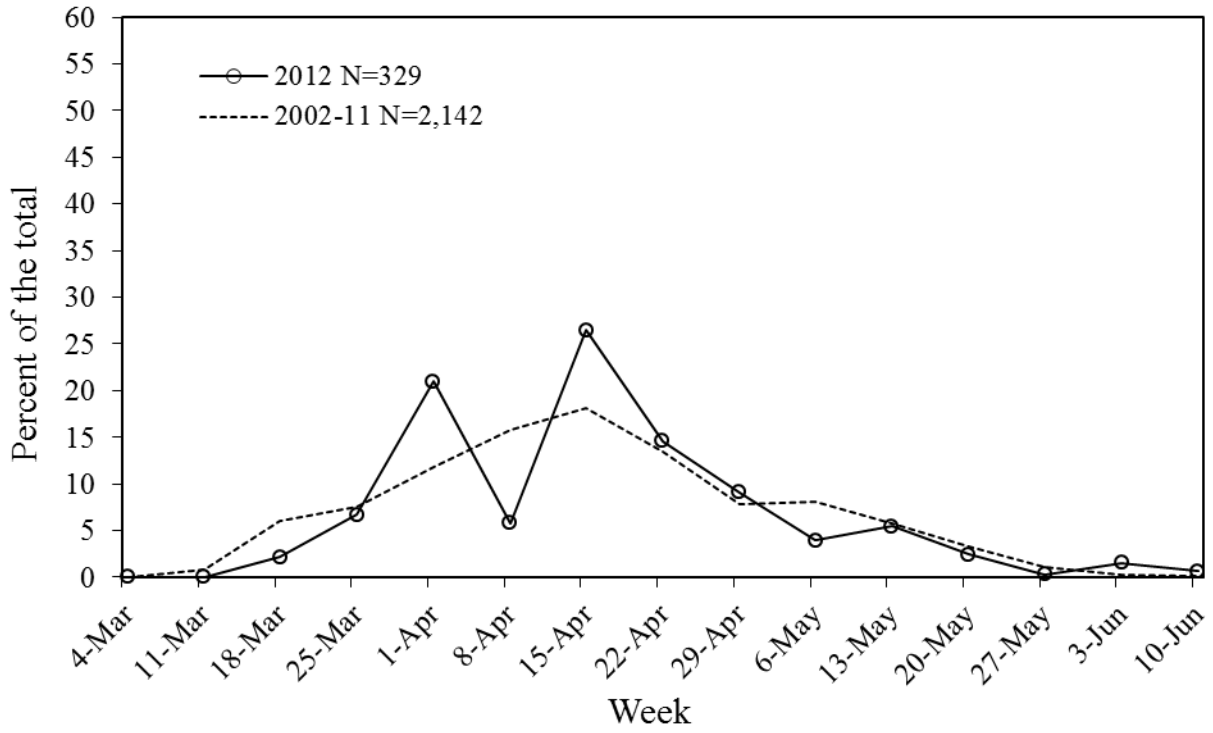

Figure 11. Summer steelhead arrival timing at the Catherine Creek adult collection facility in 2012 and mean arrival timing from 2002 to 2011.

Table 8. Spring Chinook salmon trap capture, transport, and mortality data for the Catherine Creek stock at the adult collection facility in 2012. Trapping began 1 March and ended 15 August.

	Trap capture[a]						Broodstock hauled				Trap
Week	Nat.	(jack)	Capt.	(jack)	Conv.	(jack)	Nat.	(jack)	Conv.	(jack)	mort
13-May											
20-May											
27-May			1								
3-Jun	65	1	20		27						1
10-Jun	109	4	50		126		14	1	8		
17-Jun	110	7	73	4	110	2	17	1	12		1
24-Jun	41	3	22	10	80	6	12		15	2	
1-Jul	13	2	13	8	18	4	3		2		
8-Jul	12		4	1	13		2		1		
15-Jul	7		1		6	2					
22-Jul	2		1		1						1
29-Jul	1										
5-Aug	2										
	362	17	185	23	381	14	48	2	38	2	3

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

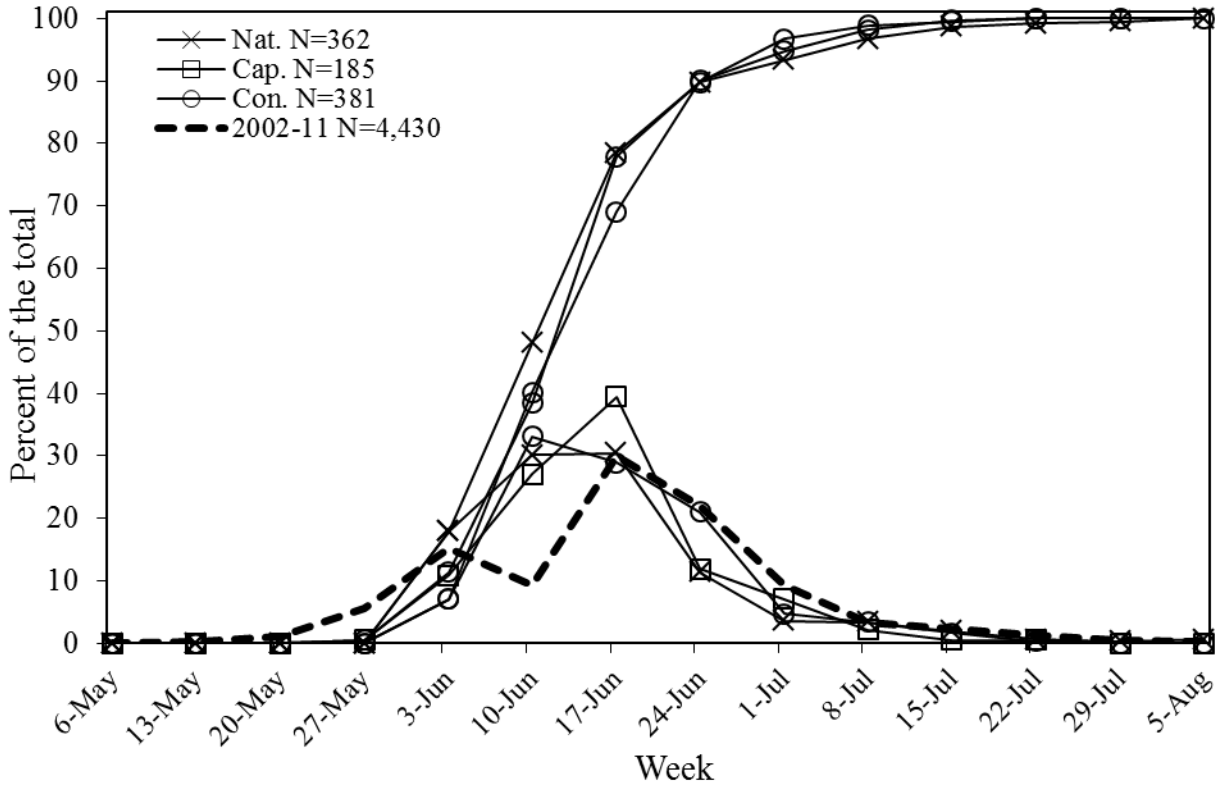

Figure 12. Arrival timing of age 4 and 5 spring Chinook salmon at the Catherine Creek adult collection facility in 2012 and mean arrival timing from 2002 to 2011.

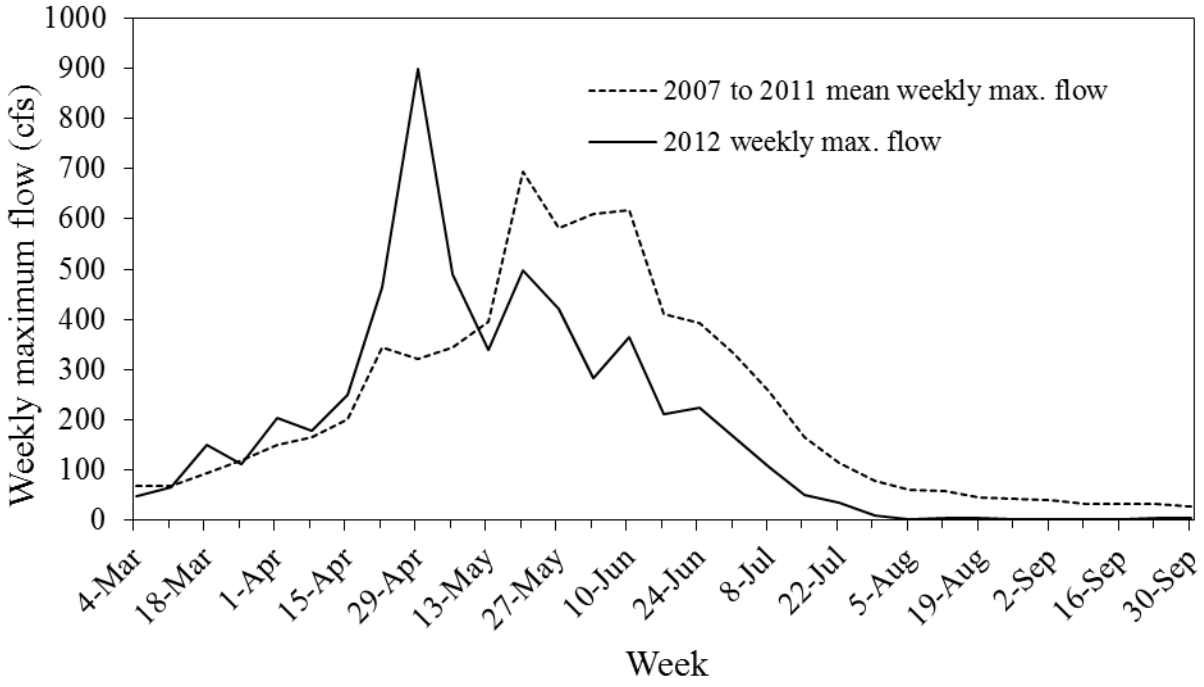

Figure 13. Weekly maximum flow (recorded daily) near the town of Union, OR in 2012(data from Oregon Water Resources Department (OWRD) website). Also shown is the mean weekly maximum flow for 2007 to 2011.

