BONNEVILLE POWER ADMINISTRATION

Grande Ronde Endemic Spring Chinook Salmon Supplementation Program

Facility Operations and Maintenance

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Grande Ronde Endemic Spring Chinook Salmon Supplementation Program

Facility Operations and Maintenance

Annual Report
1 January 2004 through 31 December 2004

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ABSTRACT

There were 2 acclimation periods at the Catherine Creek Acclimation Facility (CCAF) in 2004. During the early acclimation period, 92,475 smolts were delivered from Lookingglass Hatchery (LGH) on 8 March. This group was comprised entirely of progeny from the captive broodstock program. The size of the fish at delivery was 23.1 fish/lb. Volitional releases began 15 March 2004 and ended 22 March with an estimated total (based on PIT tag detections of 1,475) of 8,785 fish leaving the raceways. This was 9.5% 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 between 1200 and 2000 hours which was similar to the hourly temperature profile. The size of the fish just before the volitional release was 23.1 and the size of the fish remaining just before the forced release was 23.5 fish/lb. The total mortality for the acclimation period was 62 (0.07 %). The total number of fish released from the acclimation facility during the early period was 92,413. During the second acclimation period 70,977 smolts were delivered from LGH on 24 March. This group was comprised entirely of progeny from the conventional broodstock program. The size of the fish at delivery was 23.4 fish/lb. Volitional releases began 30 March 2004 and ended 12 April with an estimated total (based on PIT tag detections of 3,632) of 49,147 fish leaving the raceways. This was 69.2% 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 between 1200 and 2000 hours which was similar to the hourly temperature profile. The size of the fish just before the volitional release was 23.4 and the size of the fish remaining just before the forced release was 23.9 fish/lb. The total mortality for the acclimation period was 18 (0.03 %). The total number of fish released from the acclimation facility during the late period was 70,959.

There were also 2 acclimation periods at the Upper Grande Ronde Acclimation Facility (UGRAF) in 2004. During the early acclimation period 78,930 smolts were delivered from LGH on 9 March. This group was comprised entirely of progeny from the captive broodstock program. The size of the fish at delivery was 20.3 fish/lb. Volitional releases began 16 March 2004 and ended 22 March with an estimated total (based on PIT tag detections of 143) of 12,889 fish leaving the raceways. This was 16.3% 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 between 1300 and 1900 hours which was similar to the hourly temperature profile. The size of the fish just before the volitional release was 20.3 and the size of the fish remaining just before the forced release was 20.8 fish/lb. The total mortality for the acclimation period was 214 (0.27 %). The total number of fish released from the acclimation facility during the early period was 78,716. During the second acclimation period 70,098 smolts were delivered from LGH on 25 March. This group was comprised entirely of progeny from the conventional broodstock program. The size of the fish at delivery was 22.4 fish/lb. Volitional releases began 31 March 2004 and ended 12 April with an estimated total (based on PIT tag detections of 242) of 34,085 fish migrating from the raceways during the volitional

release period. This was 48.6% of the total fish delivered. Hourly detections of PIT-tagged fish showed that most of the fish left between 1200 and 2000 hours which was similar to the hourly temperature profile. The size of the fish just before the volitional release was 22.4 and the size of the fish remaining just before the forced release was 22.4 fish/lb. The total mortality for the acclimation period was 10 (0.01 %). The total number of fish released from the acclimation facility during the late period was 70,088.

Maintenance and repair activities were conducted at the acclimation facilities in 2004. Facility maintenance work consisted of snow removal, installation of drainage lines, removal of gravel from intake area, replacement of raceway liners at the UGRAF, and complete overhaul of 2 travel trailers.

The Catherine Creek Adult Capture Facility (CCACF) was put into operation on 1 March 2004. The first adult summer steelhead was captured on 9 March. A total of 181 adult summer steelhead were trapped and released from 9 March to 5 June 2004. Peak arrival at the trap was the week of 25 March. The first adult spring chinook salmon was captured at CCACF on 17 May 2004. A total of 724 spring chinook salmon were trapped from 17 May to 12 August 2004. There were 83 adults and 6 jacks unmarked and 575 adult and 60 jack marked spring chinook salmon trapped. Peak arrival at the trap was the week of 3 June for the unmarked fish and 17 June for the marked fish.

