

Grande Ronde Satellite Facilities O&M

Annual Report

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ABSTRACT

There was only one planned acclimation period at the Catherine Creek Acclimation Facility (CCAF) in 2006. A total of 68,894 smolts were delivered from Lookingglass Hatchery (LGH) to the acclimation facility on 13 March. This group contained progeny of both the captive (66%) and conventional broodstock programs. The size of the fish at delivery was 28.6 fish/lb. Volitional releases began 27 March 2006 and ended 12 April with an estimated total of 28,315 fish leaving the raceways (based on PIT tag detections of 8,625 of 20,964). This was 41.1% of the total fish delivered. Fish remaining in the raceways after volitional release were forced out. Hourly detections of PIT-tagged fish showed that most of the fish left in the afternoon (peaks around 1500 and 2000 hours). The size of the fish just before the volitional release was 26.0 fish/lb. and the size of the fish remaining just before the forced release was 22.6 fish/lb. The total mortality for the acclimation period was 74 (0.11 %). The total number of fish released from the acclimation facility was 68,820.

There was only one planned acclimation period at the Upper Grande Ronde Acclimation Facility (UGRAF) in 2006. A total of 18,986 smolts were delivered from LGH to the acclimation facility on 13 March. This group was comprised almost entirely of progeny from the conventional broodstock program (only 76 captive broodstock juveniles). The size of the fish at delivery was 29.3 fish/lb. Volitional releases began 27 March 2006 and ended 12 April with an estimated total of 10,366 fish leaving the raceways (based on PIT tag detections of 272 of 498). This was 54.6% of the total fish delivered. Fish remaining in the raceways after volitional release were forced out. Hourly detections of PIT-tagged fish showed that most of the fish left in the evening (around 1800 hours). The size of the fish just before the volitional release was 25.8 fish/lb. and the size of the fish remaining just before the forced release was 28.0 fish/lb. The total mortality for the acclimation period was 9 (0.05 %). The total number of fish released from the acclimation facility was 18,977.

Maintenance and repair activities were conducted at the acclimation facilities in 2006. Facility maintenance work consisted of snow removal, work on the intake site at both sites, widening the new gate for the CCAF, removal of gravel from intake area at UGRAF, and complete overhaul of 2 travel trailers.

The Catherine Creek Adult Capture Facility (CCACF) was put into operation on 1 March 2006. The first adult summer steelhead was captured on 8 March. A total of 171 adult summer steelhead were trapped and released from 8 March to 17 May 2006. Peak arrival at the trap was the week of 1 April. The first adult spring Chinook salmon was captured at CCACF on 29 May 2006. A total of 301 spring Chinook salmon were trapped from 29 May to 25 July 2006. The catch was comprised of 103 adults and 9 jacks unmarked, 120 adult and no jacks marked (captive stock), and 62 adult and 7 jacks marked (conventional stock). Peak arrival at the trap was the week of 10 June for the unmarked and marked fish.

Broodstock were collected systematically at CCACF over the entire return from 7 June to 17 July 2006. Twenty of the 63 adult broodstock collected and transported from CCACF to LGH were unmarked fish. About 19.4% of the naturally produced adult males and females trapped

were taken to LGH for broodstock. One jack was collected for every 5 adult males that were taken to LGH. A total of 63 age 4 and 5 and 3 age 3 fish were transported to LGH for broodstock. The hatchery component of the broodstock was 68.3%. Only conventional hatchery adults were retained for brood, no captive broodstock returns were collected for broodstock.

Two weekly spawning surveys were conducted below the weir on Catherine Creek beginning 13 July 2006. During these surveys no live or dead fish were observed. The trap was removed from Catherine Creek on 25 July 2006.

Temperatures at the CCACF ranged from -0.1°C on 3 March to 23.7°C on 25 July. The hourly temperatures at the adult trap during the period of operation showed that the lowest water temperatures usually occurred around 0700 hours and the highest water temperatures usually occurred around 1600 hours.

Facility maintenance work at CCACF consisted of hydraulic weir component maintenance, as well as maintenance and repair of weir panels, rock removal from the fishway, and weed abatement.

The Upper Grande Ronde Adult Collection Facility (UGRACF) was put into operation on 3 March 2006. No adult summer steelhead were captured in 2006. Two adult summer steelhead were recovered on the upstream side of the weir (1 dead female and 1 live male) on 15 and 19 June 2006. The first adult spring Chinook salmon was captured at UGRACF on 12 June 2006. A total of 206 spring Chinook salmon were trapped from 12 June to 12 July 2006. The catch was comprised of 51 adults and 5 jacks unmarked, 8 adult and no jacks marked (captive stock), and 140 adult and 2 jacks marked (conventional stock). Peak arrival at the trap for unmarked and marked fish was 24 June and 17 June respectively.

Broodstock were collected systematically at UGRACF over the entire return from 12 June to 5 July 2006. Twenty six of the 149 adult broodstock collected and transported from CCACF to LGH were unmarked fish. Ten conventional females that were originally trapped and hauled to LGH were taken back to the Grande Ronde River on 17 August after it was determined there would be excess females for production needs. About 51.0% of the naturally produced adult males and females trapped were taken to LGH for broodstock. Three (2 wild and 1 hatchery) of the 7 (5 wild and 2 hatchery) jacks trapped were taken to LGH. A total of 149 age 4 and 5 and 3 age 3 fish were transported to LGH for broodstock. The hatchery component of the broodstock was 83.1%. Only conventional hatchery adults were retained for brood, no captive broodstock returns were collected for broodstock.

On the Upper Grande Ronde River one survey was conducted from the weir to 1 mile below the weir on 13 July 2006. There were 23 live fish observed and no carcasses were recovered on this survey.

Temperatures at the UGRACF ranged from 0.0°C on 1 March to 24.2°C on 27 June. The hourly temperatures at the adult trap during the period of operation showed that the lowest water temperatures usually occurred between 0700 and 0800 hours and the highest water temperatures usually occurred between 1600 and 1700 hours.

Maintenance work at UGRACF consisted of installation and removal of the floating weir panels. Gravel was removed from under the weir panels and in front of the trapbox during the instream work window. The weir and trap was moved downstream approximately 10 miles and a new site was constructed. Instream work was completed during the instream work window. A road to the trap was constructed by contractors and electricity was brought to the site.

A total of 37 females, 27 males, and 2 jacks were spawned from the Catherine Creek stock spring Chinook salmon at LGH in 2006. The peak spawning date at LGH occurred on 31 August. A total of 84 females, 66 males, and 3 jacks from the Grande Ronde stock were spawned at LGH in 2006. The peak spawning date at LGH occurred on 7 September. No adults were spawned from the Lookingglass Creek stock in 2006. All of the 41 adults captured at the Lookingglass weir were released above the weir to spawn naturally.

CTUIR assisted the captive broodstock program with the collection of parr from Catherine Creek and the Upper Grande Ronde River. The collection goal of 300 parr from Catherine Creek and 150 parr from the Grande Ronde River was achieved in 2006. CTUIR also assisted with the spawning of the captive broodstocks (Catherine Creek, Upper Grande Ronde, and Lostine River) at Bonneville Hatchery in 2006.

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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 Chinook salmon programs for Grande Ronde and Imnaha rivers in Oregon. Despite these hatchery programs, natural spring Chinook populations continued to decline resulting in the National Marine Fisheries Service (NMFS) listing Snake River spring/summer Chinook salmon as "threatened" under the federal Endangered Species Act (1973) on 22 April 1992.

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

Although LGH was available as the primary production facility for spring Chinook programs in the Grande Ronde Basin, there were never any adult or juvenile satellite facilities developed in the tributary areas that were to be supplemented. An essential part of the GRESCESSP was the construction of adult traps and juvenile acclimation facilities in these tributary areas. Weirs were installed in 1997 for the collection of adult broodstock for the conventional component of the program. Juvenile facilities were built in 2000 for acclimation of the smolts produced by the captive and conventional broodstock programs and 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. The river miles were recalculated from previous annual reports by including the state ditch which was constructed in the late 1860's, and excluding the old Grande Ronde River channel that the ditch dried up.

Each facility consists of 4 portable aluminum 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 ft (2,064 ft³). The water supply for CCAF is pumped directly from Catherine Creek into the raceways using a screened submersible pump powered by a diesel powered electrical generator. The water supply for UGRAF is diverted from the Grande Ronde River into the raceways by gravity using a screened cement intake structure located about 600 ft upstream from the raceways. For both facilities the water is drained from each raceway through an 8 inch pipe back to the river below the water intake. A 26 ft travel trailer is placed at each facility to provide onsite housing for facility operators, who provided 24 hour watch and maintenance of the facility. Each facility is designed to hold 31,250 fish per raceway at 20 fish/lb and a density of 0.76 lbs/ft³. Maximum flow design for the facilities is 625 gpm/raceway.

In 2006 there is only one acclimation period for both CCAF and UGRAF. Fish are transported to the facilities from LGH by ODFW in tanker trucks. The proposed acclimation period is from the first week of March to mid-April. This time period is chosen to mimic the timing of the spring outmigration of the natural spring Chinook in the system. The fish are fed 3 days per week only when water temperatures are above 3°C at a rate ranging from 0.2 to 2.4 % body weight per day (BWD) depending on the water temperature during the acclimation period (Moore-Clark feed rate guidelines, November 1999). Fish are allowed to volitionally leave the raceways beginning 6 to 7 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. A portion of the fish at both facilities are tagged with passive integrated transponders (PIT) each year by ODFW for survival estimation at Snake and Columbia River dams. PIT tag detectors are installed on the exit pipes before the volitional release to monitor the outmigration. Mortalities are removed daily, scanned, 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 before the volitional migration began and just before the forceout, by netting 50 fish from each raceway. Project personnel completed maintenance and repair activities on facility grounds and the equipment needed to operate each of the facilities.

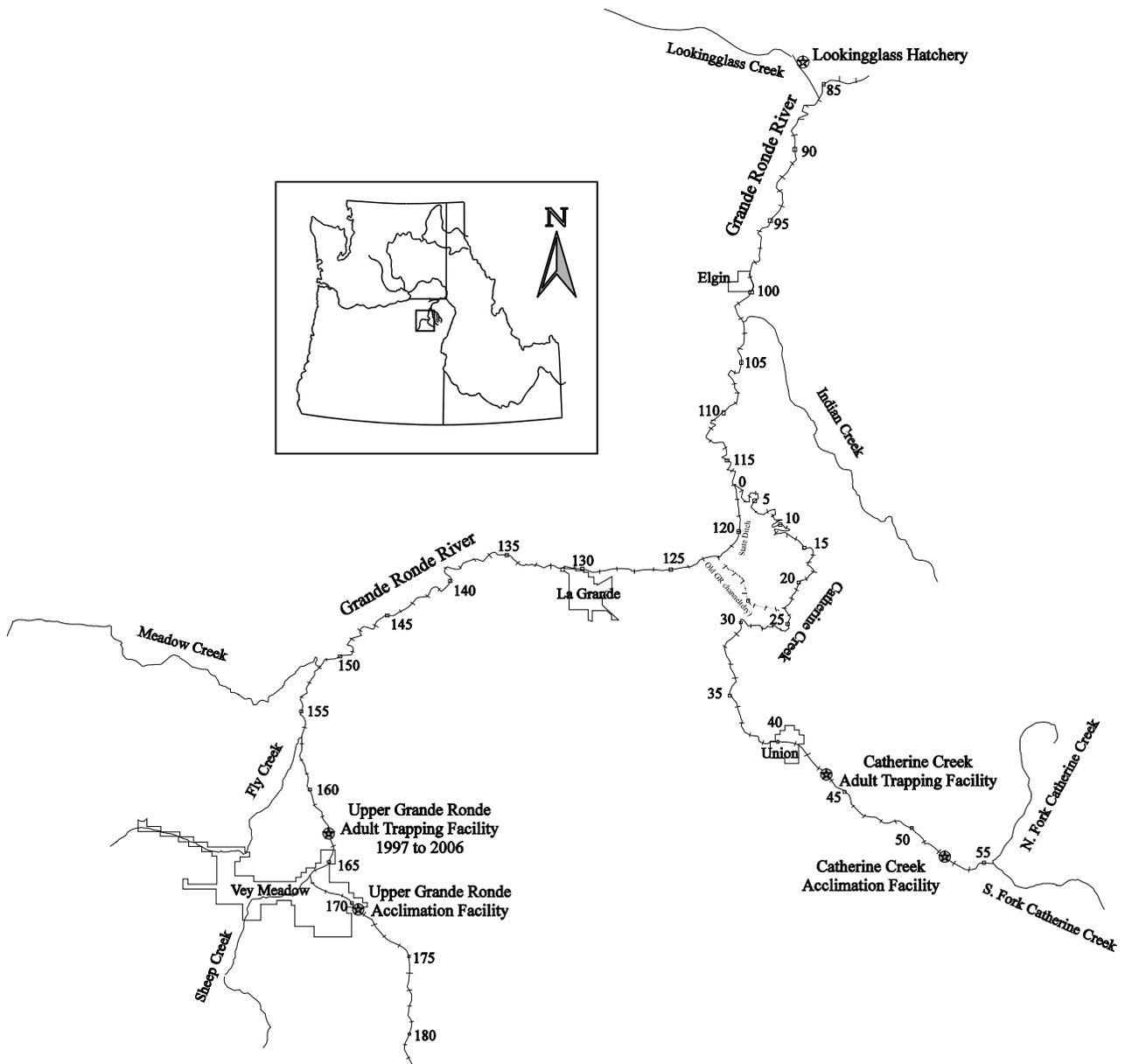


Figure 1. Map of the upper Grande Ronde River basin showing locations (rm) of Lookingglass Hatchery and Catherine Creek and Upper Grande Ronde juvenile acclimation and adult capture facilities.