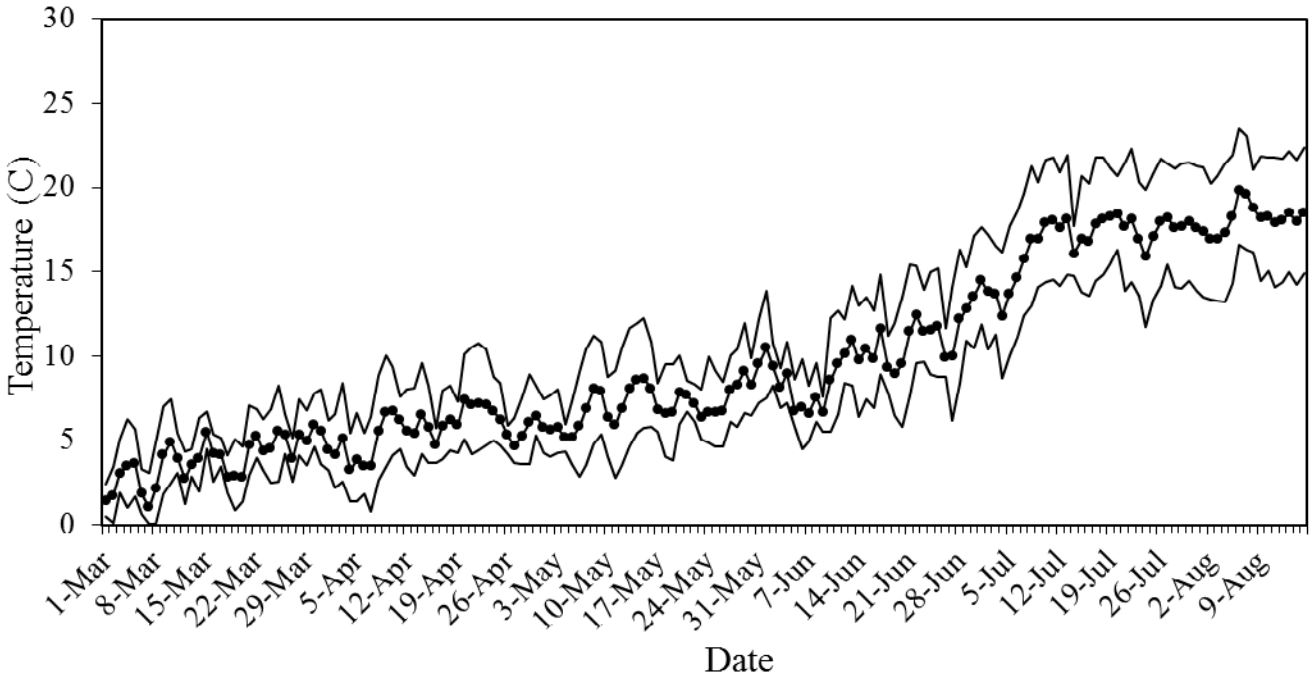

Figure 14. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Catherine Creek adult collection facility in 2012.

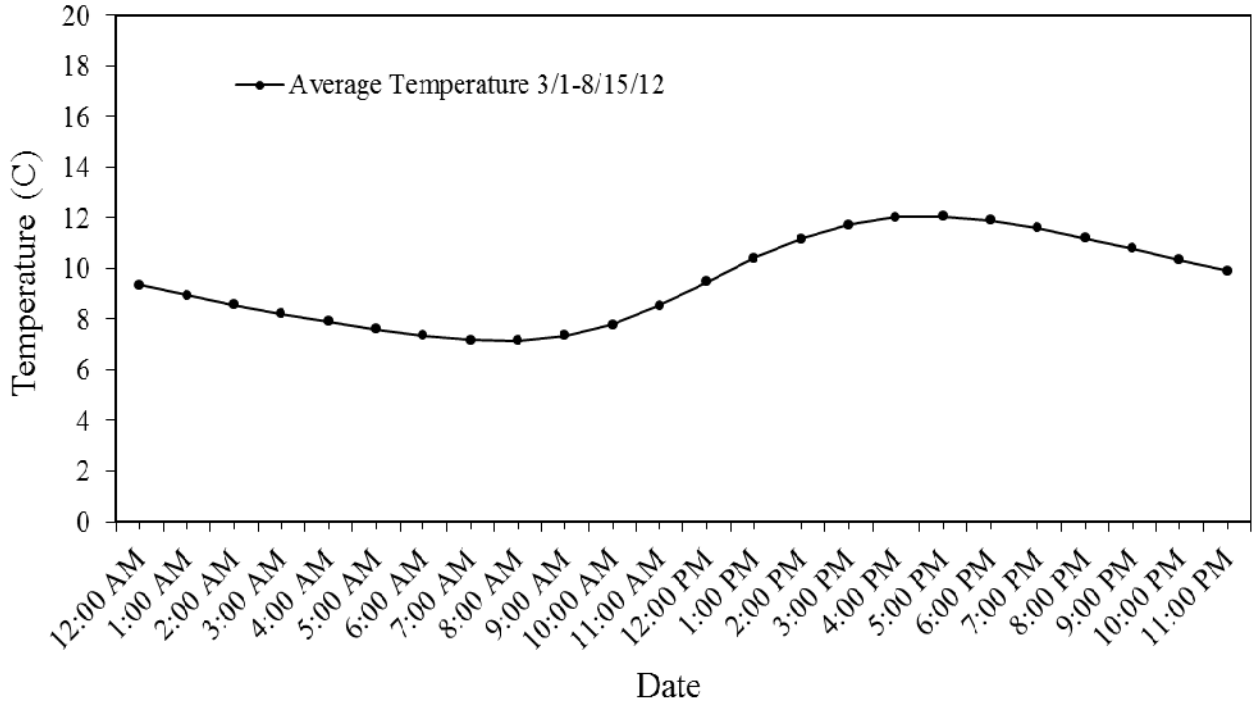

Figure 15. Average hourly water temperature at the Catherine Creek adult collection facility in 2011.

The UGRACF was moved ten miles downstream after the 2006 trapping season. This is the sixth season of trapping at the new location. There are about ten miles of spawning habitat located below the old weir location that were 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 1 March 2012. The first adult summer steelhead was captured on 12 March. A total of 13 unmarked adult summer steelhead were trapped and released from 12 March to 29 May (Table 9, Figure 16). No adipose-clipped fish were captured at the trap. Median arrival for 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 30 May 2012. A total of 674 (638 adult and 36 jack) spring Chinook salmon, were trapped from 30 May to 22 June (Table 10). The daily maximum water temperature rose above 20.0^{o}C on 21 June prompting removal of the weir for the season after the trap check on 22 June. The total catch was made up of 168 adults and 19 jacks of natural origin, 108 adults and 14 jacks from conventional broodstock, and 362 adults and 3 jacks from captive broodstock. There were an additional 17 adults and 3 jacks released above the weir that were brought from LGH on 16 August. A total of 494 adult (89 natural, 44 conventional, 361 captive) and 23 jack (17 natural, 3 conventional, 3 captive) spring Chinook salmon were released above the weir to spawn naturally. Median arrival timing for both adults and jacks trapped was the week of 17 June (Figure 17).

The trap and weir were removed from the upper Grande Ronde River on 22 June 2012 due to high stream temperature (daily maximum >20 ^{o}C). Surveys conducted by ODFW resulted in 95 redds above the weir and 2 below the weir. Based on the number of redds below the weir there did not appear to be a weir effect. There were a total of 69 adult carcasses recovered above the

weir. This was 14.0% of the total trapped and passed (494). There were 48 of the 69 fish recovered that had an opercle punch for a trap efficiency of 69.6%. The population estimate above the weir for 2012 was 707 adults (2012 Spawning Ground Survey Results, ODFW, unpublished). The spring runoff in 2012 occurred about 1 month earlier than the mean flows from 2007 to 2011 (Figure 18). The earlier runtiming observed this year may have been a direct result of the early flow. The early runoff also lead to very low summer flows in 2012 which may have affected spawning distribution. The removal of the weir early 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.

The predicted adult spring Chinook salmon return to the upper Grande Ronde River for 2012 was 2,073 (193 natural + 1,246 captive + 634 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 470 (108 conventional, 362 captive) which was 25.0% of the predicted number. The number of natural adults trapped was 168 fish which was 87.0% of the predicted number. There were 20 jacks (17 natural, 3 hatchery) and 149 males (33 natural, 116 hatchery) released above the weir (13.4% jacks). The goal of 10% jacks above the weir was exceeded due to the high number of natural jacks returning later in the run which could not be removed from the population.