Seventeen of the 18 broodstock collected and transported from CCACF to LGH were unmarked fish trapped. None of the captive broodstock returns, which comprised nearly entire return of hatchery fish (with the exception of 3 year-old conventional returns), were collected for broodstock. Broodstock was collected systematically over the entire return from 13 May to 12 August 2004. About 20% of the naturally produced adult males and females trapped were taken to LGH for broodstock. One unmarked jack was collected for every 10 adult males that were taken to LGH. A total of 16 age 4 and 5 and 2 age 3 fish (1 was conventional progeny) were transported to LGH for broodstock which was 19.3% of the natural return trapped.

Three weekly spawning surveys were conducted below the weir on Catherine Creek beginning 15 July 2004. During these surveys only 1 jack chinook was observed below the weir and no carcasses were recovered. The trap was removed from Catherine Creek on 18 August 2004.

Weekly maximum temperatures at the CCACF ranged from 2.3^{o}C on 3 March to 23.7 ^{o}C on 25 July. Weekly minimum temperatures at the trap ranged from -0.1^{o}C on 3 March to 17.1^{o}C on 16 July. The hourly temperatures at the adult trap during the period of operation showed that the lowest water temperatures usually occurred between 0500 and 0800 hours and the highest water temperatures usually occurred between 1500 and 1800 hours.

Facility maintenance work at CCACF consisted of construction of a debris barrier in front of the intake, maintenance of weir, removal of gravel from the fishway, and weed abatement.

The Upper Grande Ronde Adult Collection Facility (UGRACF) was put into operation on 1 March 2004. The first adult summer steelhead was captured on 17 March. A total of 63 adult summer steelhead were trapped and released from 17 March to 26 May 2004. Peak arrival at the trap was the week of 1 April. The first adult spring chinook salmon was captured at UGRACF on 26 May 2004. A total of 466 spring chinook salmon were trapped from 26 May to 31 July 2004. There were 28 adults and 5 jacks unmarked and 376 adult and 57 jack marked spring chinook salmon trapped. Peak arrival at the trap for both unmarked and marked fish was 24 June.

The broodstock collected and transported from UGRACF was also made up almost entirely of unmarked fish (1 conventional jack collected). Broodstock was collected systematically over the entire return from 15 June to 20 July 2004. Every other adult male and female sampled was taken to LGH (50%) for broodstock. The jacks were to be collected at a rate of 1 for every 5 adult males. A total of 14 age 4 and 5 and 2 age 3 unmarked fish and 1 age 3 marked fish were transported to LGH for broodstock. The collection percentage of unmarked fish was 50.0% of the natural return trapped.

On the Upper Grande Ronde River 3 weekly surveys were conducted from the weir to 1 mile below the weir from beginning 8 July 2004. There was an average of 15 live fish observed and no carcasses were recovered on these surveys.

Weekly maximum temperatures at the UGRACF ranged from 0.3^{o}C to 26.1^{o}C on 5 March and 25 July. Weekly minimum temperatures at the trap ranged from 0.0^{o}C to 16.0^{o}C on 5 March and 18 July. The hourly temperatures at the adult trap during the period of operation showed that the lowest water temperatures usually occurred between 0500 and 0800 hours and the highest water temperatures usually occurred between 1500 and 1800 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.

A total of 9 females and 6 males were spawned from the Catherine Creek stock spring chinook salmon at LGH in 2004. The peak spawning date at LGH occurred on 2 September. A total of 7 females and 8 males from the Grande Ronde stock were spawned at LGH in 2004. The peak spawning date at LGH occurred on 9 September. A total of 53 females and 56 males from the Lookingglass Creek stock were spawned at LGH in 2004. The peak spawning date at LGH occurred on 9 September.

CTUIR assisted the captive broodstock program with the collection of parr from Catherine Creek, Upper Grande Ronde River, and the Lostine River. The collection goal of 500 parr from each tributary was achieved in 2004. CTUIR also assisted with

the spawning of the captive broodstocks (Catherine Creek, Upper Grande Ronde, and Lostine River) at Bonneville Hatchery in 2004.

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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 (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 and upper Grande Ronde rivers and Catherine Creek. The GRESCSSP 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 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 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 adult return numbers 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. Adult fish weirs are in place on Catherine Creek and the upper Grande Ronde River and data on summer steelhead populations in those areas are collected.

METHODS

Juvenile Acclimation

The Catherine Creek Acclimation Facility (CCAF) is located at river mile (rm) 29.5 of Catherine Creek (Figure 1). Catherine Creek originates in the Wallowa Mountains and flows north to northwest entering the Grande Ronde River at rm 140. The Upper Grande Ronde Acclimation Facility (UGRAF) is located at rm 198.5 of the Grande Ronde River (Figure 1). The Grande Ronde River originates in the Elkhorn Mountains and flows north to northeast 210 rm, before entering the Snake River.