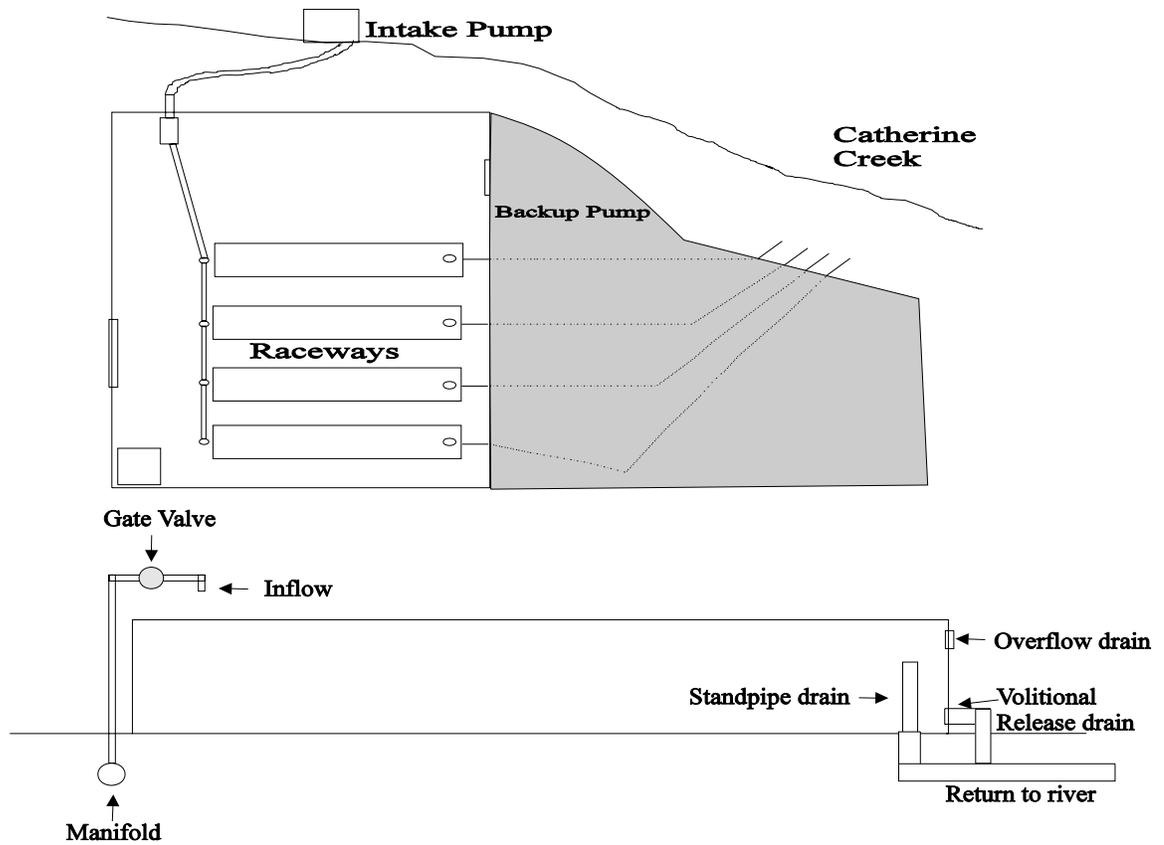


Figure 2. Diagram of the Catherine Creek acclimation facility. PIT tag reader boxes in the shaded area are underground.

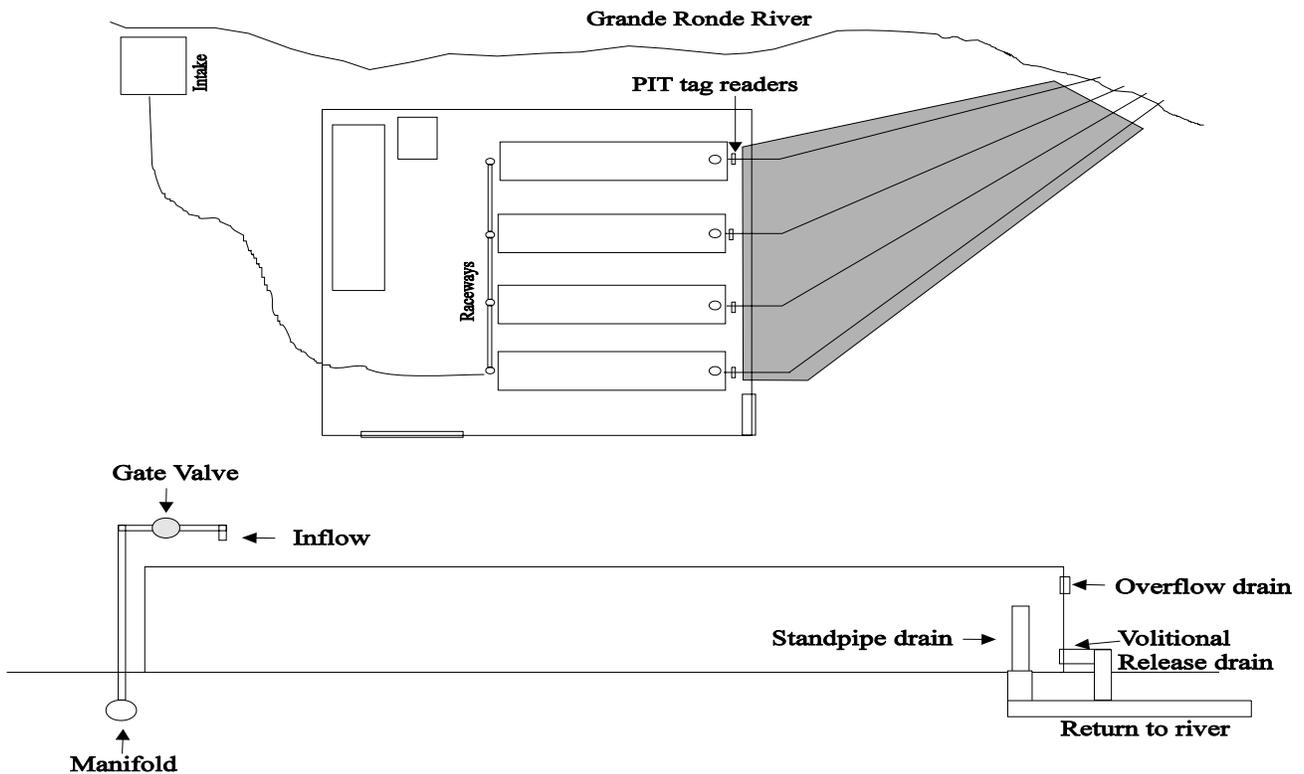


Figure 3. Diagram of the Upper Grande Ronde acclimation facility. The lines passing through the shaded area represent underground return pipes.

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 (fyke opening) and holding area that is 25 ft long, 6 ft wide, and the depth is kept at about 6 ft (900 ft³).

The Upper Grande Ronde Adult Collection Facility (UGRACF) is located at rm 163 of the Grande Ronde River (Figure 1). The facility consists of a floating weir that spans the entire stream effectively blocking upstream passage (Figure 4). Trapping of summer steelhead and spring Chinook salmon is accomplished by directing adults (age 4 and 5) and jacks (age 3) into a trapbox (fyke opening) located in the main channel near the bank that is 11 ft long, 10 ft wide, and the depth of the water in the trapbox is normally about 2.5 ft (275 ft³). The designed adult spring Chinook salmon holding capacities for these facilities is 90 at CCACF and 28 at UGRACF using 10 ft³/adult.

A travel trailer is placed at each facility after 12 April to allow for 24hr 7 day a week operation of the facility by facility operators. 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 trapboxes for hourly temperature readings. Handling events only occurred when water temperatures are below 18.3°C. Later in the season, as water temperatures rise, fish are processed earlier in the day when water temperatures are lower, in order to reduce stress. If and when the maximum water temperatures exceeded 21.1°C for three consecutive days, trapping would be discontinued and fish would be allowed to pass freely until water temperatures dropped (2006 LSRCP AOP).

During the trap checks 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 genetics samples. A single punch on the right opercle plate is used to mark the fish that are released upriver as having been trapped. Tissues from opercle punches and one additional caudal punch are collected for genetics evaluation. Tissue samples are preserved in labeled vials with 95% ethanol. Each fish is examined externally for marks, injuries or other physical conditions, and a preliminary determination of sex is made. Summer steelhead are enumerated and passed upstream. Spring Chinook salmon are collected and transported to LGH for broodstock, outplanted in another stream, or enumerated and passed upstream. Fish passed upstream are allowed to recover from handling before release. 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 (NMFS 1995, Appendix Table 1, GRBSCMP 2002). 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 spawner management. The scale is based on preseason population estimates and regulates the percentage of natural and hatchery broodstock to be retained and hatchery/wild ratios above the weir. When the ratios are applied above the weir and surplus fish are the result, these fish can be used for Lookingglass Hatchery broodstock or outplanted in Lookingglass Creek or Indian Creek. Fish collected for broodstock are taken systematically by sex and age (adult/jack). Progeny from the captive broodstock program are not to be incorporated into the conventional hatchery broodstock. This sliding scale management does not apply to the Upper Grande Ronde River.

Hatchery jack management above the weirs for Catherine Creek and the Upper Grande Ronde River is not to exceed a total of 1 jack for every 10 adult male spring Chinook passed (10%). The priority for hatchery jacks released above the weir will be for conventional jacks. When surplus jacks arrive at the weirs they are sacrificed for data collection (coded wire tag) and if the fish quality is good then the fish are saved for ceremonial and subsistence uses.

Fish collected for broodstock and transported to LGH before 15 July 2006, received prophylactic dorsal sinus injections of oxytetracycline and erythromycin upon loading. Dosage of each antibiotic is based on estimated age length data (3 year fish <601mm, 4 year fish 601-799mm, 5 year fish >799). For the erythromycin injection (200mg/ml), 3-year-old fish received 0.25cc, 4-year-old fish 0.50cc, and 5-year-old fish 1.00cc. The oxytetracycline (200mg/ml) is one-half of the erythromycin injections. Injections are not given to fish taken for broodstock after 15 July due to the fact that the broodstock would be reinjected at LGH the first week in August. Fish collected and transported after reinjection would again receive injections prior to transfer.

Adults that are to be transported to LGH for holding and spawning 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 2.0 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. Live fish, carcasses, and evidence of spawning activities (redds, test digs) are recorded. When fish are accumulating in this section below the weir and daily average stream temperatures exceed 70°F (21.1°C) for three consecutive days, efforts will be made to collect and transport these fish either for broodstock (if needed) or above the weir into cooler water. ODFW staff, directed standard spawning ground surveys (Parker et al. 1995) on segments upstream and downstream of the weir in August and September and the same information is collected.

Project personnel completed maintenance and repair activities on facility grounds and the equipment needed to operate the facility.



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

Broodstock Activities

Lookingglass Hatchery

Assistance is provided to ODFW for the spawning of the Lookingglass Creek, Catherine Creek and Upper Grande Ronde River conventional broodstocks held at LGH. The Lookingglass Creek and Catherine Creek stocks are held in the outdoor adult holding pond at LGH, while the Upper Grande Ronde River broodstock are held in the captive brood building. All stocks are checked for ripeness once a week over a 5 week period beginning 17 August. Ripe females and an equal number of ripe males are placed in smaller tanks within the building so they can be kept separate from the non-ripe fish on the day of the sorting. A spawning matrix is developed immediately based on the number of ripe females and males and the sex ratio of the entire population. The most common matrix used is 2 females crossed with 2 males.

On each spawning day, the ripe females are anesthetized in the main hatchery or captive brood building using MS 222 one family group (usually 2 fish) at a time. The fish are again checked for ripeness before being dispatched by a blow to the head. The fish are placed in a rack and bled by cutting the tails. The body cavity is then opened over a bucket to catch the eggs. The eggs are then poured into a large Ziploc bag and placed in a small cooler with ice. The males are anesthetized then live spawned at the main hatchery or captive brood building. The milt is placed into cups and also placed in the cooler with the eggs. The males are marked and recycled back into the brood pond until the end of the spawning season. The cooler is then taken to the main hatchery building for completion of the matrix. Once the gametes are mixed, ODFW staff place the eggs in incubators located in the main hatchery building.

Captive Broodstock

Assistance is provided to ODFW for the collection of parr from the Grande Ronde basin in 2006. These juveniles are used for the captive broodstock program (Hoffnagle et. al. 2007). Assistance is also provided to ODFW for the spawning of the Grande Ronde Basin captive broodstocks at Bonneville Hatchery in 2006 (Hoffnagle et. al. 2007).

RESULTS AND DISCUSSION

Juvenile Acclimation

The CCAF received 68,894 smolts from LGH on 13 March 2006 (Table 1). This group contained progeny of both the captive (66%) and conventional broodstock programs. The average size of the fish at delivery was 28.6 fish/lb (Table 2). The densities in the raceways ranged from 0.33 to 0.51 lbs/ft³. The fish were allowed to volitionally leave the raceways beginning 27 March 2006 and remaining fish were forced out of the facility on 12 April after 1200 hours. During the volitional release period there was a total of 8,625 PIT-tagged fish scanned. Based on the number of PIT-tagged fish in the population (30.4%, 20,964), an estimated 28,315 fish left during this time, this was 41.1% of the fish delivered to the facility (Table 3). Of the fish that left, 47.9% left the first 5 days of the 17 day volitional release (Figure 5). Hourly detections of PIT-tagged fish showed peaks in detections at 1500 hours (11.9%) and a second peak at 2000 hours (13.6%) (Figure 6). The fish were fed a total of 197 lbs of food for the acclimation period. The total number of fish that were released from the acclimation facility in 2006 was 68,820. The size of the fish just before the volitional release began was 26.0 fish/lb. The size of the fish that were forced from the facility was 22.6 fish/lb.

The total mortality for the acclimation period was 74 (0.11 %). There was no significant fish health problems detected in the conventional or captive broodstock mortalities provided to ODFW Fish Pathology from the acclimation site. A total of nine Catherine Creek conventional smolts were examined and all nine ELISA values were ≤ 0.082 OD units indicating that these fish did not have a BKD problem. No significant levels of systemic bacteria were detected. A total of 10 captive broodstock mortalities were examined and all ten ELISA values were ≤ 0.154 OD units indicating these fish did not have a BKD problem. All were tested for virus and found to be negative. While the conventional group of fish was at Lookingglass Hatchery, IHN was detected in some mortality. All of the mortalities examined were tested for virus and found to be negative and no significant levels of systemic bacteria were detected.

The UGRAF received 18,986 smolts from LGH on 13 March 2006 (Table 1). This group was comprised almost entirely of progeny from the conventional broodstock program (only 76 captive broodstock juveniles). The average size of the fish at delivery was 29.3 fish/lb (Table 2). The densities in the raceways were 0.16 lbs/ft³. The fish were allowed to volitionally leave the raceways beginning 27 March 2006 and the remaining fish were forced from the facility on 12 April after 1200 hours. During the volitional release period there was a total of 272 PIT-tagged fish scanned. Based on the number of PIT-tagged fish in the population (2.6%, 498), an estimated 10,366 fish left during this time, this was 54.6% of the fish delivered to the facility (Table 3). Of the fish that left, 88.2% left the first 5 days of the 17 day volitional release (Figure 7). Hourly detections of PIT-tagged fish showed peak detection at 1800 hours (67.3%) (Figure 8). The fish were fed a total of 2.7 lbs of food for the acclimation period. The total number of fish that were released from the acclimation facility in 2006 was 18,977. The size of the fish just before the volitional release began was 25.8 fish/lb. The size of the fish that were forced from the facility was 28.0 fish/lb.