The broodstock collection goal for 2012 was 160 adults and 8 jacks. The broodstock collected and transported from UGRACF consisted of both natural and conventional hatchery fish. Due to high water temperatures observed and early removal of the weir, broodstock were only collected from 30 May to 22 June 2012. A total of 79 adults and two jacks of natural origin and 81 adults and six jacks of conventional hatchery origin were transported to LGH for broodstock. The natural adults collected for broodstock comprised 47.0% of the total adult natural return trapped while 17.2% of the adult hatchery fish trapped were collected for broodstock (75.0% of just the conventional return trapped). Gender classification of adults at spawning was compared to gender classification at the weir to estimate the accuracy of sex determination at the weir. The determination of gender at the weir was 98.8% accurate (166/168). There were also 24 spring Chinook salmon with CWT but no-fin clip that returned to Lookingglass Hatchery. Four adults were retained for broodstock and 17 adults and 3 jacks were taken to the upper Grande Ronde and released. 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. All four of the adults retained for brood died before spawning.

Hourly water temperatures were taken at the UGRACF in 2012. The water temperature during the period of operation ranged from -0.1^{o}C to 23.2^{o}C on 6 March and 22 June, respectively (Figure 19). The hourly temperatures at the adult trap during the period of operation showed that the lowest water temperature usually occurred at 0800 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. We use daily maximum water temperature to estimate the removal date of the weir and adjust broodstock take accordingly.

Maintenance and repair activities conducted at the facility in 2012 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. An underground power line was also installed to get power to the storage shed. This will allow us to use EN at the UGRACF next year.

Table 9. Summer steelhead trap capture data from the Upper Grande Ronde adult collection facility in 2012. Trapping began 1 March and ended 22 June.

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

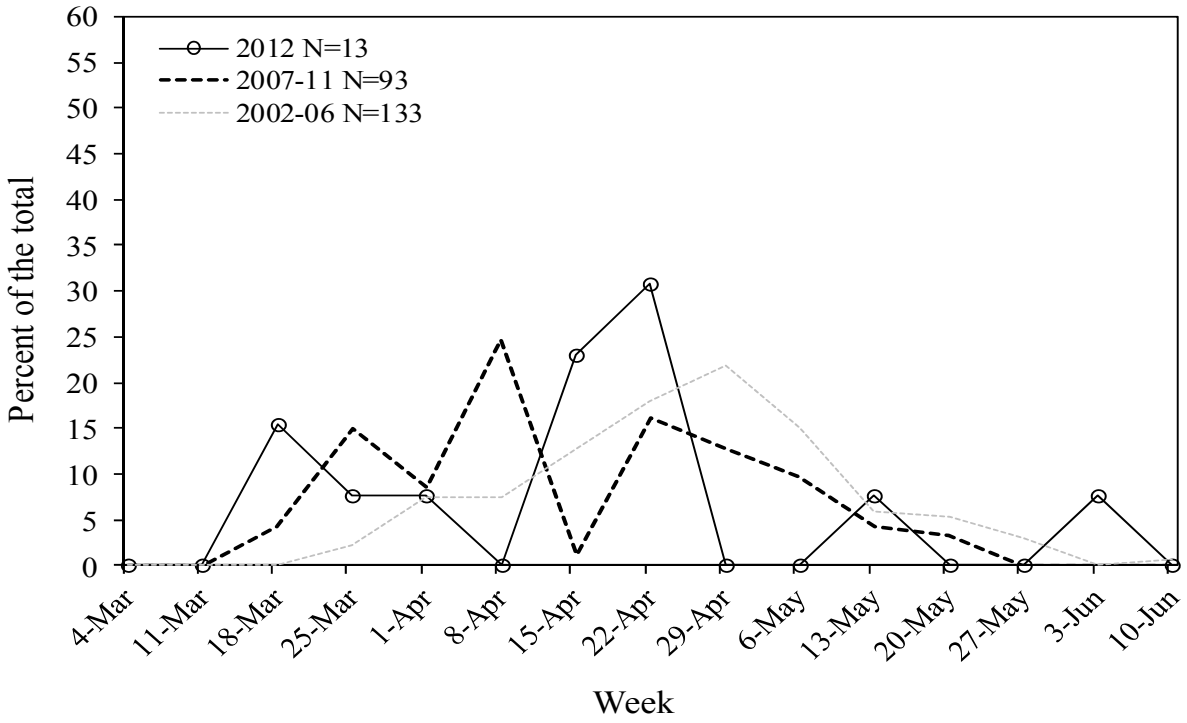

Figure 16. Summer steelhead arrival timing at the Grande Ronde adult collection facility in 2012 and for 2007-11 (rm 153.5) and mean arrival timing for 2002-06 (rm 163).

Table 10. Spring Chinook salmon trap capture, transport, and mortality data for the Grande Ronde River stock at the adult collection facility in 2012. Trapping began 1 March and ended 22 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	0		0		0						
27-May	0		0		0						
3-Jun	0		1		0						
10-Jun	69	3	179	2	29	2	32	2	29	2	
17-Jun	72	14	148	1	54	8	40		46	4	1
24-Jun	27	2	34		25	4	7		6		
1-Jul											
8-Jul											
15-Jul											
22-Jul											
29-Jul											
5-Aug											
	168	19	362	3	108	14	79	2	81	6	1

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

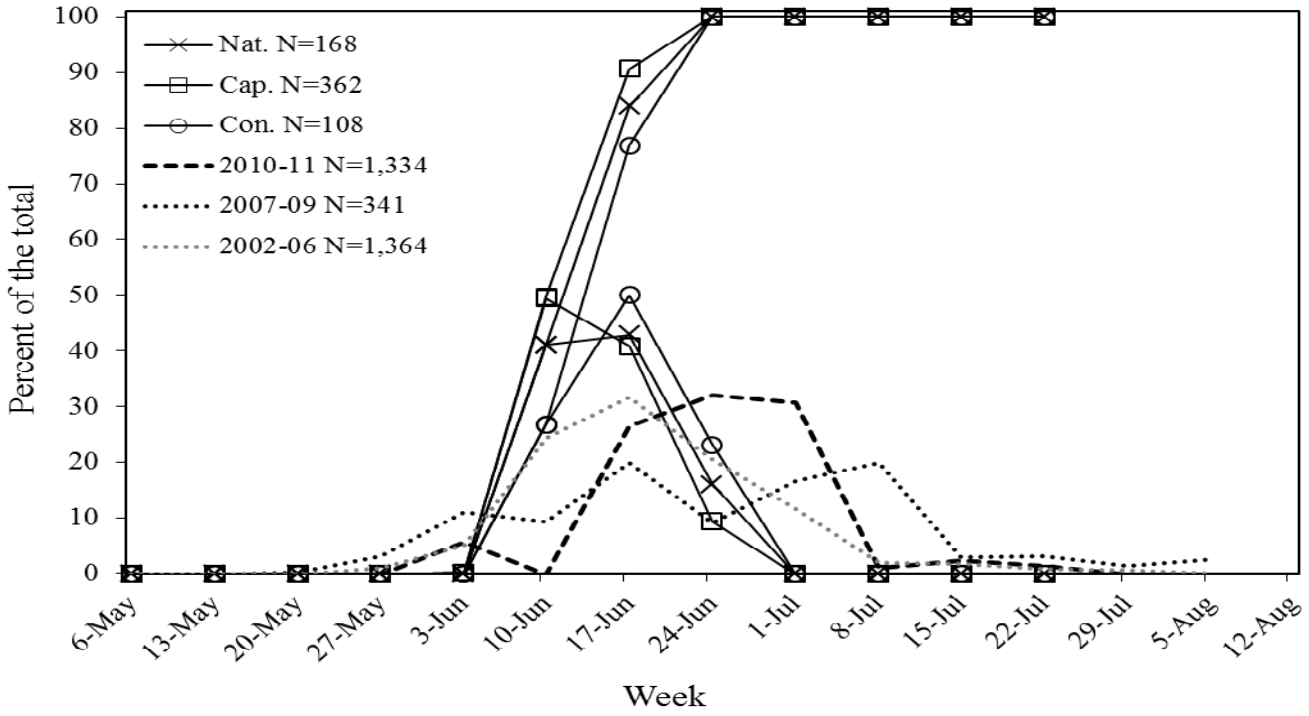

Figure 17. Arrival timing of age 4 and 5 spring Chinook salmon at the Upper Grande Ronde adult collection facility in 2012 and mean arrival timing for 2010 -11 (weir out early), 2007-10 (rm 153.5) and 2002-06 (rm 163).