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 was kept at around 3 ft (2,064 ft^3). The water supply for CCAF was 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 was 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 was placed at each facility to provide onsite housing for facility operators, who provided 24 hour watch and maintenance of the facility. Each facility also had an above ground backup pumping system which consisted of a diesel powered pump with the intake placed directly into the stream. Each facility was designed to hold 31,250 fish per raceway at 20 fish/lb and a density of 0.76 lbs/ft^3. Maximum flow design for the facilities was 625 gpm/raceway.

In 2004 there were two acclimation periods for each facility. Fish were transported to the facilities from LGH by ODFW in tanker trucks. The proposed acclimation periods were from the first week of March to the last week of March (early) and then again from the end of March to mid-April (late). The fish were fed 3 days per week only when water temperatures were 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 (Moore-Clark feed rate guidelines, November 1999). Fish were 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 were forced from the raceway at dark. At the CCAF 17% of the first group of fish acclimated (captive brood) and 7% of the second group acclimated (conventional brood) were tagged with Passive Integrated Transponders (PIT). At the UGRAF 1% of the fish acclimated in both groups were PIT tagged. PIT tag detectors were installed on the exit pipes before the volitional release to monitor the outmigration. Mortalities were removed daily, scanned, and saved for ODFW pathology. The total number of fish released was estimated using ODFW Fish Liberation Reports and acclimation mortality records. Lengths and weights were 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.