The total mortality for the acclimation period was 9 (0.05%). Since there was very little mortality during this acclimation period no samples were taken at the facility by ODFW Fish Pathology. Before transfer to the facility there were no significant fish health problems detected in this group of fish evidenced by mortalities taken at Lookingglass Hatchery by ODFW Fish Pathology.

Hourly water temperatures were taken at both facilities in 2006 (Figures 9-12). The water temperature at CCAF ranged from 0.2°C to 7.6 °C during the acclimation period and was usually at the lowest temperature around 0600 with the peak temperatures around 1500 (Optic Stowaway data). The water temperature at UGRAF ranged from -0.7°C to 4.5 °C during the acclimation period (manual temperatures taken at 0700 and again at 1600). The Optic Stowaway recording device failed on 10 March so no hourly temperature was taken past that point.

Maintenance and repair activities were conducted at the acclimation facilities in 2006. Facility maintenance work at the CCAF consisted of snow removal, work on the intake site, overhaul of the travel trailer and widening the new gate for the compound. Facility maintenance work at the UGRAF consisted of snow removal, removal of gravel from intake area, and complete overhaul of the travel trailer.

Table 1. Raceway fish density and flow data for Catherine Creek and the Upper Grande Ronde acclimation facilities before volitional release in 2006.

Catherine Creek Single Accl.	Raceway			
	1	2	3	4
No. of fish	28,866	23,227	16,801	EMPTY
Total lbs.	1,054	689	680	
Mortality	42	11	21	
Density lbs/ft ³	0.51	0.33	0.33	
lbs/gpm	3.29	2.15	2.13	
Flow gpm	320	320	320	
Treatment	Captive	Conventional	Captive	
Grande Ronde Single Accl.	76 captive split into 2 ponds			
No. of fish	EMPTY	9,493	9,493	EMPTY
Total lbs.		324	324	
Mortality		9	0	
Density lbs/ft ³		0.16	0.16	
lbs/gpm		0.46	0.46	
Flow gpm		700	700	
Treatment		Conventional	Conventional	

Table 2. Group, number, size, and receive and release dates of fish acclimated at Catherine Creek and the Upper Grande Ronde facilities in 2006.

Facility	Group	# Received	Size (fish/lb)	Acclimation dates	Volitional release began	# released
CCAF	Single	68,894	28.6	3/13-4/12	3/27	68,820
UGRAF	Single	18,986	29.3	3/13-4/12	3/27	18,977

Table 3. Group, feed fed, mortality, temperature, dissolved oxygen, and estimated volitional migration of fish acclimated at Catherine Creek and the Upper Grande Ronde facilities in 2006.

Facility	Group	Feed fed(lb.)	Total mort. (%)	Temp. °C		DO mg/l		Volitional migration	
				Min.	Max.	Min.	Max.	Number	%
CCAF	Single	197	74 (0.11)	0.2	7.6	9.0	11.4	28,311	41.1
UGRAF	Single	2.7	9 (0.05)	-0.7 ^a	4.5 ^a	10.3	12.8	10,461	55.1

^a The ONSET temperature data recorder failed. The temperatures were recorded manually by technicians in the morning hours for feed requirements (mean temp. was 0.8 °C).

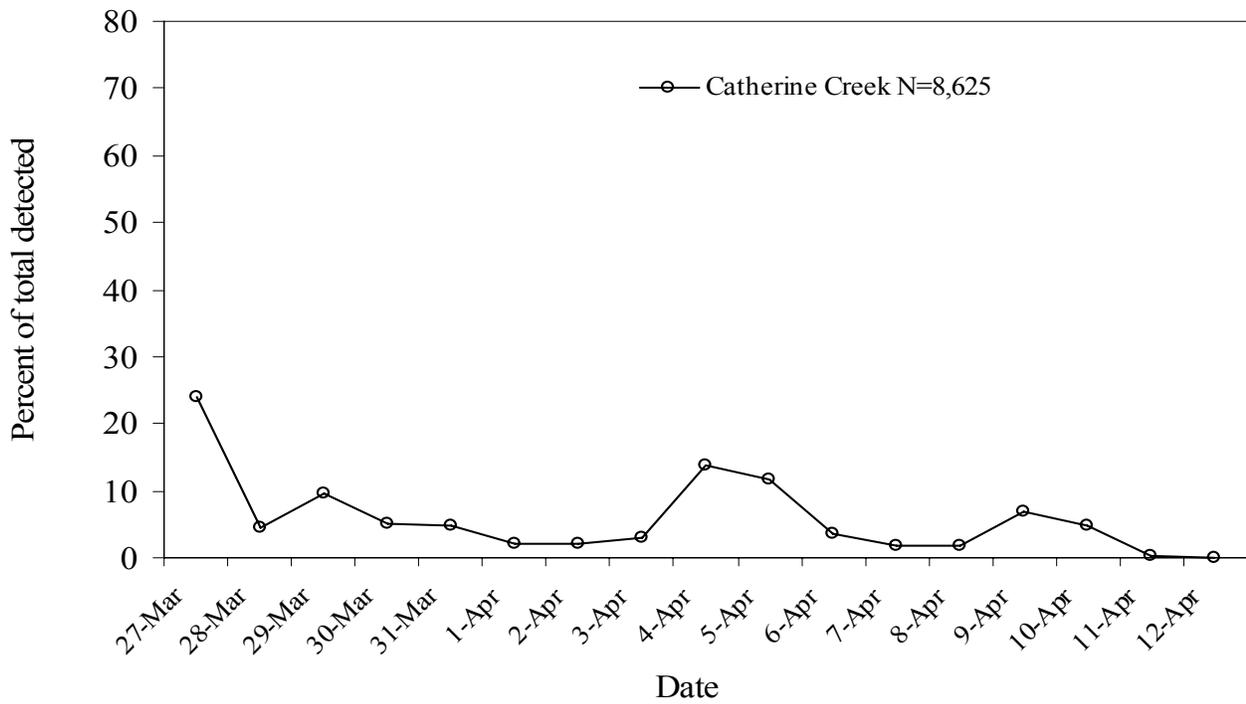


Figure 5. Daily PIT tag detections of fish leaving the raceways during the volitional release period at the Catherine Creek acclimation facility in 2006.

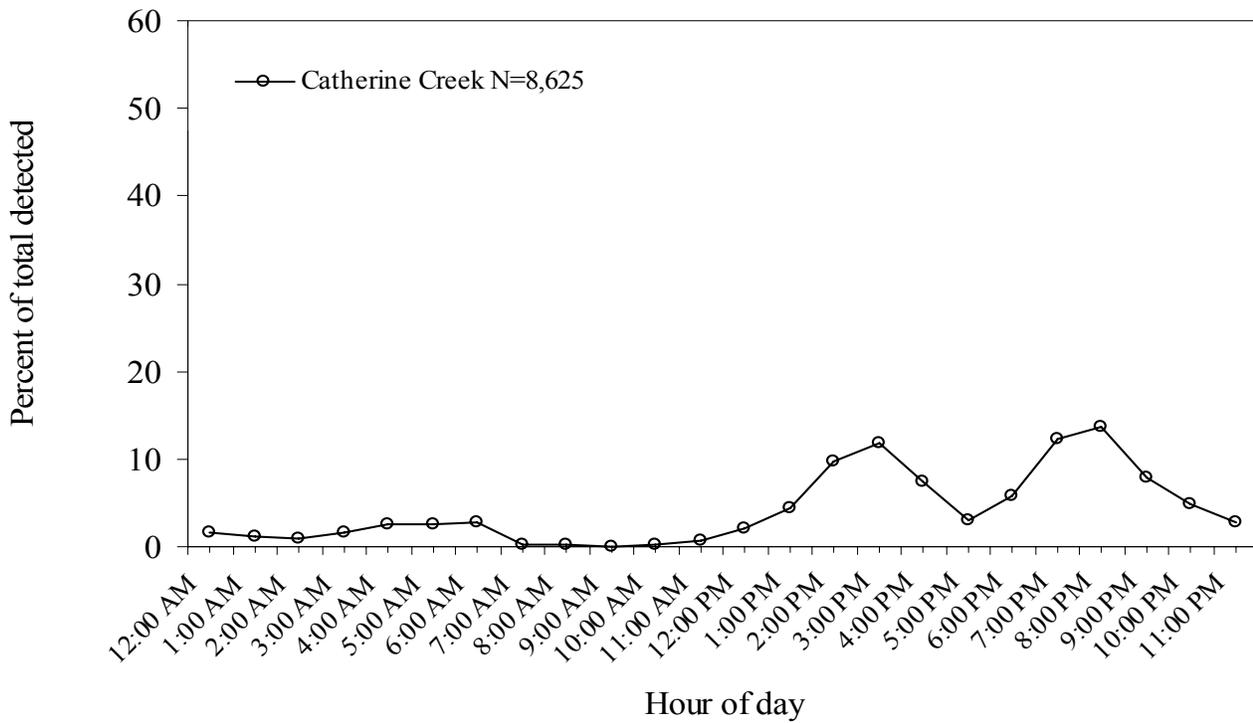


Figure 6. Hourly PIT tag detections of fish leaving the raceways during the volitional release period at the Catherine Creek acclimation facility in 2006.

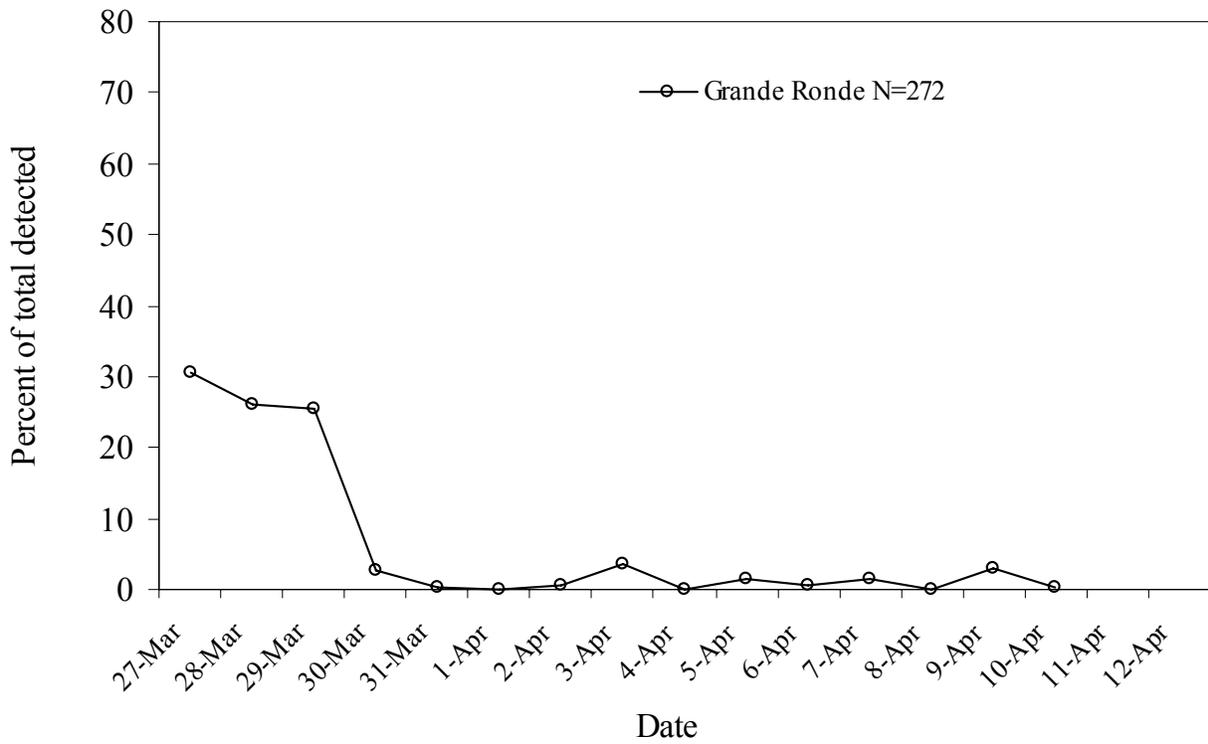


Figure 7. Daily PIT tag detections of fish leaving the raceways during the volitional release period at the Grande Ronde acclimation facility in 2006.

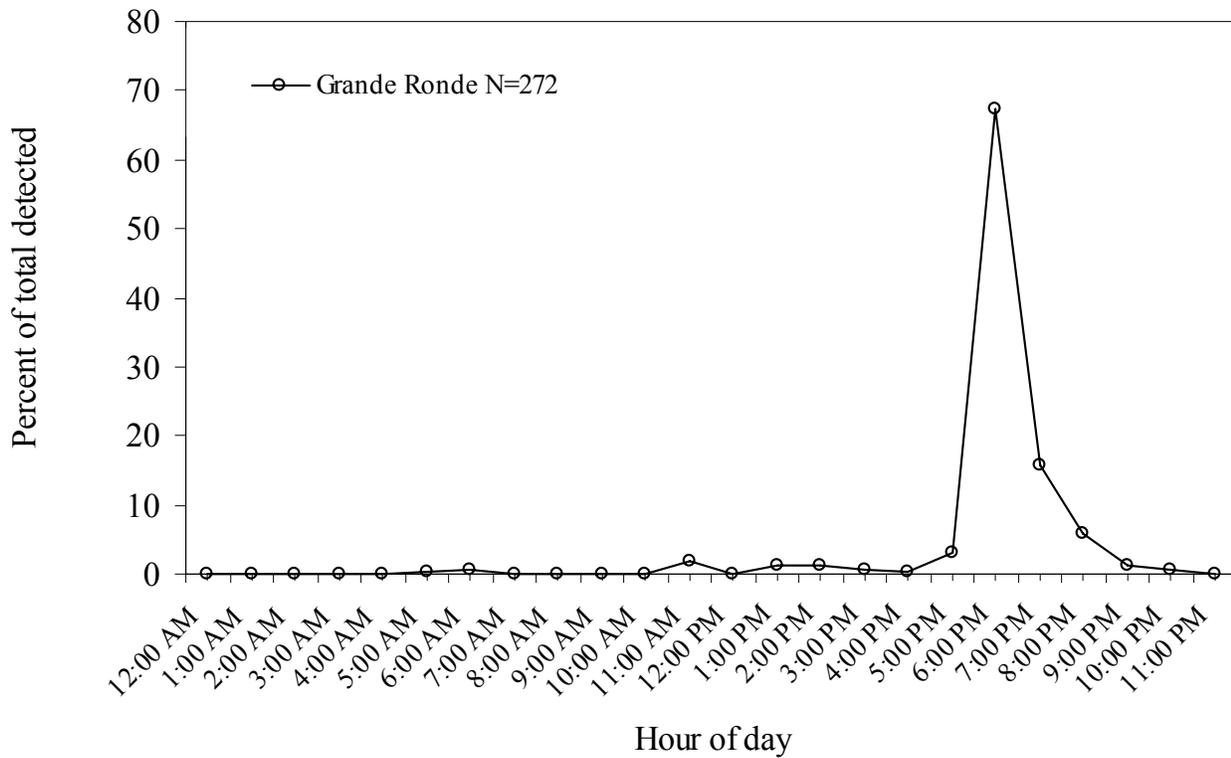


Figure 8. Hourly PIT tag detections of fish leaving the raceways during the volitional release period at the Grande Ronde acclimation facility in 2006.