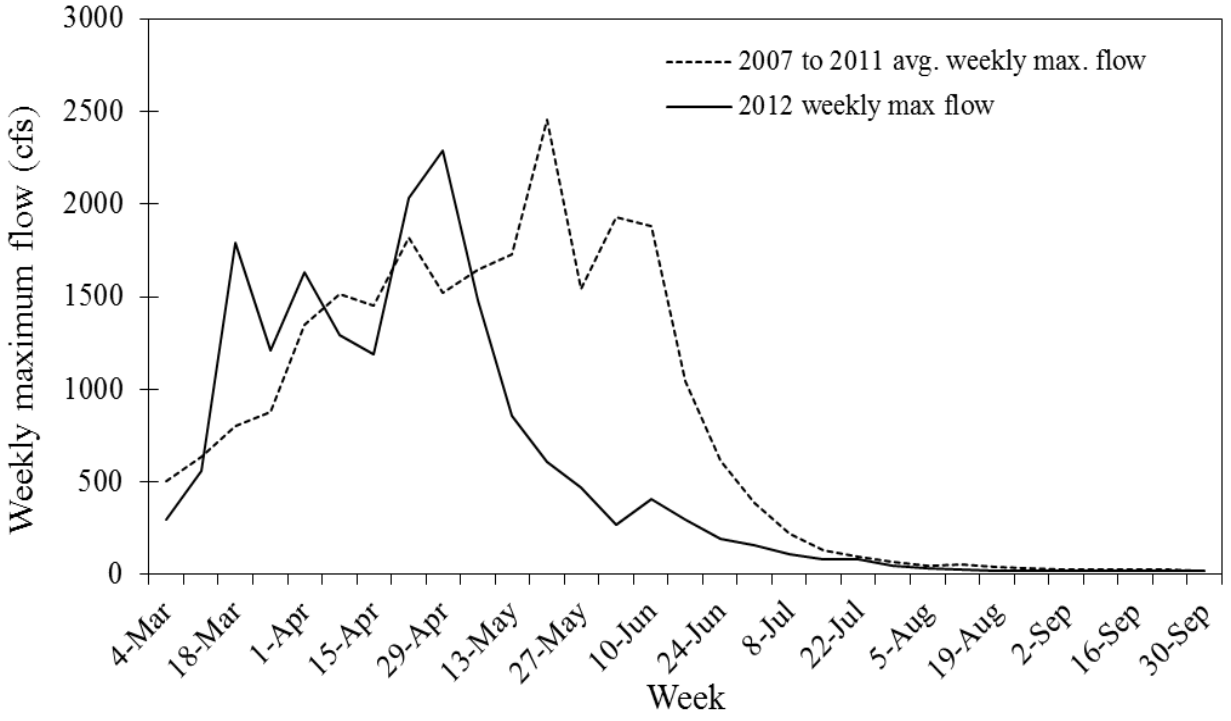

Figure 18. Weekly maximum flow (recorded daily) near the town of Perry, OR in 2012 (data from Oregon Water Resources Department (OWRD) website). Also shown is the mean weekly maximum flow for 2007 to 2011.

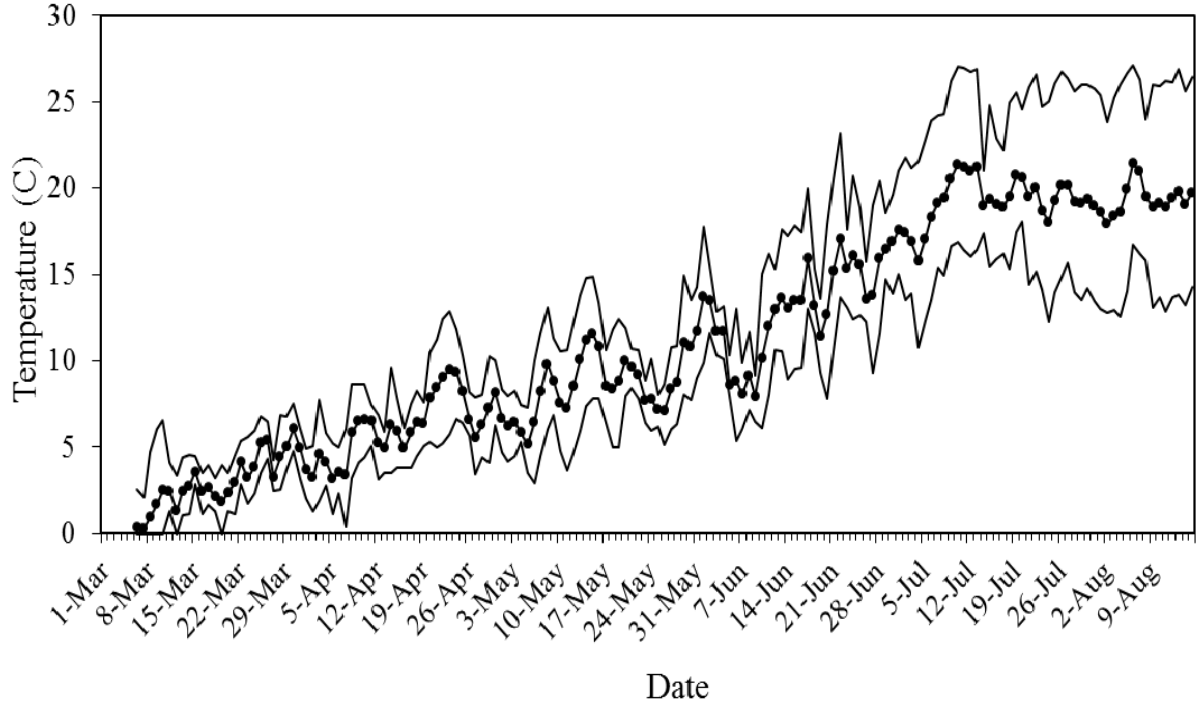

Figure 19. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Upper Grande Ronde adult collection facility in 2012.

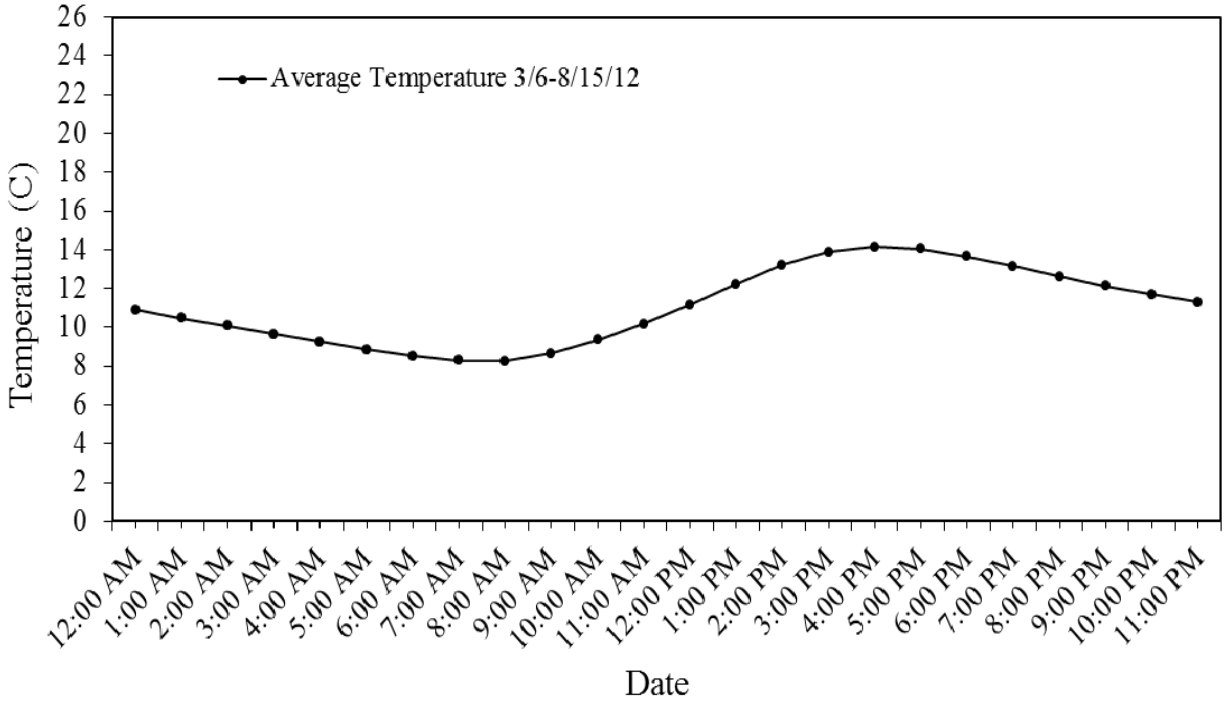

Figure 20. Average hourly water temperature at the Upper Grande Ronde adult collection facility in 2012.

Broodstock Activities

Lookingglass Hatchery

A total of 45 females, 42 males and four jacks were spawned from the Catherine Creek stock spring Chinook salmon at LGH in 2012 (Tables 11-13). Three natural and one hatchery males were spawned twice. There were two wild female and two wild male pre-spawning mortalities at the hatchery. Median spawning date at LGH occurred on 16 August (53.3% of the females by that week). This was the earliest the stock has spawned since spawning began in 2001. This date was 35 days earlier than in 2011 (Appendix Table 25). This year a point was made to keep the sliding doors to the building the fish were held in open at all times and that the overhead lights were not used. This was done to increase natural lighting and not affect the natural photoperiod if artificial lights were used at the wrong time. All 45 females spawned had ELISA values of 0.099 OD units or less.

A total of 74 females, 72 males, and six jacks were spawned from the upper Grande Ronde stock in 2012 (Tables 14-16). Three natural males spawned twice. There were 20 pre-spawn mortalities at the hatchery (8 females, 10 males, and 2 Jacks) and one killed not spawned natural male at the hatchery. Median spawning date at LGH occurred on 30 August 2012 (85.1%) compared to 1 September in 2011 (Appendix Table 25). All 74 females spawned had ELISA values of 0.110 OD units or less.