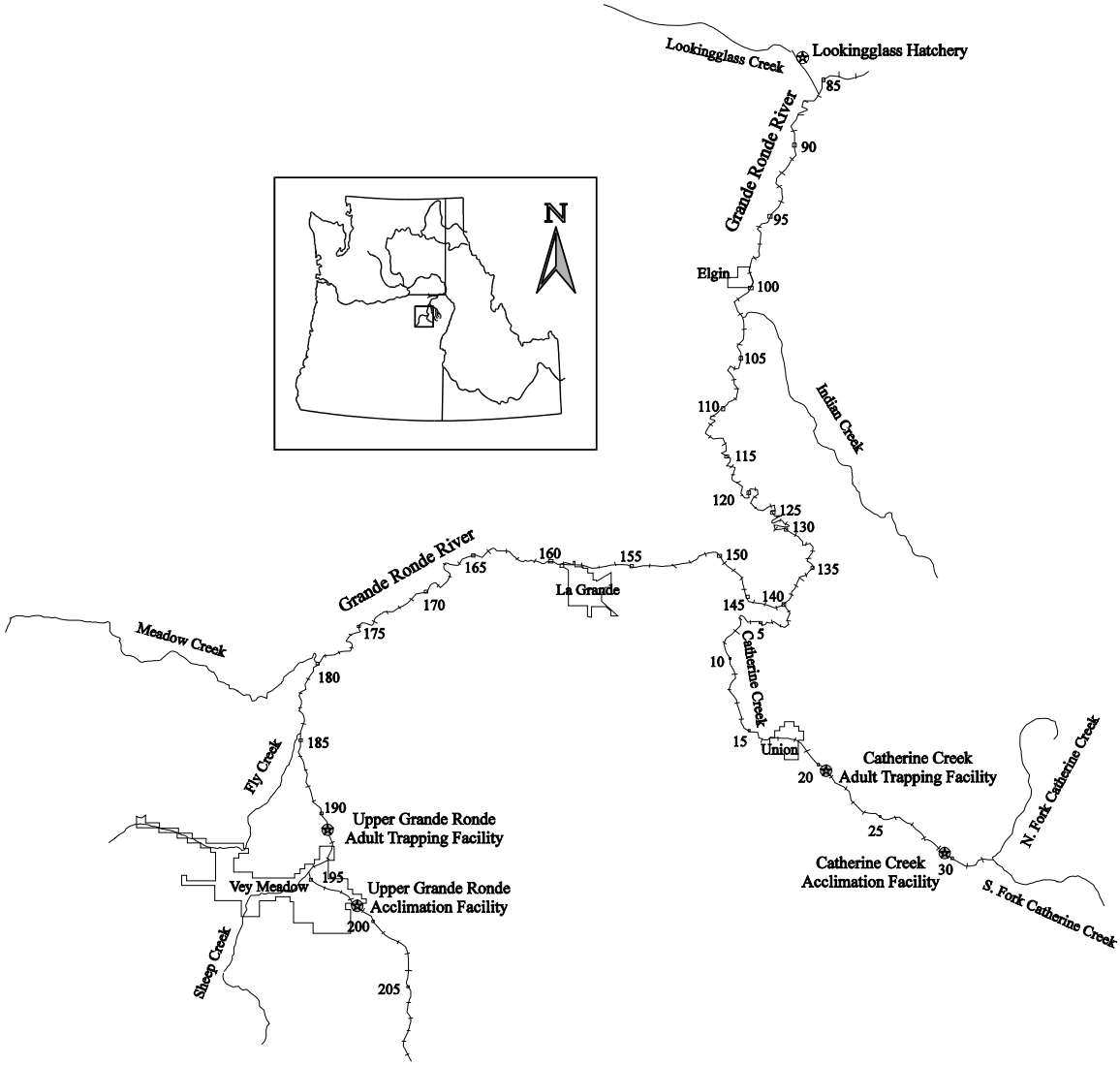

Figure 1. Map of the upper Grande Ronde River basin showing locations (rm) of Lookingglass Hatchery and Catherine Creek and Upper Grande Ronde juvenile acclimation and adult capture facilities.

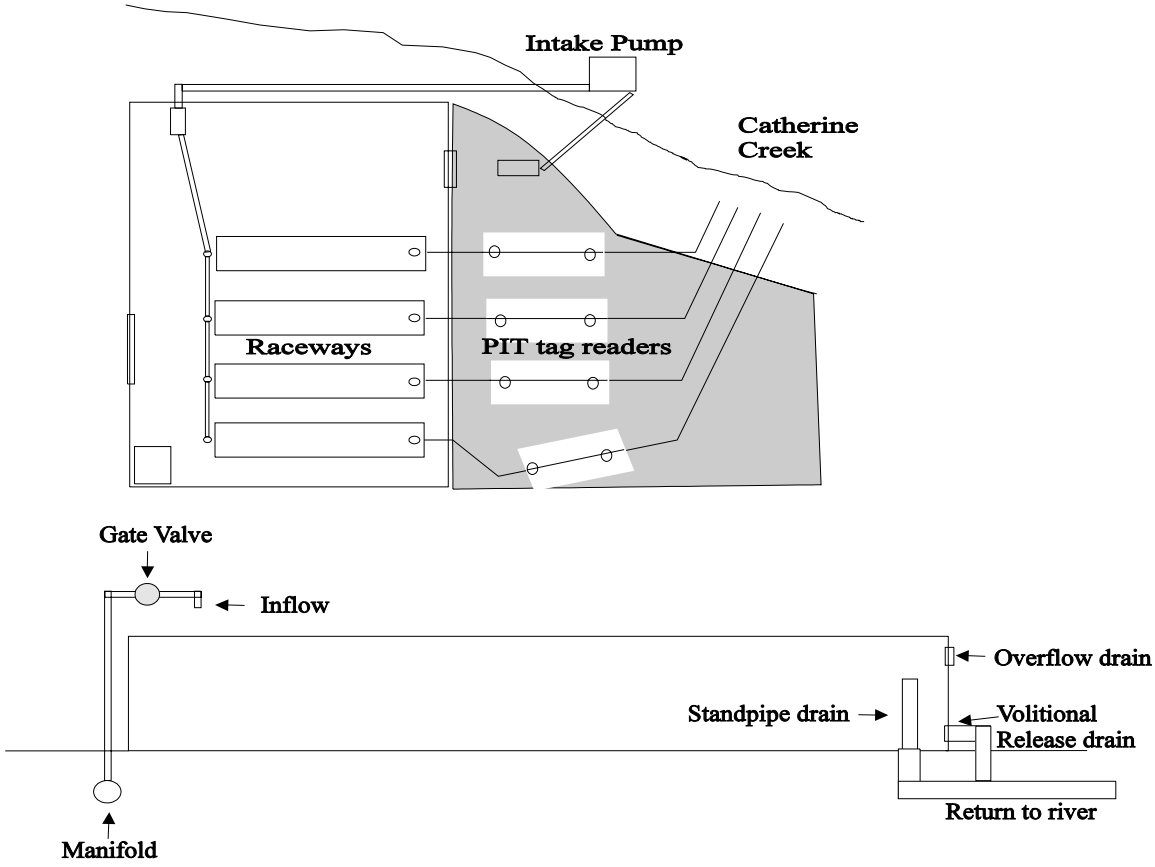

Figure 2. Diagram of the Catherine Creek acclimation facility. PIT tag reader boxes in the shaded area are underground.