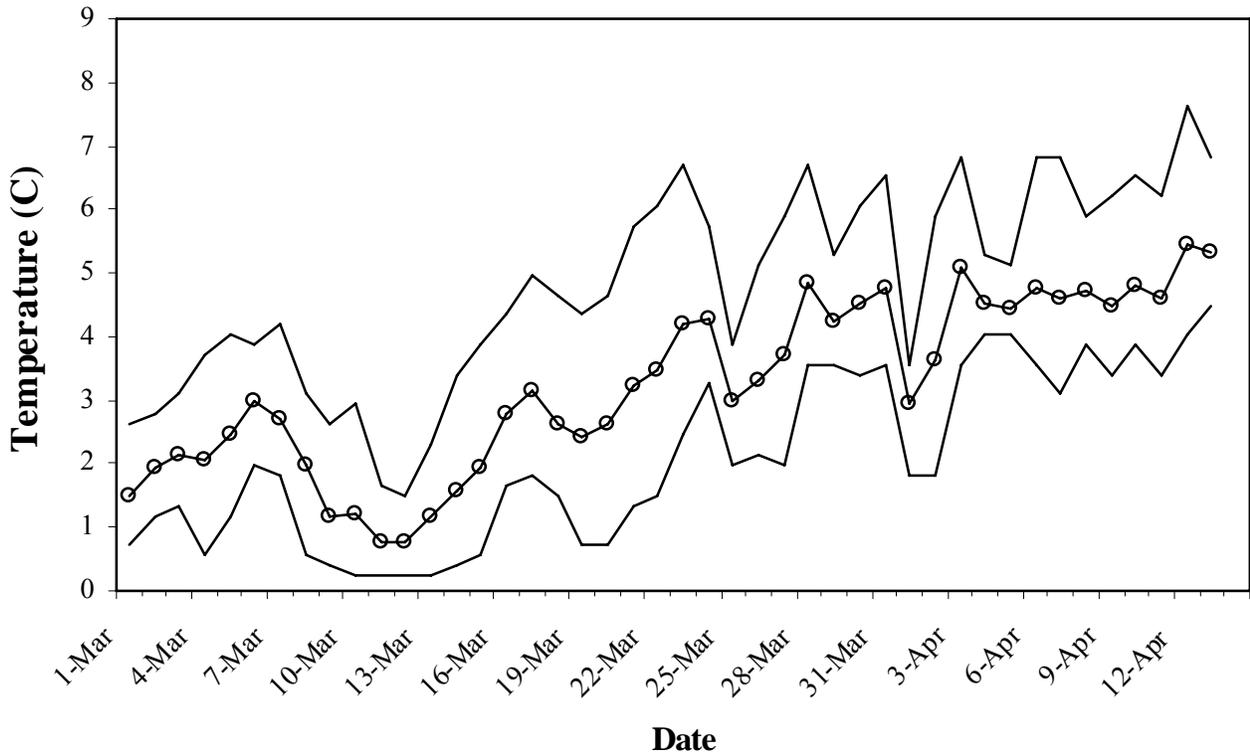


Figure 9. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Catherine Creek juvenile acclimation facility in 2006.

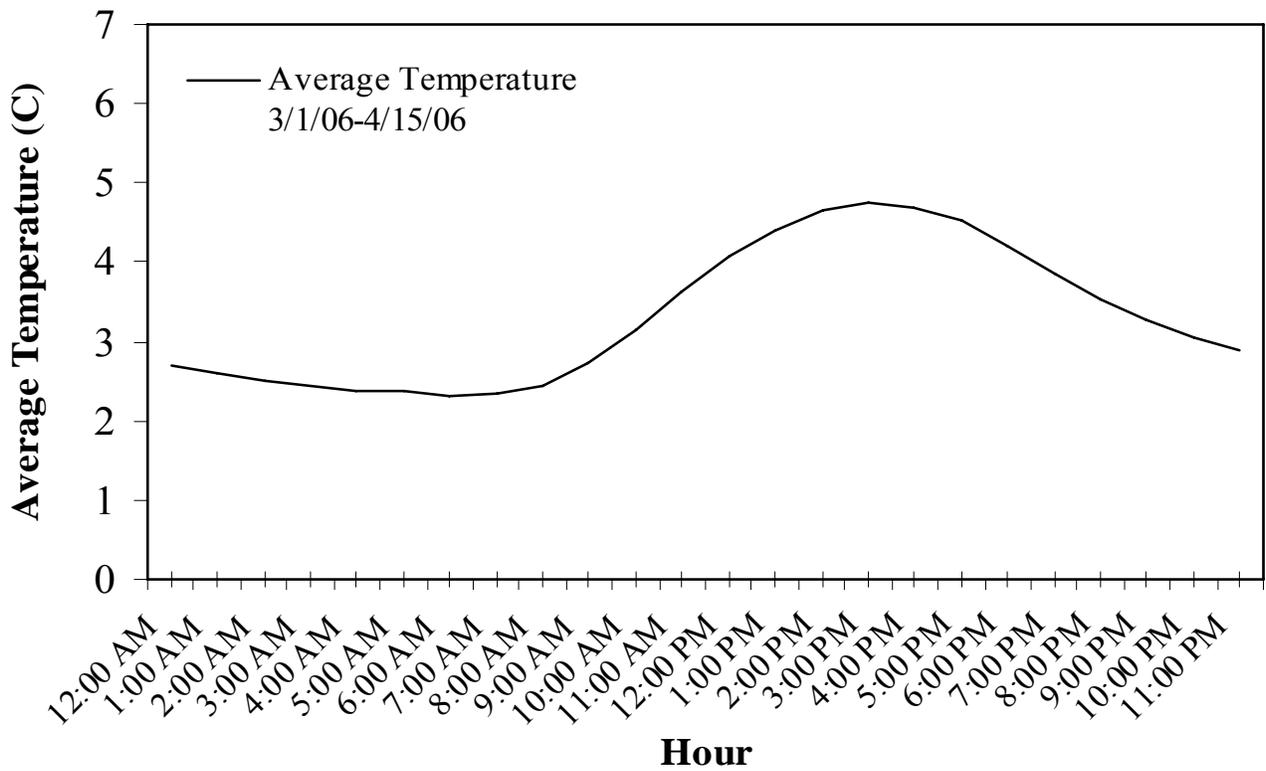


Figure 10. Average hourly water temperature at the Catherine Creek juvenile acclimation facility in 2006.

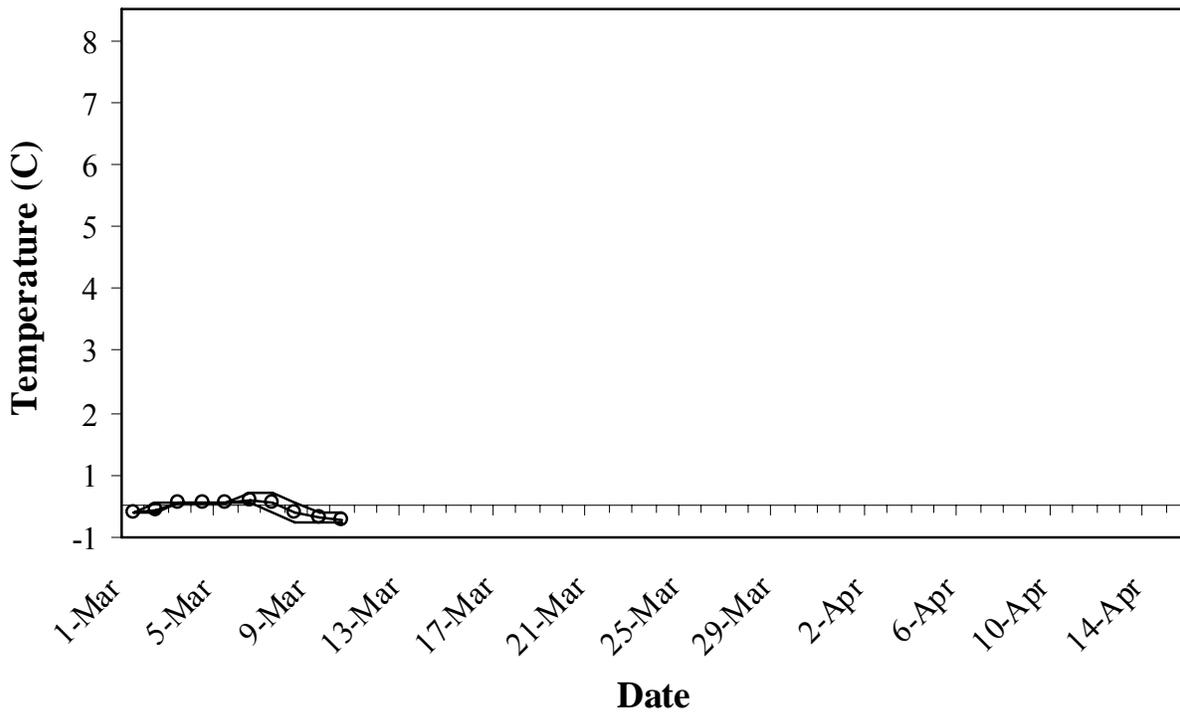


Figure 11. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Upper Grande Ronde juvenile acclimation facility in 2006 (ONSET data logger failed on 10 March).

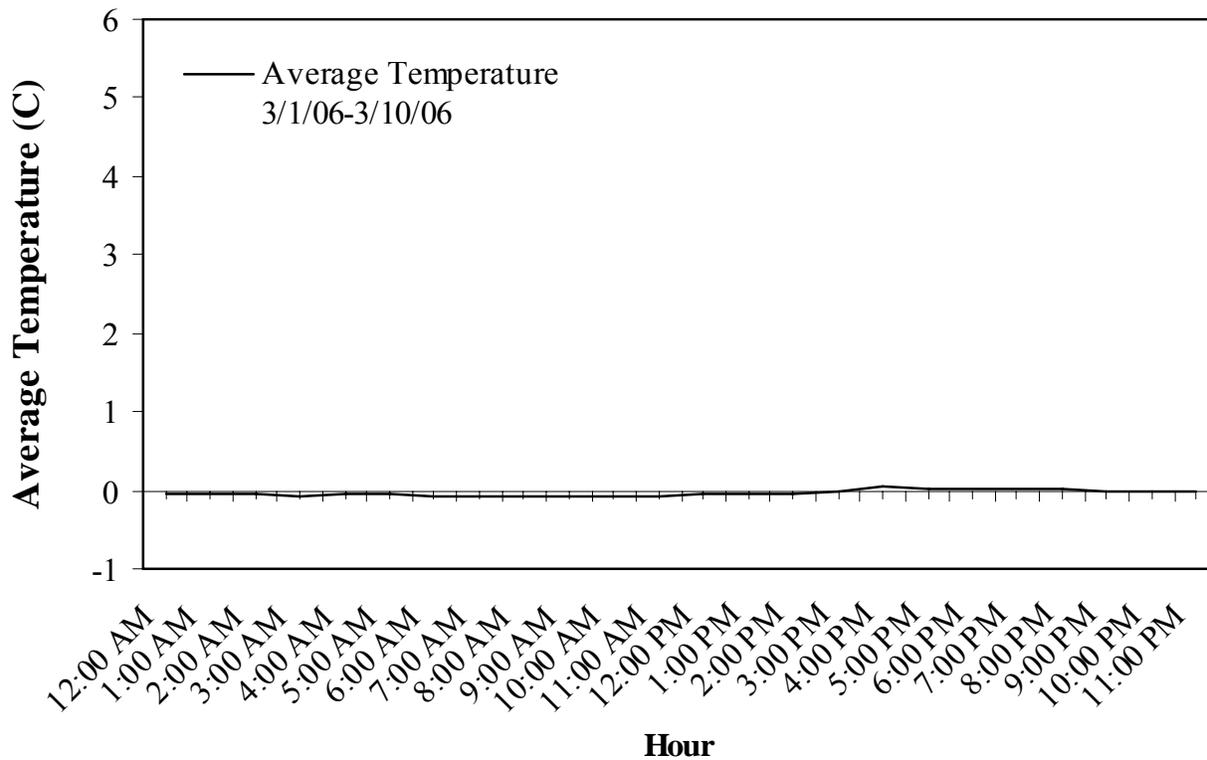


Figure 12. Average hourly water temperature at the Upper Grande Ronde juvenile acclimation facility in 2006 (ONSET data logger failed on 10 March).

Adult Collections

The CCACF was put into operation on 1 March 2006. The first adult summer steelhead was captured on 8 March. A total of 171 unmarked adult summer steelhead were trapped and released from 8 March to 17 May 2006 (Table 4, Figure 13). No adipose-clipped fish were captured at the trap. Peak arrival for unmarked fish at the trap was the week of 1 April (29.83%). Four previously trapped fish, as indicated by the presence of an opercle mark, were trapped and released, and 25 previously trapped kelts were recovered dead on the weir. There were no kelts recovered on the weir that were not previously punched. There were 12 kelts that were passed downstream over the weir that were still alive.