A total of 81 females, 80 males, and seven jacks were spawned for the Lookingglass Creek program in 2012 (Tables 17-19). Eight natural and one hatchery males spawned twice. There were nine pre-spawn mortalities (three female, six male) and four killed not spawned (all jacks) at the hatchery. Median spawning date occurred on 30 August (63.0%) compared to 1 September in 2011 (Appendix Table 25). All 81 females spawned had ELISA values of 0.104 OD units or less. A total of 930 adults and no jacks (835 hatchery and 95 wild adults) were released above the hatchery at the weir to spawn naturally.

The median spawn dates for fish held in the circular tanks (inside a building) appeared to be more variable than the median dates of the same stocks held in an outdoor raceway (Appendix Table 25). This would point to the type of holding tank, the lack of ambient light (circular under a cover), or the misuse of the artificial lights of the building (left on later into the evening or on earlier in the morning).

There were two upper Grande Ronde stock adults that escaped into the Lookingglass stock pond and were spawned with them. It was not possible to determine the origin of these fish. Next year we will try to prevent this from happening again by using colored zip-ties on the caudal peduncle of the different stocks applied at the first ripe sort.

In 2012 we use EN for the first time during the ripe sorts. EN was only used in the main building on upper Grande Ronde and Lookingglass stocks. The use of EN did not appear to affect the egg viability of those stocks of fish (Appendix Table 26).

Captive Broodstock

A total of 119 females, 88 males (age 3), 14 jacks (age 2), and 182 cryopreserved males were spawned from the upper Grande Ronde captive brood at BOH in 2012 (Table 20). There was one female pre-spawn mortality at the hatchery. Median spawning date at BOH occurred on 24 September (80.7% of the females). The last spawn date was 22 October.

The median spawn week for the captive broodstock is two to three weeks later than the conventional stocks spawned at Lookingglass Hatchery. This could pose a problem when outplanting adults into the wild. In 2013 we are going to bring the captive fish to Lookingglass Hatchery early in their maturation (May) in an attempt to move their spawn timing earlier in the year more similar to the fish that spawn at the hatchery and the wild.

Surplus eggs from the upper Grande Ronde captive brood safety net program were outplanted by the project into Sheep and Meadow Creeks from 1 November to 21 November 2012. A total of 160,997 eyed eggs were outplanted into Sheep Creek at locations ranging from rm 9.10 to 9.25 and 34,404 eggs into Meadow Creek at rm 2.71.

Lookingglass Hatchery transferred 300 eggs from Upper Grande Ronde stock females spawned at LGH in 2012 to BOH for the safety net captive broodstock program. This is different from past years where the eggs were taken to Wallowa Hatchery until smolt stage and then transferred to BOH.

Table 11. Spawning information from Catherine Creek spring Chinook salmon female broodstock at Lookingglass Hatchery in 2012

	Natural n=25					Hatchery n=22				
Date	Morts	Spawned	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/16	1									
16-Aug	1	14					10			
23-Aug		3					9			
30-Aug		5					1			
6-Sep		1					2			
13-Sep										
20-Sep										
27-Sep										
Totals	2	23	0	0	0	0	22	0	0	0

Table 12. Spawning information from Catherine Creek spring Chinook salmon male broodstock at Lookingglass Hatchery in 2012.

	Natural n=23					Hatchery n=17				
Date	Morts	Spawned[a]	DPS	KPS	KNS	Morts	Spawned[a]	DPS	KPS	KNS
Till 8/16										
16-Aug		10					14			
23-Aug	2	8		2			3		4	
30-Aug		4(1)	1	7			1(1)	3	3	
6-Sep		2(2)	5	1				4	1	
13-Sep										
20-Sep										
27-Sep										
Totals	2	24	6	10	0	0	18	7	8	0

[a] *The number in parentheses indicates the number of recycled fish used in the total.*

Table 13. Spawning information from Catherine Creek spring Chinook salmon jack broodstock at Lookingglass Hatchery in 2012.

	Natural n=2					Hatchery n=2				
Date	Morts	Spawned	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/16										
16-Aug										
23-Aug							1			
30-Aug		1					0			
6-Sep		1					1			
13-Sep										
20-Sep										
27-Sep										
Totals	0	2	0	0	0	0	2	0	0	0

Table 14. Spawning information from Grande Ronde spring Chinook salmon female broodstock at Lookingglass Hatchery in 2012.

	Natural n=30					Hatchery n=52				
Date	Morts	Spawned	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/16	1					2				
16-Aug	0					0				
23-Aug	0	2				0	9			
30-Aug	2	20				2	32			
6-Sep		4				1	6			
13-Sep		1								
20-Sep										
27-Sep										
Totals	3	27	0	0	0	5	47	0	0	0

Table 15. Spawning information from Grande Ronde spring Chinook salmon male broodstock at Lookingglass Hatchery in 2012.

	Natural n=44					Hatchery n=36				
Date	Morts	Spawned[a]	DPS	KPS	KNS	Morts	Spawned[a]	DPS	KPS	KNS
Till 8/16	1									
16-Aug	0									
23-Aug	0	6					4			
30-Aug	4	23(2)			1	2	24			
6-Sep	1	10	3	17		2	3			
13-Sep		1(1)	1	7			1	1		
20-Sep										
27-Sep										
Totals	6	40	4	24	1	4	32	1	0	0

[a] *The number in parentheses indicates the number of recycled fish used in the total.*

Table 16. Spawning information from Grande Ronde spring Chinook salmon jack broodstock at Lookingglass Hatchery in 2012.

	Natural n=2					Hatchery n=6				
Date	Morts	Spawned[a]	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/16						1				
16-Aug										
23-Aug							1			
30-Aug	1						4			
6-Sep		1								
13-Sep										
20-Sep										
27-Sep										
Totals	1	1	0	0	0	1	5	0	0	0

Table 17. Spawning information from Lookingglass Creek spring Chinook salmon female broodstock at Lookingglass Hatchery in 2012.

	Natural n=25					Hatchery n=59				
Date	Morts	Spawned	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/16						1				
16-Aug										
23-Aug		3					5			
30-Aug		8				1	35			
6-Sep	1	12					13			
13-Sep		1					3			
20-Sep							1			
27-Sep										
Totals	1	24	0	0	0	2	57	0	0	0

Table 18. Spawning information from Lookingglass Creek spring Chinook salmon male broodstock at Lookingglass Hatchery in 2012.

	Natural n=22					Hatchery n=55				
Date	Morts	Spawned[a]	DPS	KPS	KNS	Morts	Spawned[a]	DPS	KPS	KNS
Till 8/16						1				
16-Aug						0				
23-Aug	1	3				0	5			
30-Aug	0	13		1		1	30		3	
6-Sep	1	4				2	16		2	
13-Sep		8(8)	6				0		3	
20-Sep							1(1)	1		
27-Sep										
Totals	2	28	6	1	0	4	52	1	8	0

[a] *The number in parentheses indicates the number of recycled fish used in the total.*

Table 19. Spawning information from Lookingglass Creek spring Chinook salmon jack broodstock at Lookingglass Hatchery in 2012.

	Natural n=3					Hatchery n=8				
Date	Morts	Spawned	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/16										
16-Aug										
23-Aug										
30-Aug							1			1
6-Sep		2					4			0
13-Sep					1					2
20-Sep										
27-Sep										
Totals	0	2	0	0	1	0	5	0	0	3

Table 20. Spawning information from Grande Ronde captive broodstock at Bonneville Hatchery in 2012[a].

Spawn week	Females n=120			Age 3+ males n=87			Age 2 males n=14			Cryo males n=178
	Morts	Spawned	KNS	Morts	Spawned	KNS	Morts	Spawned	KNS	Spawned[b]
3-Sep		1			2			0		0
10-Sep		10			8			0		16
17-Sep	1	44			32			4		68
24-Sep		41			26			8		63(2)
1-Oct		20			17			2		28(2)
8-Oct		2			2			0		4
15-Oct		0			0			0		0
22-Oct		1			1			0		3
Totals	1	119	0	0	88	0	0	14	0	182

[a] *All production from captive brood will be 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. 2012. 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 2012 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
CC 12	Single con	106,939	21.8	4	0.55	0.05	278	106,882

[a] *Single= one acclimation period. Early=1st of 2 groups. Late= 2nd of 2 groups.*

Appendix Table 3. Group, number, size, raceways, mortality, feed fed, and numbers released from the Upper Grande Ronde acclimation facility 2000 to 2012 release years.