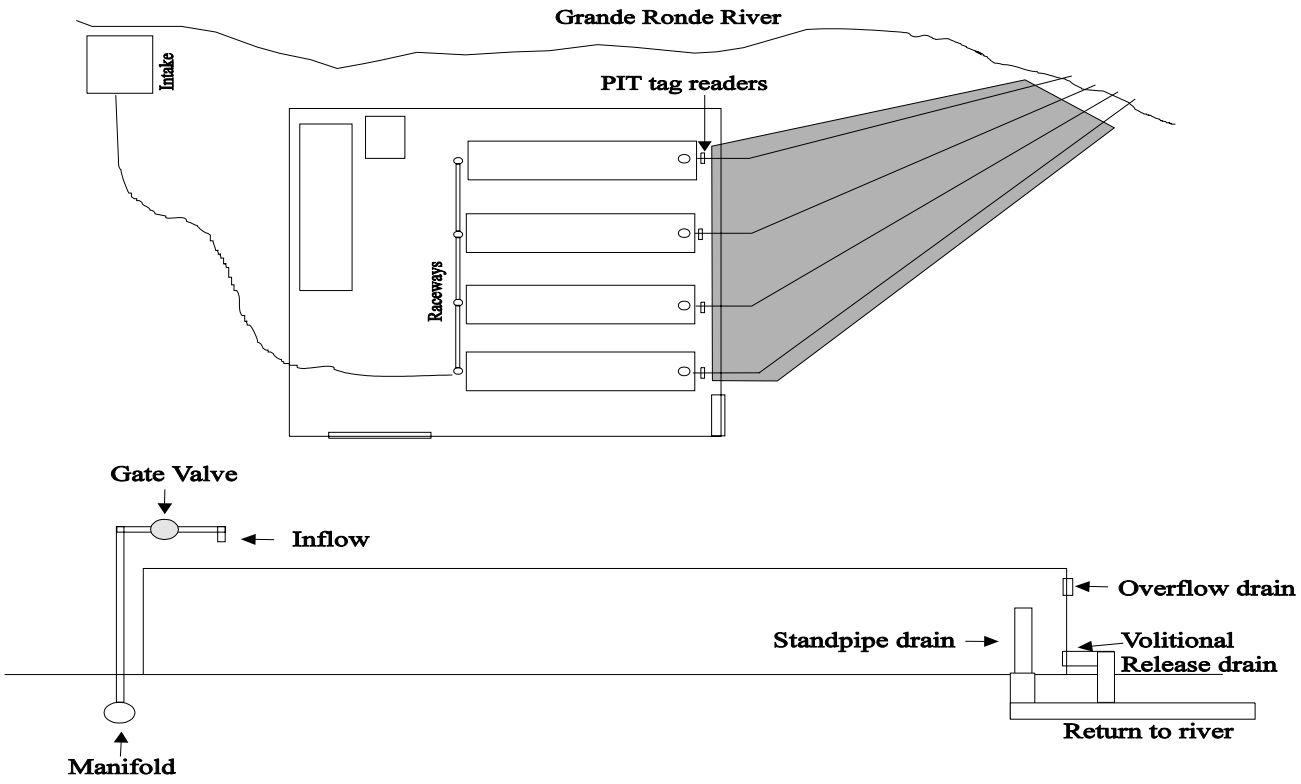

Figure 3. Diagram of the Upper Grande Ronde acclimation facility. The lines passing through the shaded area represent underground return pipes.

Adult Collections

The Catherine Creek Adult Collection Facility (CCACF) is located at rm 20.5 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 (monitoring) and spring chinook salmon (hatchery broodstock collection/monitoring and evaluation) was 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 was kept at about 6 ft (900 ft^3). The Upper Grande Ronde Adult Collection Facility (UGRACF) is located at rm 191 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 the adult summer steelhead and spring chinook salmon was accomplished by directing adults 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 was normally about 2.5 ft (275 ft^3). The designed adult spring chinook salmon holding capacities for these facilities, at 10 ft^3/adult, is 90 at CCACF and 28 at UGRACF.