The first adult spring Chinook salmon was captured at CCACF on 29 May 2006. A total of 301 spring Chinook salmon were trapped from 29 May to 25 July 2006 (Table 5, Figure 14). Three different groups of fish from the same stock returned to Catherine Creek in 2006; natural adults (unmarked with no coded wire tag), captive broodstock progeny (ad-clipped), and conventional broodstock progeny (ad-clipped with Visual Implant Elastomer (VIE)). The total catch was made up of 103 adult, and nine jack natural fish, 120 adult and no jack captive broodstock progeny and 62 adult and seven jack conventional broodstock progeny. Peak arrival for adults at the trap was the week of 17 June for all three groups. By the week of 17 June, 53.4% of the adult natural fish had been trapped compared to 52.5% and 51.6% of the captive and conventional fish respectively. The peak arrival for jacks was the week of 24 June for all groups. There was only one mortality in the trap in 2006 (conventional hatchery adult). One carcass (male, captive) was recovered on the weir. The carcass had been previously handled at the trap. Due to the low adult return to Catherine Creek, there were no surplus captive broodstock adults that could have been hauled to LGH for Lookingglass Creek broodstock or outplanting in 2006.

Two weekly spring Chinook spawning surveys were conducted below the weir on Catherine Creek beginning 13 July 2006. During these surveys no live or dead fish were observed below the weir. The trap was removed from Catherine Creek on 25 July. Surveys conducted by ODFW above and below the weir in 2006 resulted in 115 redds counted above the weir and 2 redds counted below the weir. A total of 78 adult carcasses were recovered above the weir which was 35.3% of the total trapped and passed above the weir (221) and two fish were recovered below the weir (not previously trapped). There were 65 punched fish (13 unpunched) in the recovery above the weir (83.3% trap efficiency) (2006 Spawning Ground Survey Results, ODFW, unpublished).

Table 4. Summer steelhead trap capture data from the Catherine Creek adult collection facility in 2006. Trapping began 1 March and ended 25 July.

Week	Trap capture		Kelt	
	First time	Reruns	Not punched ^a	Punched
4-Mar	0			
11-Mar	1			
18-Mar	0			
25-Mar	2			
1-Apr	51			
8-Apr	49			
15-Apr	30			3
22-Apr	6	1		2
29-Apr	19	1		8
6-May	6			
13-May	5	1		8
20-May	2			3
27-May	0			
3-Jun	0	1		
10-Jun	0			
17-Jun	0			1
24-Jun	0			
1-Jul	0			
8-Jul	0			
15-Jul	0			
Totals	171	4	0	25

^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.*

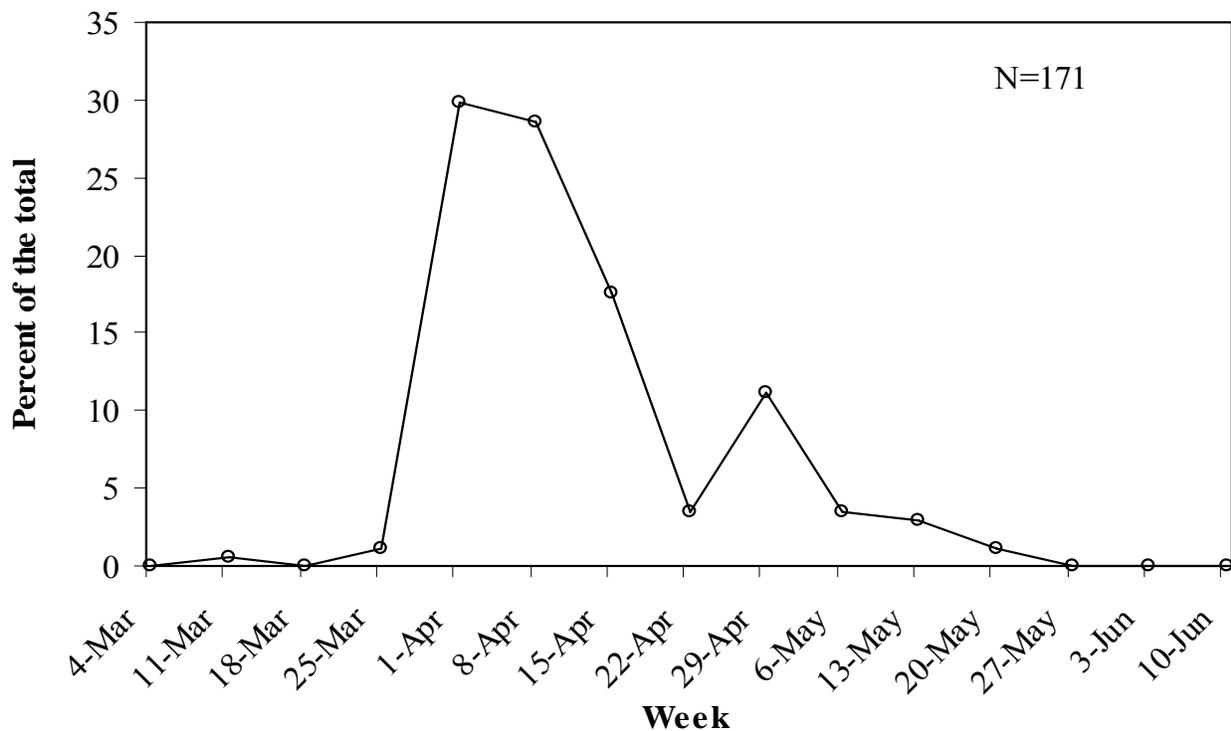


Figure 13. Summer steelhead arrival timing at the Catherine Creek adult collection facility in 2006.

Table 5. Spring Chinook salmon trap capture, transport, and mortality data for the Catherine Creek stock at the adult collection facility in 2006. Trapping began 1 March and ended 25 July.

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	17	2	11		14		2		8		1
17-Jun	38	1	51		18	2	8		15	1	
24-Jun	28	5	42		25	2	6	1	18		
1-Jul	16	1	9		5	1	3		2	1	
8-Jul	3		5		0	2					
15-Jul	0		0		0						
22-Jul	1		0		0		1				
29-Jul	0		1		0						
Totals	103	9	120	0	62	7	20	1	43	2	1

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

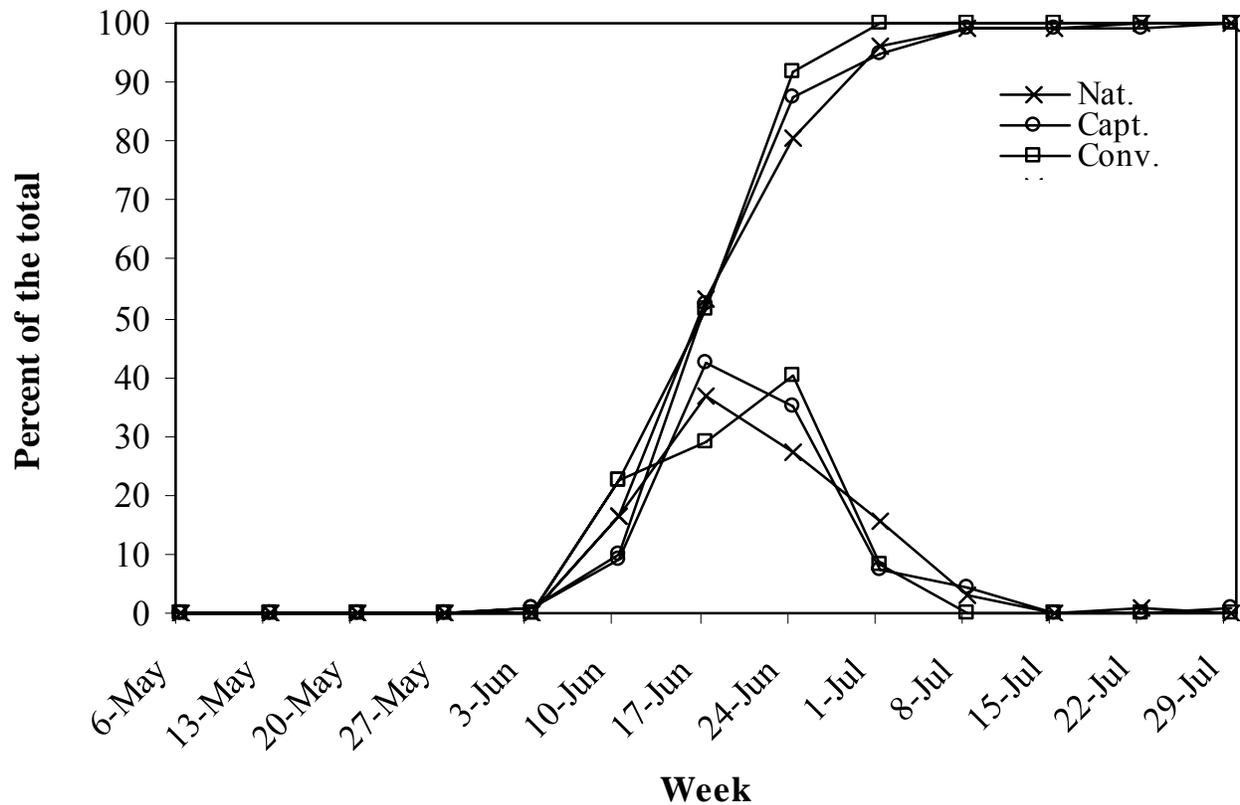


Figure 14. Arrival timing of age 4 and 5 spring Chinook salmon at the Catherine Creek adult collection facility in 2006.

Hourly water temperatures were taken at the CCACF in 2006 (Figures 15 and 16). The water temperature at CCACF during the operation of the adult collection facility ranged from -0.1°C on 3 March to 23.7°C on 25 July and was usually at the lowest temperature around 0700 with the peak temperature around 1600. The period of low water temperature set the time of day that the trap was checked and the fish worked up. High stream flows that occurred in 2006 moved the loose substrate in the stream onto the weir causing the weir to drop unexpectedly for a short period of time.

Maintenance and repair activities were conducted at the facility in 2006. Maintenance work at the CCACF consisted of hydraulic weir components maintenance, maintenance of weir, rock removal from the fishway, and weed abatement.

The UGRACF was put into operation on 3 March 2006. No adult summer steelhead were captured in the trap in 2006 (Table 6). Two adult summer steelhead were recovered on the upstream side of the weir (1 dead female and 1 live male) on 15 and 19 June. A high water event the first week of May 2006 dislodged a beaver dam that damaged right wing wall on the side of our weir. This occurred during a time when steelhead may have been present.

The first adult spring Chinook salmon was captured at UGRACF on 12 June 2006. A total of 206 spring Chinook salmon were trapped from 12 June to 12 July 2006 (Figure 17, Table 7).

Three different groups of fish from the same stock returned to the upper Grande Ronde River in 2006; natural adults (unmarked with no tag), captive broodstock progeny (ad-clipped), and conventional broodstock progeny (no clip with CWT and VIE). The total catch was made up of 51 adult and five jack natural fish, eight adult and no jack captive broodstock and 140 adult and two jack conventional broodstock spring Chinook salmon. Peak arrival for adult fish at the trap was the week of 17 June for the hatchery production and 24 June for the natural production. By the week of 24 June, 80.4% of the adult natural fish had been trapped compared to 55.6% and 77.1% of the captive and conventional fish respectively. The peak arrival for the jacks was the week of 17 June for all groups. There were no mortalities in the trap in 2006. One carcass that had already been captured in the trap was recovered on the weir on 28 June.

On the Upper Grande Ronde River one spring Chinook survey was conducted from the weir to one mile below the weir on 13 July 2006. During this survey 23 live fish were observed. Surveys conducted by ODFW above and below the weir in 2006 resulted in 14 redds counted above the weir and four redds counted below the weir. Vey Meadow, which is privately owned, contains about four miles of spawning habitat, and is located just above the weir. The meadow was not surveyed in 2006 (landowner denied permission). A total of five adult carcasses were recovered above the weir which was 10.0% of the total trapped and passed (50) and two carcasses were recovered below the weir. There were five punched fish in the recovery above the weir (100.0% trap efficiency) for a population estimate of 50 fish (2006 Spawning Ground Survey Results, ODFW, unpublished).

Hourly water temperature was taken at the UGRACF in 2006. The water temperature during operation of the adult collection facility from 1 March to 1 July ranged from 0.0°C to 24.2°C on 1 March and 27 June respectively (Figure 18). The hourly temperatures at the adult trap during the period of operation showed that the lowest water temperatures usually occurred between 0700 and 0800 hours and the highest water temperatures usually occurred between 1600 and 1700 hours (Figure 19). The period of low water temperature set the time of day that the trap was checked and the fish worked up. The battery for the temperature logger failed on 1 July 2006.

Maintenance and repair activities were conducted at the facility in 2006. Maintenance work at the UGRACF consisted of installation and removal of the floating weir panels. Gravel was removed from under the weir panels and in front of the trapbox during the instream work window.

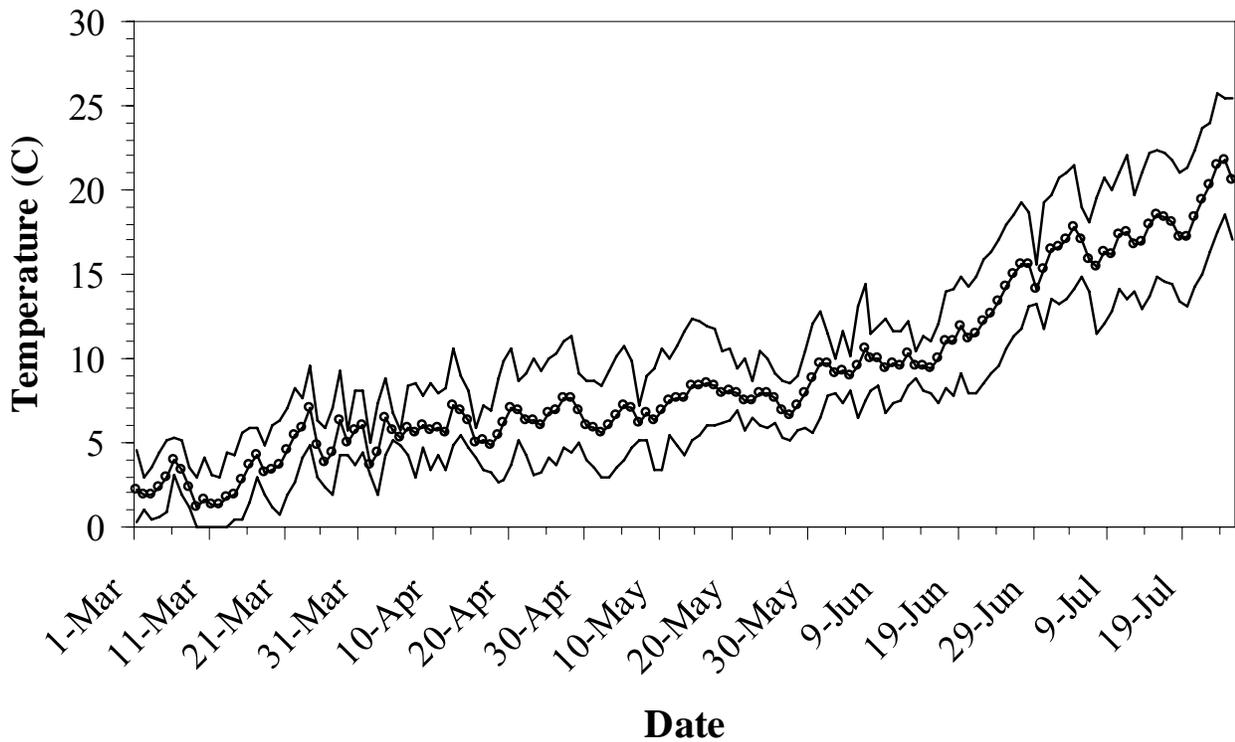


Figure 15. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Catherine Creek adult collection facility in 2006.