Facility/ rel. yr	Groupa	Number received	Size fish/lb.	Raceways used	Density lbs/ft3	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	100,523
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
GR 12	Early con	73,402	23.0	2	0.72	0.16	86	73,286
GR 12	Single con	73,402	23.0	2	0.72	0.13	38	73,303
GR 12	Late con	72,211	20.5	2	0.79	0.03	47	72,192

[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 2012 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
CC 12	Single con	3/20 – 4/14	3/22	0.5	8.1	11.0	13.6	53,377	49.9

[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 force out from the Catherine Creek facility. Actual PIT tags detected during the volitional release period were 290; tags detected during the force out 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 2012 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
GR 12	Early con	3/19 – 4/2	3/21	0.0	5.0	7.9	9.2	17,100	23.3
GR 12	Single con	3/19 – 4/14	3/22	0.0	6.2	7.9	9.3	5,800	7.9
GR 12	Late con	4/4 – 4/14	4/9	-0.1	6.2	8.1	9.3	9,545	13.2

[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 force out from the Catherine Creek facility. Actual PIT tags detected during the volitional release period were 290; tags detected during the force out were 6,862.*

Appendix Table 6. Release and return summary for spring Chinook salmon from Catherine Creek 1998 to 2010 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	Unk	--
2007	Acc.	Smolt	Conventional ad	138,843	90	115	38	0.18
2008	Acc.	Smolt	Captive ad	34,111	57	185		
2008	Acc.	Smolt	Conventional ad vie	110,242	77	343		
2009	Acc.	Smolt	Captive ad	96,738	23			
2009	Acc.	Smolt	Conventional ad vie	58,737	14			
2010	Acc.	Smolt	Conventional ad	106,882				
2010	Dir.stream	Smolt	Conventional ad	54,492				

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 2012 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	Dir. stream	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	Dir. stream	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	7	0.13
2007	Acc.	Smolt	Conventional cwt	94,148	13[e]	60	13	0.09
2008	Acc.	Smolt	Captive ad	190,531	45	355		
2008	Acc.	Smolt	Conventional cwt	41,819	43	95		
2009	MeadowCr	Egg	Captive	143,349	Unk			
2009	Acc.	Smolt	Captive ad	53,114	3			
2009	Acc.	Smolt	Conventional cwt	189,268	14			
2010	MeadowCr	Egg	Captive	251,107				
2011	MeadowCr	Egg	Captive	96,885				
2011	SheepCr	Egg	Captive	103,365				
2010	Acc.	Smolt	Conventional ad	218,781				
2010	Dir.stream	Smolt	Conventional ad	66,956				

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, 2011, and 2012 due to high stream temperature . 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 2010 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	34	0.40
2008	Hat.	Smolt	Conv.	262,911	639	915		
2009	Hat.	Smolt	Conv.	102,828	59			
2010	Hat.	Smolt	Conv.	228,565				

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 2012 (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
2012	362	185	381	631	689	91.7	238	1	48	0	38

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 2012 (does not include jack salmon).

	Adults captured			Passed	Est.	Trap	Redds		Adult broodstock taken		
Year	Nat.	Capt.	Conven.	above	above	eff.	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
2012	168	362	108	477	707	69.6	95	2	79	0	81

Appendix Table 11. Adult trapping, broodstock and redd counts for spring Chinook salmon from Lookingglass Creek 2004 to 2012 (does not include jack salmon)(Trap operated by ODFW Lookingglass Hatchery).

	Adults captured			Passed	Est.	Trap	Redds		Adult broodstock taken	
Year	Nat.	Hat.	Stray	above	above	eff.	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
2012	142	949	22	930	1016	91.6	314	133	47	112

Appendix Table 12. Daily summer steelhead trapping data from the Catherine Creek adult collection facility in 2012.

		Trapped		Sacrificed/mortality		Recaptures at trap	
DATE	TOTAL	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
14-Mar	3	0	3	0	0	0	0
16-Mar	4	0	4	0	0	0	0
19-Mar	19	0	19	0	0	0	0
21-Mar	0	0	0	0	0	0	0
23-Mar	3	0	3	0	0	0	0
26-Mar	15	0	15	0	0	0	0
28-Mar	9	0	9	0	0	0	0
30-Mar	17	0	17	0	0	0	1
MAR	70	0	70	0	0	0	1
1-Apr	28	0	28	0	0	0	0
2-Apr	7	0	7	0	0	0	0
4-Apr	11	0	11	0	0	0	0
6-Apr	1	0	1	0	0	0	0
9-Apr	26	0	26	0	0	0	0
11-Apr	27	0	27	0	0	0	3
12-Apr	14	0	14	0	0	0	0
13-Apr	14	0	14	0	0	0	0
14-Apr	6	0	6	0	0	0	0
16-Apr	14	0	14	0	0	0	0
17-Apr	0	0	0	0	0	0	0
18-Apr	12	0	12	0	0	0	0
19-Apr	22	0	22	0	0	0	0
23-Apr	24	0	24	0	0	0	3
25-Apr	4	0	4	0	0	0	0
27-Apr	2	0	2	0	0	0	1
APR	212	0	212	0	0	0	7

Appendix Table 12 (cont.). Daily summer steelhead trapping data from the Catherine Creek adult collection facility in 2012.

		Trapped		Sacrificed/mortality		Recaptures at trap	
DATE	TOTAL	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
1-May	0	0	0	0	0	0	0
2-May	10	0	10	0	0	0	1
3-May	0	0	0	0	0	0	0
4-May	3	0	3	0	0	0	1
5-May	0	0	0	0	0	0	0
6-May	0	0	0	0	0	0	0
7-May	4	0	4	0	0	0	1
8-May	0	0	0	0	0	0	0
9-May	7	0	7	0	0	0	0
10-May	0	0	0	0	0	0	0
11-May	7	0	7	0	0	0	1
13-May	0	0	0	0	0	0	0
14-May	5	0	5	0	0	0	0
16-May	1	0	1	0	0	0	1
17-May	0	0	0	0	0	0	0
18-May	2	0	2	0	0	0	0
20-May	0	0	0	0	0	0	0
25-May	1	0	1	0	0	0	0
29-May	3	0	3	0	0	0	0
MAY	43	0	43	0	0	0	5
1-Jun	2	0	2	0	0	0	0
2-Jun	0	0	0	0	0	0	0
3-Jun	0	0	0	0	0	0	0
5-Jun	2	0	2	0	0	0	0
6-Jun	0	0	0	0	0	0	0
8-Jun	0	0	0	0	0	0	0
12-Jun	0	0	0	0	0	0	0
29-Jun	0	0	0	0	0	0	0
JUN	4	0	4	0	0	0	0
Total	329	0	329	0	0	0	13

Appendix Table 13. Daily spring Chinook salmon trapping data from the Catherine Creek adult collection facility in 2012.

		Trapped				Sacrificed/mortality				Brood collected			
		Adults		Jacks		Adults		Jacks		Adults		Jacks	
Date	Total	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
25-May	1	1	0	0	0	0	0	0	0	0	0	0	0
29-May	1	0	1	0	0	0	0	0	0	0	0	0	0
30-May	4	2	2	0	0	0	0	0	0	0	0	0	0
May	6	3	3	0	0	0	0	0	0	0	0	0	0
1-Jun	19	4	14	0	1	0	0	0	0	0	0	0	0
2-Jun	32	14	18	0	0	0	0	0	0	0	0	0	0
3-Jun	57	27	30	0	0	1	0	0	0	0	0	0	0
4-Jun	52	26	26	0	0	0	0	0	0	5	8	0	0
5-Jun	59	31	27	0	1	0	0	0	0	0	0	0	0
6-Jun	11	8	2	0	1	0	0	0	0	0	0	0	0
7-Jun	48	27	20	0	1	0	0	0	0	3	6	0	1
8-Jun	47	31	16	0	0	0	0	0	0	0	0	0	0
9-Jun	49	30	18	0	1	0	0	0	0	0	0	0	0
10-Jun	23	23	0	0	0	0	0	0	0	0	0	0	0
11-Jun	73	51	20	0	2	0	0	0	0	7	10	0	1
12-Jun	74	48	23	1	2	1	0	0	0	0	0	0	0
13-Jun	44	29	12	2	1	0	0	0	0	0	0	0	0
14-Jun	56	29	25	1	1	0	0	0	0	0	0	0	0
15-Jun	21	5	15	0	1	0	0	0	0	5	7	0	0
16-Jun	27	16	9	2	0	0	0	0	0	0	0	0	0
17-Jun	11	5	6	0	0	0	0	0	0	0	0	0	0
18-Jun	23	18	4	1	0	0	0	0	0	8	2	1	0
19-Jun	28	19	8	0	1	0	0	0	0	0	0	0	0
20-Jun	13	5	2	5	1	0	0	0	0	4	2	1	0
21-Jun	26	19	0	7	0	0	0	0	0	0	0	0	0
22-Jun	16	4	12	0	0	0	0	0	0	3	8	0	0
23-Jun	37	26	8	2	1	0	0	0	0	0	0	0	0
24-Jun	19	11	7	1	0	0	0	0	0	0	0	0	0
25-Jun	17	9	0	8	0	0	0	7	0	0	0	0	0
26-Jun	11	5	5	0	1	0	0	0	0	2	3	0	0
28-Jun	22	12	5	4	1	0	0	0	0	0	0	0	0
30-Jun	8	5	3	0	0	0	0	0	0	0	0	0	0
JUN	923	537	335	34	17	2	0	7	0	37	46	2	2
2-Jul	17	8	9	0	0	0	0	0	0	1	2	0	0
3-Jul	7	4	2	1	0	0	0	1	0	0	0	0	0
4-Jul	2	1	1	0	0	0	0	0	0	0	0	0	0
6-Jul	4	4	0	0	0	0	0	0	0	0	0	0	0
9-Jul	12	5	5	2	0	0	0	2	0	0	0	0	0
11-Jul	3	2	1	0	0	0	0	0	0	0	0	0	0
13-Jul	1	0	1	0	0	0	0	0	0	0	0	0	0
16-Jul	3	1	2	0	0	1	0	0	0	0	0	0	0
20-Jul	1	1	0	0	0	0	0	0	0	0	0	0	0
27-Jul	1	0	1	0	0	0	0	0	0	0	0	0	0
30-Jul	1	0	1	0	0	0	0	0	0	0	0	0	0
JUL	52	26	23	3	0	1	0	3	0	1	2	0	0

Appendix Table 13 (cont.). Daily spring Chinook salmon trapping data from the Catherine Creek adult collection facility in 2012.