A travel trailer was 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 was checked daily and water temperatures were taken with a pocket thermometer before the trap was operated. An Onset™ recording thermometer was also installed in the trapboxes for hourly temperature readings. Handling events only occurred when water temperatures were below 18.3^oC. Later in the season, as water temperatures rose, fish were processed earlier in the day when water temperatures were lower, in order to reduce stress. If and when the maximum water temperatures exceeded 21.1^oC for three consecutive days, trapping would be discontinued and fish would be allowed to pass freely until water temperatures dropped (2004 LSRCP AOP).

During the trap checks fork length from both summer steelhead and spring chinook salmon was measured to the nearest mm. A paper punch was used to mark fish and collect tissues for genetics samples. A single punch on the right opercle plate was used to mark the fish that were released upriver as having been trapped. Tissues from opercle punches and one additional caudal punch were collected for genetics evaluation. Tissue samples were preserved in labeled vials with 95% ethanol. Each fish was examined externally for marks, injuries or other physical conditions, and a preliminary determination of sex was made. The summer steelhead were enumerated and passed upstream and the spring chinook salmon that were not transported to LGH for broodstock or outplanted in another stream were enumerated and passed upstream after recovering from the anesthetic. Summer steelhead kelts that were encountered were counted and allowed to pass downstream over the weir if alive and were sampled (length and weight) if dead. Spring chinook salmon mortality recovered was also sampled. Fish species that were captured incidentally were released upstream.

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

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. 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 Grande Ronde facility. Hatchery jack management above the weirs for Catherine Creek and the Upper Grande Ronde River was not to exceed, in combination with wild jacks, a total of 1 jack for every 10 adult male spring chinook passed. The priority for hatchery jacks released above the weir will be for conventional jacks. Fish collected for broodstock were taken systematically by sex and age (adult/jack).

Fish collected for broodstock and transported to LGH before 15 July 2004, received prophylactic intraperitoneal injections of oxytetracycline and erythromycin upon loading. Dosage of each antibiotic was based on estimated age length data (3 year fish <621mm, 4 year fish 621-799mm, 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) was one-half of the erythromycin injections. Injections were 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 were transported from the weir site to LGH using a 240 (CCACF) and 300 (UGRACF) gallon fiberglass tanks mounted on flatbed trailers. The tanks were each equipped with an aerator and oxygen tank. Transport time to LGH from the weir site was about 1.0 to 2.0 hours. Target dissolved oxygen level in the tank during transport was 11 mg/l. Dissolved oxygen levels were checked mid way through the transport.

The possible effects of the weirs on fish behavior was 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) were recorded. When fish are accumulating in this section below the weir and daily average stream temperatures exceed 70^{o}F (21.1^{o}C) for three consecutive days, efforts will be made to collect and transport fish for broodstock based on collection percentage 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 was collected.

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

Broodstock Activities

Lookingglass Hatchery

Trapping of adult spring chinook salmon was done at LGH. Spring chinook salmon that returned from previous smolt or fingerling releases into Lookingglass Creek were trapped by the LGH crew and CTUIR monitoring and evaluation personnel and kept as broodstock for the Lookingglass Creek hatchery program. Captive broodstock adults that returned to Catherine Creek that were surplus to needs in that system were also transported to LGH to supplement the Lookingglass Creek broodstock.

Assistance was provided to ODFW for the spawning of the Lookingglass Creek, Catherine Creek and Upper Grande Ronde River conventional broodstock at LGH. The Lookingglass Creek stock was held in the outdoor adult holding ponds at LGH, while the Catherine Creek and Upper Grande Ronde River broodstocks were held in the captive brood building. All stocks were checked for ripeness once a week over a 6 week period beginning 19 August. The frequency of ripeness checks increased to twice a week late in the season. Ripe females and an equal number of ripe males were placed in smaller tanks within the building so they could be kept separate from the non-ripe fish on the day of the sorting. A spawning matrix was developed immediately based on the number of ripe females and males and the sex ratio of the entire population. The most common matrix used was 2 females crossed with 2 males.

On each spawning day, the ripe females were anesthetized in the main hatchery or captive brood building using Aqui-S one family group (usually 2 fish) at a time. The fish were again checked for ripeness before being dispatched by a blow to the head. The fish were placed in a rack and bled by cutting the tails. The body cavity was then opened over a colander to catch the eggs and to drain the ovarian fluid. The eggs were then poured into large Ziploc bags and placed in a small cooler with ice. The males were anesthetized then live spawned at the captive brood building. The milt was placed into cups and also placed in the cooler with the eggs. All males were marked and recycled back into the brood pond. The cooler was then taken to the main hatchery building for completion of the matrix. Once the gametes were mixed, ODFW staff placed the eggs in incubators located in the main hatchery building.