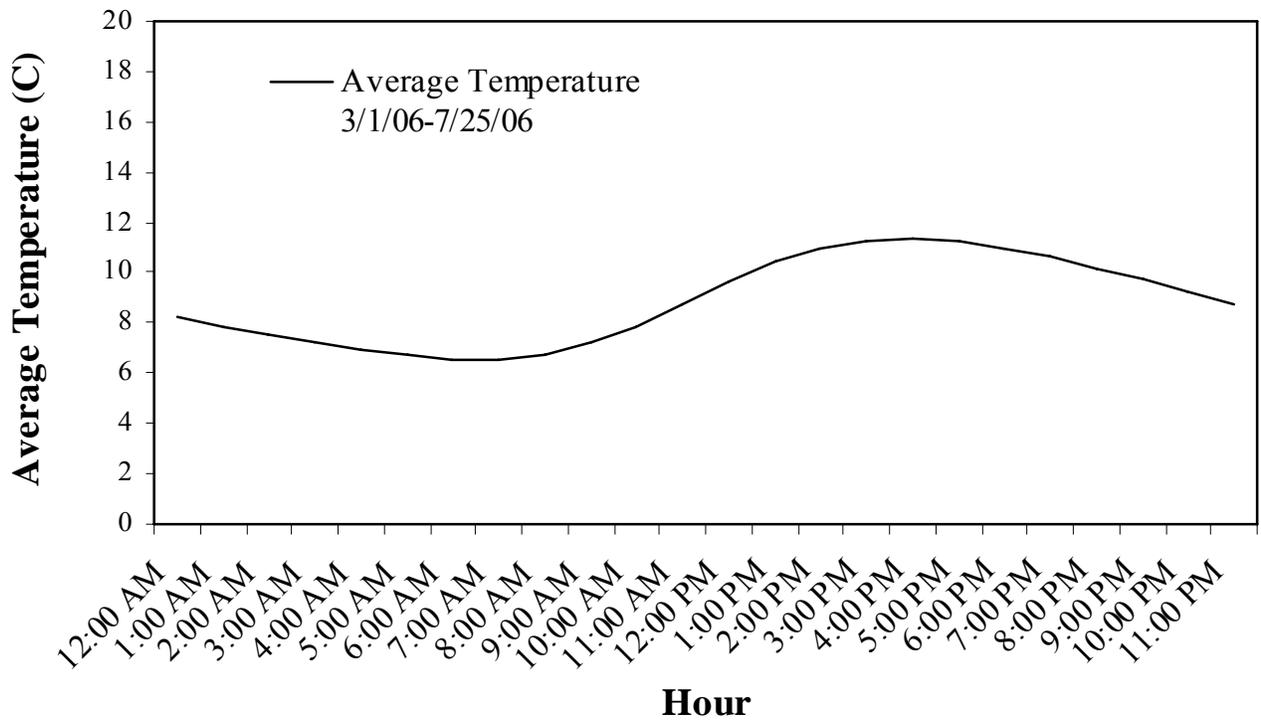


Figure 16. Average hourly water temperature at the Catherine Creek adult collection facility in 2006.

Table 6. Summer steelhead trap capture data from the Upper Grande Ronde adult collection facility in 2005. Trapping began 3 March and ended 25 July.

Week	Trap capture		Kelt	
	First time	Reruns	Not punched ^a	Punched
8-Apr	0			
15-Apr	0			
22-Apr	0			
29-Apr	0			
6-May	0			
13-May	0			
20-May	0			
27-May	0			
3-Jun	0			
10-Jun	0			
17-Jun	0		1	
24-Jun	0		1	
Totals	0	0	2	

^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.

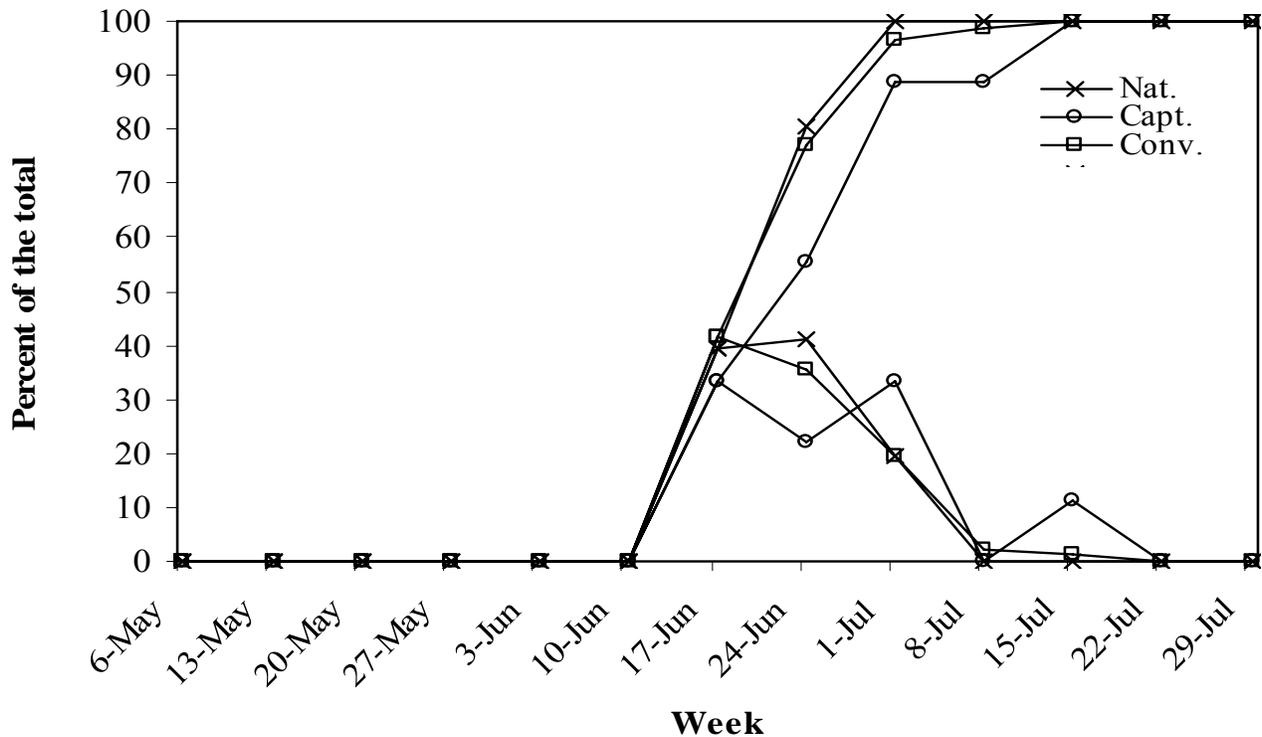


Figure 17. Arrival timing of age 4 and 5 spring Chinook salmon at the Upper Grande Ronde adult collection facility in 2006.

Table 7. Spring Chinook salmon trap capture, transport, and mortality data for the Grande Ronde River stock at the adult collection facility in 2006. Trapping began 3 March and ended 25 July.

Week	Trap capture ^a						Broodstock hauled				Trap Mort
	Nat.	(jack)	Capt.	(jack)	Conv.	(jack)	Nat.	(jack)	Conv.	(jack)	
3-Jun	0		0		0		0		0		
10-Jun	0		0		0		0		0		1
17-Jun	20	2	3		58		10	2	52		
24-Jun	21	2	2		50		11		46		
1-Jul	10	1	3		27	1	5		24	1	
8-Jul	0		0		3		0		1		
15-Jul	0		0		2	1	0				
22-Jul	0		0		0		0				
29-Jul	0		0		0		0				
Totals	51	5	8	0	140	2	26	2	123	1	1

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

The sliding scale management plan (Appendix Table 1) is a tool used to determine spring Chinook salmon disposition in the Grande Ronde River Basin. 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 pre-season 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. The changes needed would be difficult to make mid-trapping 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 2006 was 343 (77 natural + 170 captive + 96 conventional). Based on these predictions the sliding scale called for retaining 20% of the adult returning natural population. Since the predicted total return was more than 250 fish the percent of adults released above the weir that can be of hatchery origin is 70. Fish that are not passed above the weir or taken for Catherine Creek broodstock have four possible dispositions: transported to Lookingglass Creek for a fishery/natural spawning, taken as broodstock for the Lookingglass Hatchery program, outplanted into Indian Creek, or sacrificed for tribal subsistence. The actual number of captive broodstock hatchery adults trapped was 123 and all were passed upstream. The natural adult return was 103 fish which was 134.0% of the predicted number. The percentage of hatchery fish above the weir in 2006 was 62.4%. There were no hatchery fish outplanted to Lookingglass Creek, taken as broodstock for the Lookingglass program, or outplanted into Indian Creek. Jacks were collected for broodstock at a rate of one jack for every 10 males in the broodstock.

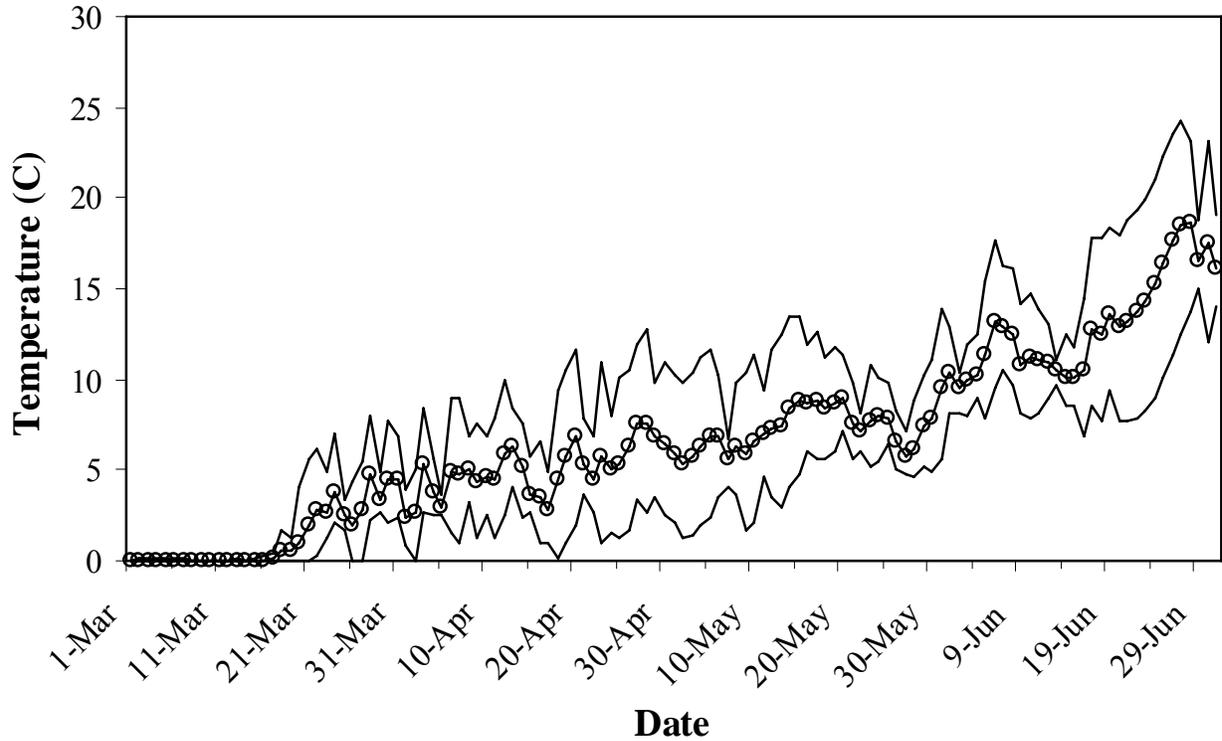


Figure 18. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Upper Grande Ronde adult collection facility in 2006.

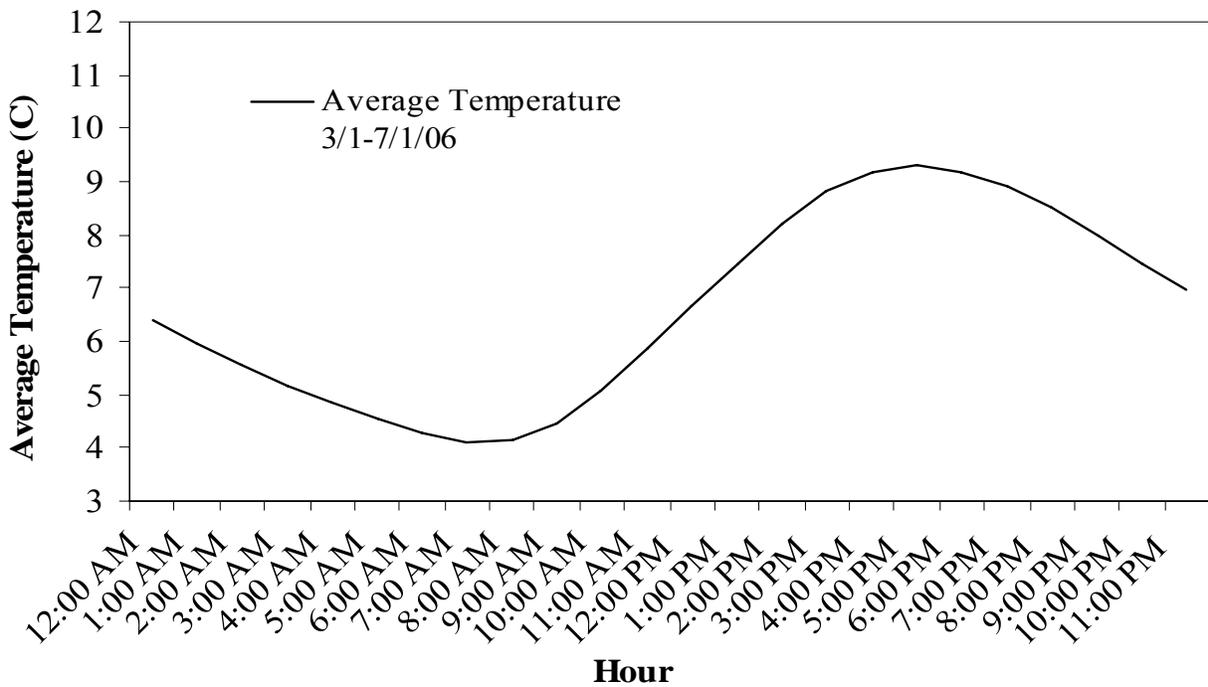


Figure 19. Average hourly water temperature at the Upper Grande Ronde adult collection facility in 2006.