		Trapped				Sacrificed/mortality				Brood collected			
		Adults		Jacks		Adults		Jacks		Adults		Jacks	
Date	Total	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
1-Aug	0	0	1	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	982	566	362	37	17	3	0	10	0	38	48	2	2

Appendix Table 14. Daily summer steelhead trapping data from the Upper Grande Ronde adult collection facility in 2012.

		Trapped		Sacrificed/mortality		Recaptures at trap	
DATE	TOTAL	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
12-Mar	2	0	2	0	0	0	0
23-Mar	1	0	1	0	0	0	0
26-Mar	1	0	1	0	0	0	0
MAR	4	0	4	0	0	0	0
11-Apr	2	0	2	0	0	0	0
13-Apr	1	0	1	0	0	0	1
16-Apr	2	0	2	0	0	0	0
18-Apr	2	0	2	0	0	0	1
APR	7	0	7	0	0	0	2
7-May	1	0	1	0	0	0	0
29-May	1	0	1	0	0	0	0
MAY	2	0	2	0	0	0	0
Total	13	0	13	0	0	0	2

Appendix Table 15. Daily spring Chinook salmon trapping data from the Upper Grande Ronde adult collection facility in 2012.

		Trapped				Sacrificed/mortality				Brood collected			
		Adults		Jacks		Adults		Jacks		Adults		Jacks	
Date	Total	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
30-May	1	1	0	0	0	0	0	0	0	0	0	0	0
May	1	1	0	0	0	0	0	0	0	0	0	0	0
4-Jun	21	11	8	0	2	0	0	0	0	2	4	0	2
5-Jun	134	92	39	2	1	0	0	0	0	9	19	1	0
7-Jun	67	57	9	1	0	0	0	0	0	10	4	1	0
8-Jun	20	16	3	1	0	0	0	0	0	3	1	0	0
9-Jun	42	32	10	0	0	0	0	0	0	5	4	0	0
11-Jun	83	69	12	0	2	0	0	0	0	16	8	0	0
12-Jun	43	30	10	1	2	0	0	0	0	9	5	1	0
13-Jun	61	36	17	4	4	1	0	0	0	6	9	3	0
14-Jun	23	15	5	1	2	0	0	1	0	8	2	0	0
15-Jun	24	14	9	1	0	0	0	1	0	5	4	0	0
16-Jun	29	14	10	2	3	0	0	2	0	0	5	0	0
17-Jun	34	24	9	0	1	0	0	0	0	2	7	0	0
18-Jun	39	27	8	3	1	0	0	3	0	2	3	0	0
19-Jun	14	9	5	0	0	0	0	0	0	0	0	0	0
20-Jun	12	10	1	1	0	0	0	1	0	1	0	0	0
21-Jun	5	1	4	0	0	0	0	0	0	0	3	0	0
22-Jun	22	12	9	0	1	0	0	0	0	3	1	0	0
JUN	673	469	168	17	19	1	0	8	0	81	79	6	2
Total	674	470	168	17	19	1	0	8	0	81	79	6	2

Appendix Table 16. Daily summer steelhead trapping data from the Lookingglass Creek adult collection facility in 2012.

		Trapped		Sacrificed/mortality		Recaptures at trap	
Date	Total	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
12-Mar	3	0	3	0	0	0	0
14-Mar	2	1	1	1	0	0	0
16-Mar	6	0	6	0	0	0	0
19-Mar	10	0	10	0	0	0	0
21-Mar	5	0	5	0	0	0	1
23-Mar	3	0	3	0	0	0	0
26-Mar	11	0	11	0	0	0	1
28-Mar	8	0	8	0	0	0	1
30-Mar	12	0	12	0	0	0	1
MAR	60	1	59	1	0	0	4
1-Apr	14	0	14	0	0	0	0
4-Apr	6	0	6	0	0	0	0
6-Apr	12	0	12	0	0	0	0
9-Apr	10	0	10	0	0	0	2
11-Apr	13	0	13	0	0	0	3
13-Apr	13	0	13	0	0	0	0
16-Apr	18	0	18	0	0	0	3
18-Apr	1	0	1	0	0	0	0
20-Apr	5	0	5	0	0	0	2
23-Apr	17	0	17	0	0	0	8
30-Apr	12	0	12	0	0	0	3
APR	121	0	121	0	0	0	21

Appendix Table 16 (cont.). Daily summer steelhead trapping data from the Lookingglass Creek adult collection facility in 2012.

		Trapped		Sacrificed/mortality		Recaptures at trap	
Date	Total	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
2-May	1	0	1	0	0	0	0
4-May	9	0	9	0	0	0	4
7-May	10	0	10	0	0	0	0
9-May	21	0	21	0	0	0	6
11-May	3	0	3	0	0	0	0
14-May	15	0	15	0	0	0	2
16-May	14	0	14	0	0	0	2
18-May	2	0	2	0	0	0	0
21-May	8	0	8	0	0	0	1
25-May	1	0	1	0	0	0	0
28-May	5	0	5	0	0	0	0
29-May	0	0	0	0	0	0	1
30-May	1	0	1	0	0	0	0
31-May	1	0	1	0	0	0	0
MAY	91	0	91	0	0	0	16
1-Jun	1	0	1	0	0	0	0
2-Jun	3	0	3	0	0	0	0
JUN	4	0	4	0	0	0	0
Total	276	1	275	1	0	0	41

Appendix Table 17. Daily spring Chinook salmon trapping data from the Lookingglass Creek adult collection facility in 2012.

		Trapped				Sacrificed/mortality				Brood collected			
		Adults		Jacks		Adults		Jacks		Adults		Jacks	
Date	Total	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
22-May	2	2	0	0	0	0	0	0	0	1	0	0	0
24-May	1	1	0	0	0	0	0	0	0	0	0	0	0
25-May	4	4	0	0	0	0	0	0	0	0	0	0	0
28-May	3	3	0	0	0	0	0	0	0	0	0	0	0
29-May	5	0	5	0	0	0	0	0	0	0	2	0	0
30-May	7	6	1	0	0	0	0	0	0	1	0	0	0
31-May	5	3	2	0	0	0	0	0	0	0	0	0	0
May	27	19	8	0	0	0	0	0	0	2	2	0	0
1-Jun	29	24	4	1	0	0	0	0	0	1	0	0	0
2-Jun	71	55	16	0	0	0	0	0	0	0	1	0	0
3-Jun	53	41	12	0	0	0	0	0	0	0	0	0	0
4-Jun	6	3	3	0	0	0	0	0	0	0	0	0	0
5-Jun	57	47	8	2	0	0	0	1	0	0	0	0	0
6-Jun	22	19	1	2	0	0	0	2	0	0	0	0	0
7-Jun	46	39	4	3	0	0	0	1	0	15	2	0	0
8-Jun	4	3	1	0	0	0	0	0	0	1	1	0	0
9-Jun	45	40	4	1	0	0	0	1	0	14	4	0	0
10-Jun	15	12	2	0	1	0	0	0	0	12	2	0	1
11-Jun	34	29	5	0	0	0	0	0	0	9	5	0	0
12-Jun	82	73	7	2	0	0	0	2	0	4	5	0	0
13-Jun	70	65	5	0	0	0	0	0	0	6	4	0	0
14-Jun	68	58	7	3	0	0	0	3	0	1	7	0	0
15-Jun	97	88	4	5	0	0	0	4	0	0	0	0	0
16-Jun	58	50	6	2	0	0	0	2	0	2	2	0	0
17-Jun	7	6	0	1	0	0	0	1	0	0	0	0	0
18-Jun	6	4	1	1	0	0	0	1	0	0	1	0	0
19-Jun	9	6	1	2	0	0	0	2	0	0	0	0	0
20-Jun	1	1	0	0	0	0	0	0	0	0	0	0	0
21-Jun	10	8	0	1	1	0	0	1	0	0	0	0	1
22-Jun	6	5	1	0	0	0	0	0	0	3	1	0	0
23-Jun	1	1	0	0	0	0	0	0	0	0	0	0	0
25-Jun	7	6	0	0	1	0	0	0	0	5	0	0	1
26-Jun	9	7	1	1	0	0	0	0	0	3	1	1	0
27-Jun	20	15	3	2	0	0	0	0	0	1	1	1	0
28-Jun	23	21	2	0	0	0	0	0	0	6	0	0	0
29-Jun	13	10	2	1	0	0	0	1	0	2	0	0	0
30-Jun	16	14	0	2	0	0	0	0	0	1	0	2	0
JUN	885	750	100	32	3	0	0	22	0	86	37	4	3

Appendix Table 17 (cont.). Daily spring Chinook salmon trapping data from the Lookingglass Creek adult collection facility in 2012.