Captive Broodstock

Assistance was provided to ODFW for the collection of parr from the Grande Ronde basin in 2004. These juveniles are used for the captive broodstock program (Hoffnagle et. al. 2004). Assistance was also provided to ODFW for the spawning of the Grande Ronde Basin captive broodstocks at Bonneville Hatchery in 2004 (Hoffnagle et. al. 2004).

RESULTS AND DISCUSSION

Juvenile Acclimation

The CCAF received the early group of 92,475 smolts from LGH on 8 March 2004 (Table 1). This group was comprised entirely from progeny of the captive broodstock program. The average size of the fish at delivery was 23.1 fish/lb (Table 2). The densities in the raceways ranged from 0.44 to 0.58 lbs/ft3. The fish were allowed to volitionally leave the raceways beginning 15 March 2004. Any fish remaining on 22 March were forced from the facility after 1200 hours. During the volitional release period there was a total of 1,475 PIT-tagged fish scanned. Based on the number of PIT-tagged fish in the population (17.0%), an estimated 8,785 fish left during this time, this was 9.5% of the fish delivered to the facility (Table 3). Of the fish that left, 85.2% left the first 4 days of the 8 day volitional release (Figure 5). Hourly detections of PIT-tagged fish showed that most of the fish left between 1200 and 2000 hours (94.5%) peaking at 1400 hours and again at 1700 hours (Figure 6). The total mortality for the early acclimation period was 62 (0.07 %). Pathology examined 20 mortalities (personal communication, Sam Onjukka, Fish Pathologist, ODFW La Grande). All ELISA values were ≤ 0.107 and none had gross signs of BKD. All bacterial and viral cultures from these fish were negative. The fish were fed a total of 179 lbs of food for the acclimation period. The total number of fish in the early group that were released from the acclimation facility in 2004 was 92,413. The size of the fish just before the volitional release began was 23.1 fish/lb. The size of the fish that were forced from the facility was 23.5 fish/lb.

The CCAF received the late group of 70,977 smolts from LGH on 24 March 2004 (Table 1). This group was comprised entirely from progeny of the conventional broodstock program. The average size of the fish at delivery was 23.4 fish/lb (Table 2). The densities in the raceways ranged from 0.14 to 0.56 lbs/ft3. The fish were allowed to volitionally leave the raceways beginning 30 March 2004. Any fish remaining on 12 April were forced from the facility after 1200 hours. During the volitional release period there was a total of 3,632 PIT-tagged fish scanned. Based on the number of PIT-tagged fish in the population (7.4%), an estimated 49,147 fish left during this time, this was 69.2% of the fish delivered to the facility (Table 3). Of the fish that left, 96.8% left the first 7 days of the 14 day volitional release (Figure 5). Hourly detections of PIT-tagged fish showed that most of the fish left from 1200 to 2000 hours (95.5%) peaking at 1800 hours (Figure 6). The total mortality for the late acclimation period was 18 (0.03%). Pathology examined 8 mortalities from this period (personal communication, Sam Onjukka, Fish Pathologist, ODFW La Grande). All ELISA values were ≤ 0.121 and none had gross signs of BKD. One bacterial culture from 7 of the 8 mortalities had a heavy level of aeromonad-pseudomonad bacteria. Viral cultures from these fish were negative. The fish were fed a total of 179.1 lbs of food for the acclimation period. The total number of fish in the late group that were released from the acclimation facility in 2004 was 70,959. The size of the fish just before the volitional release began was 23.4 fish/lb. The size of the fish that were forced from the facility was 23.9 fish/lb.

Table 1. Raceway fish density and flow data for Catherine Creek and the Upper Grande Ronde acclimation facilities before volitional release in 2004.