The adult broodstock collected and transported from CCACF consisted of 20 unmarked and 43 conventional broodstock. None of the captive broodstock returns were collected for broodstock. Adult broodstock was collected systematically over the entire return from 7 June to 17 July 2006. Every 5th natural adult male and female sampled was taken to LGH for broodstock. One unmarked jack was collected for every 5 adult males that were taken to LGH. Enough conventional returns were taken to maintain the percentage of hatchery fish in the broodstock to no more than 70%. The unmarked adult portion of the broodstock was 19.4% of the adult natural return trapped (Appendix Table 4). The hatchery adult portion of the entire broodstock was 68.3%. The estimation of the sex of the adult fish at the weir was 92.8% accurate based on the accuracy of sex estimation in the broodstock collected. Of the five fish that were not sexed correctly three were hatchery fish that were originally called males but were actually females and two were natural fish that were originally called females but were actually males.

The predicted adult spring Chinook salmon return to the Upper Grande Ronde River for 2006 was 106 (16 natural + 49 captive + 41 conventional). There is no sliding scale for the Grande Ronde River and the broodstock collection percentage is up to 50% of the natural return and up to 100% of the conventional hatchery return. The actual number of hatchery adults trapped was 148 (8 captive + 140 conventional) and from these fish 25 were passed upstream (16.9%). The natural adult return was 51 fish which was 319% of the predicted number. The percentage of hatchery fish above the weir in 2006 was 50.0%. Only seven jacks were collected in 2006 and three of these were taken for broodstock.

The broodstock collected and transported from UGRACF consisted of both natural and hatchery fish. Broodstock was collected systematically over the entire return from 12 June to 5 July 2006. Every other natural adult male and female sampled was taken to LGH for broodstock. A total of 26 adult and two jack natural fish and 123 adult and one jack hatchery fish (conventional broodstock) were transported to LGH for broodstock. The natural adult portion of the broodstock was 51.0% of the adult natural return trapped while the adult hatchery portion was 83.1% of the adult hatchery return trapped. The hatchery adult portion of the entire broodstock was 82.6%. Ten females that were originally collected for brood and hauled to LGH were taken back to the Grande Ronde on 17 August after it was determined there would be excess females for our production needs. The estimation of the sex of the adult fish at the weir was 97.0% accurate based on the accuracy of the sex estimation in the broodstock collected. Fish that were actually females, tended to be called males at the weir leading to an increased number of females in the broodstock. All but seven conventional fish were initially taken to the hatchery. These fish all returned late in the run and were estimated to be females. The male: female sex ratio observed for these conventional fish was 1.37: 1 (no jacks).

Broodstock Activities

Lookingglass Hatchery

A total of 37 females and 27 males and two jacks were spawned from the Catherine Creek stock spring Chinook salmon at LGH in 2006 (Tables 8-10). Most of the spawning matrices were three females by two males. No males were spawned more than one time. There were a total of two mortalities (pre-spawn) at the hatchery, one female and one male. One jack and one male were sacrificed due to poor quality milt. Peak spawning date at LGH occurred on 31 August

2006. No females had spawned prior to this date. The last spawning date was 7 September. A total of three fish (all females) positively identified as Catherine Creek production swam into the Lookingglass Creek trap and were used in the Catherine Creek broodstock. All 37 females had ELISA values of 0.116 OD units or less.

A total of 84 females, 66 males, and three jacks were spawned from the Grande Ronde stock spring Chinook salmon at LGH in 2006 (Tables 11-13). Most of the spawning matrices were three females by two males. A total of 11 males were used more than one time. There were a total of five female and 15 male pre-spawning mortalities at the hatchery. One female was not used due to bad eggs and four males were not used due to poor quality milt. Peak spawning date at LGH occurred on 7 Sept 2006 with only 35.7% of the females spawning prior to this date. A total of 14 fish (10 males and four females) identified as likely Grande Ronde production (no fin clip with a CWT) swam into the Lookingglass Creek trap and were incorporated into the Grande Ronde broodstock. The CWT from each of these fish was read before their eggs or milt would be used. All but two of these fish were positively identified as Grande Ronde fish. The CWT could not be detected at spawn for these two fish so the fish were killed and not spawned. All 40 females had ELISA values of 0.136 OD units or less.

In 2006, the males and females were separated into two different circular tanks in the endemic building after the first spawn date. The ripening of the females or males did not appear to be affected by the separation as the spawn timing was similar to that of 2005. There were a large number of unspawned males that died the week of 14 September. This mortality event late in the spawning season could have been due to the fact that the males had no more reason to live as all the females were in another tank. After this event the remaining two females were placed into the same tank as the males but were separated by a crowder. The remaining two females ripened with no more loss of males.

No fish were spawned from the Lookingglass Creek stock spring Chinook salmon at LGH in 2006. All of the 47 fish (41 adults, 6 jacks) captured at the Lookingglass Creek trap were released above the weir to spawn naturally.

Captive Broodstock

The goal for parr collection in Catherine Creek and Upper Grande Ronde was achieved. Details of the collection can be obtained in Hoffnagle et. al. 2006. Assistance was also provided to ODFW for the spawning of the Grande Ronde Basin captive broodstocks at Bonneville Hatchery in 2006. Details of the spawning operation can be obtained in Hoffnagle et. al. 2006.

Table 8. Spawning information from Catherine Creek spring Chinook salmon female broodstock at Lookingglass Hatchery in 2006.

Date	Natural n=9					Hatchery n=29				
	Morts	Spawned	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/5	1									
17-Aug										
24-Aug										
31-Aug		3					17			
7-Sep		5					12			
14-Sep										
Totals	1	8	0	0	0	0	29	0	0	0

Table 9. Spawning information from Catherine Creek spring Chinook salmon male broodstock at Lookingglass Hatchery in 2006.

Date	Natural n=11					Hatchery n= 17				
	Morts	Spawned	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/5						1				
17-Aug										
24-Aug										
31-Aug		3					10			
7-Sep		8					6		2	
14-Sep				11				4	10	
Totals	0	11	0	11	0	1	16	4	12	0

Table 10. Spawning information from Catherine Creek spring Chinook salmon jack broodstock at Lookingglass Hatchery in 2006.

Date	Natural n=1					Hatchery n=2				
	Morts	Spawned	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/5										
17-Aug										
24-Aug										
31-Aug		1	1							
7-Sep							1			1
14-Sep									1	
Totals	0	1	1	0	0	0	1	0	1	1

Table 11. Spawning information from Grande Ronde spring Chinook salmon female broodstock at Lookingglass Hatchery in 2006.

Date	Natural n=15					Hatchery n=75				
	Morts	Spawned	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/5						1				
17-Aug							4			
24-Aug		2					10			
31-Aug	1						14			
7-Sep		3					24			1
14-Sep	1	7				2	18			
19-Sep		1					1			
Totals	2	13	0	0	0	3	71	0	0	1

Table 12. Spawning information from Grande Ronde spring Chinook salmon male broodstock at Lookingglass Hatchery in 2006.

Date	Natural n=11					Hatchery n=62				
	Morts	Spawned	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/5										
17-Aug		1					3			2
24-Aug		1					7			
31-Aug		3					7			
7-Sep		6			1	2	18		10	1
14-Sep		5	4	2		13	13	8	5	
19-Sep			2	2			2	7	5	
Totals	0	16	6	4	1	15	50	15	20	3

Table 13. Spawning information from Grande Ronde spring Chinook salmon jack broodstock at Lookingglass Hatchery in 2006.

Date	Natural n=2					Hatchery n=1				
	Morts	Spawned	DPS	KPS	KNS	Morts	Spawned	DPS	KPS	KNS
Till 8/5										
17-Aug										
24-Aug										
31-Aug										
7-Sep		1					1			
14-Sep		1	1							
19-Sep										
Totals	0	2	1	0	0	0	1	0	0	0

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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, and receive and release dates of fish acclimated at Catherine Creek and the Upper Grande Ronde facilities.

Facility/ rel. yr	Group ^a	Number received	Size fish/lb.	Density lbs/f t ³	Acclimation period	Volitional began	Number released
CC 00	Single	37,902	23.6	0.20	2/28-4/18	4/2	37,873
CC 01	Single	137,816	19.6	0.85	3/8-4/16	4/2	136,902
CC 02	Single	180,912	17.4	1.26	2/26-4/15	4/2	180,343
CC 03	Early	105,352	12.8	1.00	3/7-3/23	3/13	105,313
CC 03	Late	24,404	12.6	0.47	3/24-4/14	3/31	24,392
CC 04	Early	92,475	23.1	0.49	3/8-3/22	3/15	92,413
CC 04	Late	70,977	23.4	0.37	3/24-4/12	3/30	70,959
CC 05	Early	130,748	24.0	0.67	3/7-3/27	3/14	130,544
CC 05	Late	59,100	21.8	0.66	3/28-4/7	3/4	59,036
GR 00	Single	1,512	19.4	0.04	2/28-3/14	(none)	1,508
GR 01	Single	2,570	13.9	0.09	2/27-3/27	(none)	2,544
GR 02	Single	201,958	18.4	1.33	2/27-4/15	4/2	151,444
GR 03	Early	110,169	14.2	1.14	3/10-3/23	3/17	110,114
GR 03	Late	127,631	13.6	0.94	3/24-4/14	3/30	127,446
GR 04	Early	78,930	20.3	0.48	3/9-3/22	3/15	78,716
GR 04	Late	70,098	22.4	0.50	3/25-4/12	3/31	70,088
GR 05	Single	105,418	21.0	0.61	3/8-3/14	None	105,369

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

Appendix Table 3. Group, feed fed, mortality, temperature, dissolved oxygen, and estimated volitional migration of fish acclimated at Catherine Creek and the Upper Grande Ronde facilities.

Facility/ rel. yr	Group ^a	Feed fed	Total mortality (%)	Temp.°C		DO mg/l		Volitional	
				Min.	Max.	Min.	Max.	migration	%
CC 00	Single	474	29 (0.1)	0.2	9.3	8.2	14.4	6,842	18.0
CC 01	Single	1,296	914 (0.7)	0.5	9.6	8.9	13.9	^b	
CC 02	Single	1,968	569 (0.3)	0.0	10.5	7.0	13.3	68,948	38.1
CC 03	Early	345	39 (0.04)	1.1	6.2	10.3	12.2	25,092	23.8
CC 03	Late	73	12 (0.05)	0.7	8.2	9.7	12.6	16,218	66.4
CC 04	Early	179	62 (0.07)	1.8	7.9	10.5	11.7	8,785	9.5
CC 04	Late	115	18 (0.03)	2.1	8.2	10.5	12.4	49,147	69.2
CC 05	Early	209	204 (0.16)	0.1	5.8	9.6	15.4	29,402	22.5
CC 05	Late	60	64 (0.11)	0.6	8.7	8.9	12.7	None	
GR 00	Single	1	4 (0.3)	-0.5	2.7	-	-	(none)	
GR 01	Single	8	26 (1.0)	-0.7	3.8	8.7	12.1	(none)	
GR 02	Single	568	50,514 (25.0)	0.0	3.5	9.2	12.7	68,200	44.9
GR 03	Early	24	55 (0.05)	0.0	4.4	10.0	11.9	31,900	30.0
GR 03	Late	200	185 (0.14)	0.0	6.6	9.0	11.9	37,900	29.7
GR 04	Early	58	214 (0.27)	-0.1	5.9	11.3	14.7	12,889	16.3
GR 04	Late	79	10 (0.01)	-0.1	7.1	10.6	12.3	34,085	48.6
GR 05	Single	10	49 (0.05)	-0.1	3.4	10.3	11.9	None	

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

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

Appendix Table 4. Release and return summary for spring Chinook salmon from the upper Grande Ronde River^a.

Brood year	Release location	Life stage	Rearing type	Number released	Returns trapped			SAR
					3	4	5	
1998	Acc.	Smolt	Captive	1,508	0	3	0	0.20
1999	Acc.	Smolt	Captive	2,544	1	4	4	0.35
2000	Acc.	Smolt	Captive	151,444	35	321	15	0.24
2000	River	Parr	Captive	75,636	2	51	2	0.07
2001	Acc.	Smolt	Captive	210,637	48	180	7	0.11
2001	Acc.	Smolt	Conventional	26,923	9	60	0	0.26
2001	River	Parr	Captive	32,800	0	0	0	0.00
2002	Acc.	Smolt	Captive	78,716	0	1		
2002	Acc.	Smolt	Conventional	70,088	6	140		
2003	Acc.	Smolt	Captive	1,020	0			
2003	Acc.	Smolt	Conventional	104,349	1			
2004	Acc.	Smolt	Captive	76				
2004	Acc.	Smolt	Conventional	18,901				

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.

Appendix Table 5. Release and return summary for spring Chinook salmon from Catherine Creek^a.

Brood year	Release location	Life stage	Rearing type	Number released	Returns trapped			SAR
					3	4	5	
1998	Acc.	Smolt	Captive	37,873	29	132	54	0.57
1999	Acc.	Smolt	Captive	136,902	10	181	19	0.15
2000	Acc.	Smolt	Captive	180,343	70	564	24	0.36
2001	Acc.	Smolt	Captive	105,313	30	84	3	0.11
2001	Acc.	Smolt	Conventional	24,392	22	28	2	0.21
2002	Acc.	Smolt	Captive	92,413	19	121		
2002	Acc.	Smolt	Conventional	70,959	11	56		
2003	Acc.	Smolt	Captive	68,827	0			
2003	Acc.	Smolt	Conventional	120,753	7			
2004	Acc.	Smolt	Captive	45,604				
2004	Acc.	Smolt	Conventional	23,216				

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

Appendix Table 6. Release and return summary for spring Chinook salmon from Lookingglass Creek^a.