		Trapped				Sacrificed/mortality				Brood collected			
		Adults		Jacks		Adults		Jacks		Adults		Jacks	
Date	Total	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
1-Jul	18	16	1	1	0	0	0	0	0	0	0	1	0
2-Jul	3	3	0	0	0	0	0	0	0	0	0	0	0
5-Jul	6	3	1	2	0	0	0	0	0	3	0	2	0
6-Jul	17	13	3	1	0	0	0	0	0	2	2	1	0
9-Jul	14	5	4	5	0	0	0	5	0	0	1	0	0
10-Jul	6	4	1	1	0	0	0	1	0	0	0	0	0
11-Jul	10	5	2	3	0	0	0	3	0	0	0	0	0
13-Jul	7	4	0	3	0	0	0	3	0	1	0	0	0
16-Jul	5	3	2	0	0	0	0	0	0	0	0	0	0
17-Jul	2	1	0	1	0	0	0	1	0	0	0	0	0
19-Jul	3	3	0	0	0	0	0	0	0	1	0	0	0
20-Jul	1	0	1	0	0	0	0	0	0	0	0	0	0
23-Jul	5	3	0	2	0	0	0	2	0	1	0	0	0
26-Jul	1	0	1	0	0	0	0	0	0	0	0	0	0
30-Jul	1	1	0	0	0	0	0	0	0	0	0	0	0
JUL	99	64	16	19	0	0	0	15	0	8	3	4	0
3-Aug	1	0	0	1	0	0	0	1	0	0	0	0	0
6-Aug	1	0	1	0	0	0	0	0	0	0	1	0	0
13-Aug	5	4	1	0	0	0	0	0	0	4	1	0	0
15-Aug	6	5	0	1	0	0	0	1	0	2	0	0	0
16-Aug	6	4	1	1	0	0	0	1	0	1	1	0	0
20-Aug	29	24	5	0	0	0	0	0	0	6	1	0	0
22-Aug	19	17	2	0	0	0	0	0	0	3	1	0	0
24-Aug	27	22	4	1	0	0	0	1	0	0	0	0	0
27-Aug	42	30	4	8	0	1	0	8	0	0	0	0	0
29-Aug	10	10	0	0	0	0	0	0	0	0	0	0	0
AUG	146	116	18	12	0	1	0	12	0	16	5	0	0
4-Sep	13	13	0	0	0	0	0	0	0	0	0	0	0
5-Sep	2	2	0	0	0	0	0	0	0	0	0	0	0
7-Sep	5	5	0	0	0	0	0	0	0	0	0	0	0
10-Sep	2	2	0	0	0	1	0	0	0	0	0	0	0
SEP	22	22	0	0	0	1	0	0	0	0	0	0	0
Total	1179	971	142	63	3	2	0	49	0	112	47	8	3

Appendix Table 18. Adult summer steelhead trapping summary from the Catherine Creek adult collection facility 1997-2012.

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
2012	329	0	329	0	0	0	13

Appendix Table 19. Adult summer steelhead trapping summary from the Upper Grande Ronde River adult collection facility 1997-2012.

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
2012	13	0	13	0	0	0	2

Appendix Table 20. Adult summer steelhead trapping summary from the Lookingglass Creek adult collection facility 1997-2012.

		Trapped		Sacrificed/mortality		Recaptures at trap	
Year	Total	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
2012	276	1	275	1	0	0	41

Appendix Table 21. Spawning data for Catherine Creek stock spring Chinook salmon at Lookingglass Hatchery 2001-2012.

		Fish spawned										Median	Mortality		
Year	Stock	NatF	HatF	NatM	recy	HatM	recy	NatJ	recy	HatJ	recy	Spawn wk	F	M	J
2001	CC	13	0	5		0		2		0		30-Aug	2	2	1
2002	CC	20	0	11		0		3		0		23-Aug	1	1	0
2003	CC	28	0	17		0		1		0		21-Aug	1	2	0
2004	CC	9	0	6		0		0		1		16-Sep	0	2	0
2005	CC	8	9	2		10		0		5		8-Sep	2	0	0
2006	CC	8	29	11		16		1		1		31-Aug	0	0	0
2007	CC	14	31	16	3	13	1	1		4		29-Aug	2	1	0
2008	CC	11	21	19	14	32	21	0		4		3-Sep	0	0	0
2009	CC	13	30	14	1	5		4		2		27-Aug	4	4	0
2010	CC	13	29	22	7	18	3	1		2		9-Sep	1	0	0
2011	CC	19	20	13	2	24	3	2		2		15-Sep	5	5	0
2012	CC	23	22	24	3	18		2		2		16-Aug	2	2	0

NatF=Natural Females, HatF=Natural Males, etc. Recy=number of fish that were spawned a second time. These are included in the total. Example 2007: NatM=16 total males, recy=3 indicates that 3 of the 16 males spawned twice. There were 13 unique individuals. Median spawn wk=the week in which 50% of the females had spawned. Mortality=total mortality for the season.

Appendix Table 22. Spawning data for Grande Ronde stock spring Chinook salmon at Lookingglass Hatchery 2001-2012.

		Fish spawned										Median	Mortality		
Year	Stock	NatF	HatF	NatM	recy	HatM	recy	NatJ	recy	HatJ	recy	Spawn wk	F	M	J
2001	GR	8	0	7		0		0		0		5-Sep	2	3	0
2002	GR	21		14		0		1		0		23-Aug	6	3	0
2003	GR	23	0	20		0		0		0		28-Aug	16	11	0
2004	GR	7	0	5		0		0		1		9-Sep	1	2	1
2005	GR	2	38	4		24	6	0		5		1-Sep	3	4	0
2006	GR	13	71	14	2	50		2		1		7-Sep	4	15	0
2007	GR	6	25	10	2	14	1	0		7		11-Sep	1	4	1
2008	GR	4	8	10	5	11	6	0		5	2	3-Sep	0	1	0
2009	GR	9	52	10	2	30	1	1		9	1	13-Aug	37	28	4
2010	GR	14	68	23	6	63	6	1		0		2-Sep	5	12	1
2011	GR	2	37	8	4	32	3	2	1	1		1-Sep	17	4	0
2012	GR	27	47	40	3	32		1		5		30-Aug	8	10	2

NatF=Natural Females, HatF=Natural Males, etc. Recy=number of fish that were spawned a second time. These are included in the total. Example 2006: NatM=14 total males, recy=2 indicates that 2 of the 14 males spawned twice. There were 12 unique individuals. Median spawn wk=the week in which 50% of the females had spawned. Mortality=total mortality for the season.

Appendix Table 23. Spawning data for Lookingglass Creek stock spring Chinook salmon at Lookingglass Hatchery 2001-2012.

		Fish spawned										Median	Mortality		
Year	Stock	NatF	HatF	NatM	recy	HatM	recy	NatJ	recy	HatJ	recy	Spawn wk	F	M	J
2004	LG	0	53	0		53		0		4		9-Sep	5	12	0
2005	LG	Fish were released above the hatchery													
2006	LG	Fish were released above the hatchery													
2007	LG	0	23	0		19	4	0		23		6-Sep	2	1	3
2008	LG	0	76	22	11	91	45	1		6	4	3-Sep	1	2	0
2009	LG	19	7	14	6	8	5	27		0		3-Sep	1	1	4
2010	LG	20	55	23		49	3	9		0		2-Sep	8	10	0
2011	LG	29	50	32	6	41	3	8		0		1-Sep	4	9	0
2012	LG	24	57	28		52	10	2		5		30-Aug	3	7	0

NatF=Natural Females, HatF=Natural Males, etc. Recy=number of fish that were spawned a second time. These are included in the total. Example 2008: NatM=22 total males, recy=11 indicates that 11 of the 22 males spawned twice. There were 11 unique individuals. Median spawn wk=the week in which 50% of the females had spawned. Mortality=total mortality for the season.

Appendix Table 24. Bulltrout trapping summary from the Catherine Creek, Upper Grande Ronde, and Lookingglass Creek adult collection facilities 1999-2012.

Year	Catherine Creek	Grande Ronde	Lookingglass Creek
1999	1	0	47
2000	1	0	49
2001	1	0	43
2002	3	0	87
2003	5	0	45
2004	7	0	42
2005	5	0	60
2006	1	2	51
2007	5	0	58
2008	4	0	58
2009	14	0	35
2010	31	0	36
2011	35	0	81
2012	56	0	126

Appendix Table 25. Median spawn dates and holding location at Lookingglass Hatchery for Catherine Creek, Grande Ronde, and Lookingglass Creek stocks 2001-2012.

Year	Catherine Creek (#fem.)	Grande Ronde (#fem.)	Lookingglass Creek (#fem.)
2001	8/30 (12) circular	9/5 (8) circular	--
2002	8/23 (20) circular	8/23 (21) circular	--
2003	8/21 (28) circular	8/28 (23) circular	--
2004	9/16 (9) circular	9/9 (7) circular	9/9 (53) raceway
2005	9/8 (17) circular	9/1 (40) circular	--
2006	8/31 (37) circular	9/7 (85) circular	--
2007	8/29 (45) raceway	9/11 (32) circular	9/6 (23) raceway
2008	9/3 (32) raceway	9/3 (12) circular	9/3 (76) raceway
2009	8/27 (43) raceway	8/13 (61) circular	9/3 (26) raceway
2010	9/9 (42) circular	9/2 (82) raceway	9/2 (75) raceway
2011	9/15 (39) circular	9/1 (39) raceway	9/1 (79) raceway
2012	8/16 (45) circular	8/30 (74) raceway	8/30 (81) raceway

Appendix Table 26. Pecent egg viability for stocks of fish spawned at Lookingglass Hatchery (mean percent viability).

Year	Catherine Creek	Grande Ronde	Lookingglass Creek	Lostine	Imnaha
2006-11	85-95 (92)	81-93 (88)	77-98 (89)	85-96 (91)	75-93 (88)
2012	87	92	94	90	80