Brood year	Release location	Life stage	Rearing type	Number released	Returns trapped			SAR
					3	4	5	
2000	LGC	Parr	Captive	51,864	2	35	1	0.07
2001	LGC	Parr	Captive	17,880	10	21	1	0.18
2002	Hat.	Smolt	Captive	53,195	7	40		
2003	Hat.	Smolt	Captive	98,023	22			
2004	Hat.	Smolt	Conventional	113,418				

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

Appendix Table 7. Adult trapping, broodstock and redd counts for spring Chinook salmon from the upper Grande Ronde River (does not include jack salmon).

Year	Adults captured			Passed above	Est. above	Redds		Adult broodstock taken		
	Nat.	Capt.	Conven.			Above	Below	Nat.	Capt.	Conven.
1997	9	--	--	9	--	22	6	0	0	0
1998	33	--	--	39	88	35	2	0	0	0
1999	1	--	--	1	--	0	0	0	0	0
2000	17	--	--	15	30	8	12	0	0	0
2001	38	--	--	29	29	7	8	21	0	0
2002	101	3	--	54	54	19	2	48	0	0
2003	119	4	--	63	95	24	19	71	0	0
2004	28	376	--	386	453	134	51	15	0	0
2005	14	197	60	204	205	52	38	7	0	59
2006	51	8	140	50	51	14	4	26	0	123

Appendix Table 8. Adult trapping, broodstock and redd counts for spring Chinook salmon from Catherine Creek (does not include jack salmon).

Year	Adults captured			Passed above	Est. above	Redds		Adult broodstock taken		
	Nat.	Capt.	Conven.			Above	Below	Nat.	Capt.	Conven.
1997	2	--	--	2	--	40	6	0	0	0
1998	28	--	--	28	85	34	0	0	0	0
1999	16	--	--	16	58	38	2	0	0	0
2000	22	--	--	22	45	26	8	0	0	0
2001	78	--	--	57	459	131	2	21	0	0
2002	161	132	--	247	413	156	2	35	0	0
2003	248	235	--	431	474	165	2	50	0	0
2004	83	575	--	190	209	94	2	16	0	0
2005	56	108	28	131	155	72	2	10	0	20
2006	103	120	62	221	266	115	2	20	0	43

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

Year	Adults captured			Passed above	Est. above	Redds		Adult broodstock taken		
	Nat.	Hat.	Stray			Above	Below	Nat.	Capt.	Conven.
2004	73	37	0	100	100	49	49	0	136	0
2005	24	26	5	45	43	29	10	0	0	0
2006	10	41	17	41	44	28	28	0	0	0

Appendix Table 10. Daily summer steelhead trapping data from the Catherine Creek adult collection facility in 2006.

Date	Total	Trapped		Sacrificed/mortality		Recaptures at trap	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
8-Mar	1	0	1	0	0	0	0
20-Mar	1	0	1	0	0	0	0
24-Mar	1	0	1	0	0	0	0
27-Mar	14	0	14	0	0	0	0
29-Mar	25	0	25	0	0	0	0
31-Mar	12	0	12	0	0	0	0
MAR	54	0	54	0	0	0	0
3-Apr	13	0	13	0	0	0	0
5-Apr	21	0	21	0	0	0	0
7-Apr	15	0	15	0	0	0	0
9-Apr	0	0	0	0	0	0	0
10-Apr	12	0	12	0	0	0	0
12-Apr	7	0	7	0	0	0	0
14-Apr	11	0	11	0	0	0	0
16-Apr	0	0	0	0	0	0	0
17-Apr	5	0	5	0	0	0	0
18-Apr	0	0	0	0	0	0	0
21-Apr	1	0	1	0	0	0	1
23-Apr	0	0	0	0	0	0	0
24-Apr	9	0	9	0	0	0	1
25-Apr	0	0	0	0	0	0	0
26-Apr	3	0	3	0	0	0	0
28-Apr	7	0	7	0	0	0	0
29-Apr	0	0	0	0	0	0	0
APR	104	0	104	0	0	0	2
1-May	4	0	4	0	0	0	0
2-May	0	0	0	0	0	0	0
3-May	1	0	1	0	0	0	0
5-May	1	0	1	0	0	0	0
8-May	1	0	1	0	0	0	1
10-May	3	0	3	0	0	0	0
11-May	0	0	0	0	0	0	0
12-May	1	0	1	0	0	0	0
13-May	0	0	0	0	0	0	0
15-May	1	0	1	0	0	0	0
16-May	0	0	0	0	0	0	0
17-May	1	0	1	0	0	0	0
31-May	0	0	0	0	0	0	1
MAY	13	0	13	0	0	0	2
16-Jun	0	0	0	0	0	0	0
17-Jun	0	0	0	0	0	0	0
JUN	0	0	0	0	0	0	0
Total	171	0	171	0	0	0	4

Appendix Table 11. Daily spring Chinook salmon trapping data from the Catherine Creek adult collection facility in 2006.

Date	Total	Trapped				Sacrificed/mortality				Brood collected			
		Adults		Jacks		Adults		Jacks		Adults		Jacks	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
29-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
6-Jun	1	0	1	0	0	0	0	0	0	0	0	0	0
7-Jun	2	2	0	0	0	0	0	0	0	1	0	0	0
8-Jun	9	2	7	0	0	0	0	0	0	0	0	0	0
9-Jun	25	18	6	0	1	1	0	0	0	7	2	0	0
10-Jun	7	3	3	0	1	0	0	0	0	0	0	0	0
11-Jun	23	16	7	0	0	0	0	0	0	5	2	0	0
12-Jun	19	13	5	0	1	0	0	0	0	1	1	0	0
13-Jun	20	12	8	0	0	0	0	0	0	4	2	0	0
14-Jun	3	2	1	0	0	0	0	0	0	0	0	0	0
15-Jun	19	10	7	2	0	0	0	0	0	3	1	1	0
16-Jun	15	10	5	0	0	0	0	0	0	2	2	0	0
17-Jun	11	6	5	0	0	0	0	0	0	0	0	0	0
18-Jun	13	9	2	1	1	0	0	0	0	3	1	0	0
19-Jun	12	6	5	0	1	0	0	0	0	0	0	0	0
20-Jun	33	24	8	0	1	0	0	0	0	10	2	0	0
21-Jun	14	8	4	0	2	0	0	0	0	2	1	0	1
22-Jun	19	11	8	0	0	0	0	0	0	3	2	0	0
23-Jun	7	6	0	1	0	0	0	0	0	0	0	0	0
24-Jun	4	3	1	0	0	0	0	0	0	0	0	0	0
26-Jun	2	1	1	0	0	0	0	0	0	0	0	0	0
28-Jun	26	10	15	1	0	0	0	0	0	2	3	1	0
29-Jun	3	2	0	0	1	0	0	0	0	0	0	0	0
30-Jun	1	1	0	0	0	0	0	0	0	0	0	0	0
JUN	288	175	99	5	9	1	0	0	0	43	19	2	1
3-Jul	7	4	3	0	0	0	0	0	0	0	0	0	0
5-Jul	1	1	0	0	0	0	0	0	0	0	0	0	0
7-Jul	2	0	0	2	0	0	0	2	0	0	0	0	0
10-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0
17-Jul	1	0	1	0	0	0	0	0	0	0	1	0	0
25-Jul	1	1	0	0	0	0	0	0	0	0	0	0	0
JUL	12	6	4	2	0	0	0	2	0	0	1	0	0
Total	301	182	103	7	9	1	0	2	0	43	20	2	1

Appendix Table 12. Daily summer steelhead trapping data from the Upper Grande Ronde adult collection facility in 2006.

Date	Total	Trapped		Sacrificed/mortality		Recaptures at trap	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
15-Jun	0	0	0	0	0	0	0
19-Jun	0	0	0	0	0	0	0
JUN	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0

Two kelts on the upstream side of the trap were captured on these days. No fish were captured in the trap.

Appendix Table 13. Daily spring Chinook salmon trapping data from the Upper Grande Ronde adult collection facility in 2006.

Date	Total	Trapped				Sacrificed/mortality				Brood collected			
		Adults		Jacks		Adults		Jacks		Adults		Jacks	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
12-Jun	5	3	2	0	0	0	0	0	0	3	1	0	0
13-Jun	41	32	8	0	1	0	0	0	0	31	3	0	1
14-Jun	7	7	0	0	0	0	0	0	0	6	0	0	0
16-Jun	30	19	10	0	1	0	0	0	0	17	6	0	1
19-Jun	24	16	7	0	1	0	0	0	0	15	4	0	0
21-Jun	17	13	4	0	0	0	0	0	0	13	2	0	0
23-Jun	34	23	10	0	1	0	0	0	0	22	5	0	0
26-Jun	24	20	4	0	0	0	0	0	0	17	2	0	0
28-Jun	11	7	3	0	1	0	0	0	0	7	1	0	0
30-Jun	7	3	3	1	0	0	0	0	0	1	2	1	0
JUN	200	143	51	1	5	0	0	0	0	132	26	1	2
3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0
5-Jul	3	3	0	0	0	0	0	0	0	1	0	0	0
10-Jul	1	1	0	0	0	0	0	0	0	0	0	0	0
11-Jul	1	0	0	1	0	0	0	0	0	0	0	0	0
12-Jul	1	1	0	0	0	0	0	0	0	0	0	0	0
17-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0
JUL	6	5	0	1	0	0	0	0	0	1	0	0	0
9-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0
17-Aug	0	0	0	0	0	0	0	0	0	-10	0	0	0
21-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	-10	0	0	0
Total	206	148	51	2	5	0	0	0	0	123	26	1	2

Appendix Table 14. Daily summer steelhead trapping data from the Lookingglass Creek adult collection facility in 2006.

Date	Total	Trapped		Sacrificed/mortality		Recaptures at trap	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
16-Mar	4	0	4	0	0	0	0
20-Mar	1	0	1	0	0	0	0
22-Mar	1	0	1	0	0	0	0
24-Mar	3	0	3	0	0	0	0
27-Mar	17	0	17	0	0	0	0
29-Mar	7	0	7	0	0	0	0
31-Mar	16	0	16	0	0	0	1
MAR	49	0	49	0	0	0	1
3-Apr	13	0	13	0	0	0	0
5-Apr	6	0	6	0	0	0	1
7-Apr	11	0	11	0	0	0	0
10-Apr	12	0	12	0	0	0	2
12-Apr	7	0	7	0	0	0	1
14-Apr	17	1	16	1	0	0	1
17-Apr	2	0	2	0	0	0	0
16-Apr	3	0	3	0	0	0	1
21-Apr	13	0	13	0	0	0	0
24-Apr	11	0	11	0	0	0	0
26-Apr	5	0	5	0	0	0	0
28-Apr	8	0	8	0	0	0	1
APR	108	1	107	1	0	0	7
1-May	4	0	4	0	0	0	2
4-May	5	0	5	0	0	0	3
8-May	7	1	6	1	0	0	1
12-May	7	0	7	0	0	0	0
15-May	8	0	8	0	0	0	0
17-May	3	0	3	0	0	0	2
22-May	2	0	2	0	0	0	1
24-May	3	1	2	1	0	0	1
MAY	39	2	37	2	0	0	10
9-Jun	0	0	0	0	0	0	1
JUN	0	0	0	0	0	0	1
Total	196	3	193	3	0	0	19

Appendix Table 15. Daily spring Chinook salmon trapping data from the Lookingglass Creek adult collection facility in 2006.

Date	Total	Trapped				Sacrificed/mortality				Brood collected			
		Adults		Jacks		Adults		Jacks		Adults		Jacks	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
12-Jun	9	7	0	2	0	0	0	0	0	7	0	2	0
14-Jun	6	4	1	1	0	0	1	0	0	3	0	1	0
16-Jun	2	0	1	1	0	0	1	0	0	0	0	1	0
19-Jun	10	6	2	2	0	0	2	0	0	5	0	2	0
21-Jun	10	6	2	2	0	0	2	0	0	6	0	2	0
23-Jun	5	5	0	0	0	0	0	0	0	0	0	0	0
26-Jun	14	8	0	6	0	0	0	0	0	0	0	0	0
28-Jun	4	2	1	1	0	0	1	1	0	0	0	0	0
30-Jun	8	5	2	1	0	0	2	1	0	0	0	0	0
JUN	68	43	9	16	0	0	9	2	0	21	0	8	0
3-Jul	6	3	2	1	0	0	0	1	2	0	0	0	0
5-Jul	1	1	0	0	0	0	0	0	0	0	0	0	0
10-Jul	5	2	1	2	0	0	1	2	0	0	0	0	0
14-Jul	1	0	0	0	1	0	0	0	1	0	0	0	0
JUL	13	6	3	3	1	0	1	3	3	0	0	0	0
3-Aug	0	0	0	0	0	0	0	8	0	-21	0	-8	0
7-Aug	1	0	0	0	1	0	0	0	1	0	0	0	0
9-Aug	2	1	0	1	0	0	0	1	0	0	0	0	0
21-Aug	4	3	0	1	0	0	0	1	0	0	0	0	0
25-Aug	3	2	0	1	0	0	0	1	0	0	0	0	0
28-Aug	3	3	0	0	0	0	0	0	0	0	0	0	0
AUG	13	9	0	3	1	0	0	11	1	-21	0	-8	0
Total	94	58	10	22	4	0	10	16	4	0	0	0	0

Appendix Table 16. Adult summer steelhead trapping summary from the Catherine Creek adult collection facility in 1997-2005.

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

Appendix Table 17. Adult summer steelhead trapping summary from the Upper Grande Ronde River adult collection facility in 1997-2005.

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

Appendix Table 18. Adult summer steelhead trapping summary from the Lookingglass Creek adult collection facility in 1997-2005.

Year	Total	Trapped		Sacrificed/mortality		Recaptures at trap	
		Hat.	Nat.	Hat.	Nat.	Hat.	Nat.
1997	10	1	9	0	0	0	0
1998	15	4	11	0	0	0	0
1999	40	0	40	0	0	0	0
2000	11	0	11	0	0	0	0
2001	114	1	113	0	0	0	2
2002	260	2	258	2	0	1	42
2003	165	0	165	0	0	0	14
2004	135	3	132	3	0	0	14
2005	206	5	201	5	1	0	20