	Raceway			
	1	2	3	4
Catherine Creek early				
No. of fish	23,420	23,421	22,817	22,817
Total lbs.	972	972	905	1,195
Mortality	15	13	23	11
Density lbs/ft^3	0.47	0.47	0.44	0.58
lbs/gpm	3.04	3.04	2.83	3.73
Flow gpm	320	320	320	320
Treatment	Captive	Captive	Captive	Captive
Catherine Creek late				
No. of fish	17,574	6,505	27,096	19,802
Total lbs.	754	282	1,158	839
Mortality	1	3	10	4
Density lbs/ft^3	0.37	0.14	0.56	0.41
lbs/gpm	2.36	0.88	3.62	2.62
Flow gpm	320	320	320	320
Treatment	Conventional	Conventional	Conventional	Conventional
Upper Grande Ronde early				
No. of fish	19,299	19,877	19,877	19,877
Total lbs.	1,097	908	891	1,030
Mortality	116	39	24	35
Density lbs/ft^3	0.53	0.44	0.43	0.50
lbs/gpm	3.13	2.59	2.55	2.94
Flow gpm	350	350	350	350
Treatment	Captive(hi BKD)	Captive	Captive	Captive
Upper Grande Ronde late				
No. of fish	Empty	23,366	23,366	23,366
Total lbs.		1,007	1,057	1,062
Mortality		4	3	3
Density lbs/ft^3		0.49	0.51	0.51
lbs/gpm		2.88	3.02	3.03
Flow gpm		350	350	350
Treatment		Conventional	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 2004.

Facility	Group	No. received	Size fish/lb	Accl. period	Volit begin
CCAF	Early	92,475	23.1	3/8-3/22	15-Mar
	Late	70,977	23.4	3/24-4/12	30-Mar
UGRAF	Early	78,930	20.3	3/9-3/22	15-Mar
	Late	70,098	22.4	3/25-4/12	31-Mar

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 2004.

				Temp.°C		DO mg/l		Volitional migration	
Facility	Group	Feed fed(lb.)	Total mort.(%)	min.	max.	min.	max.	Number	%
CCAF	Early	179	62 (0.07)	1.8	7.9	10.5	11.7	8,785	9.5
	Late	115	18 (0.03)	2.1	8.2	10.5	12.4	49,147	69.2
UGRAF	Early	58	214 (0.27)	-0.1	5.9	11.3	14.7	12,889	16.3
	Late	79	10 (0.01)	-0.1	7.1	10.6	12.3	34,085	48.6

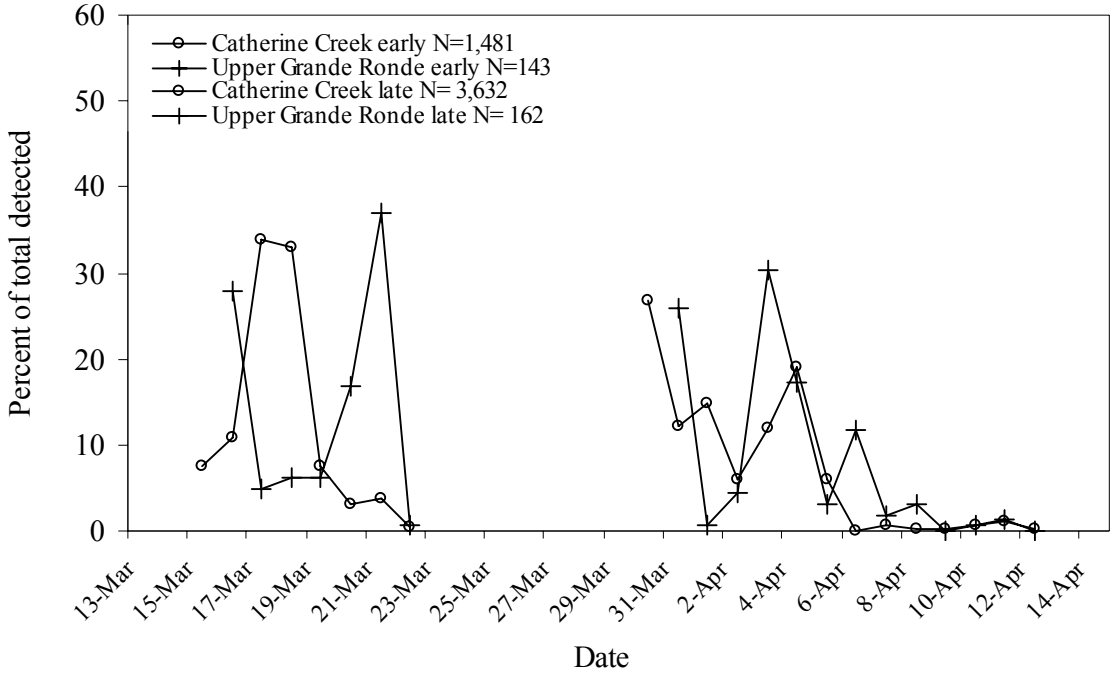

Figure 5. Daily PIT tag detections of fish leaving the raceways during the volitional release period at the Catherine Creek and Upper Grande Ronde acclimation facilities in 2004.

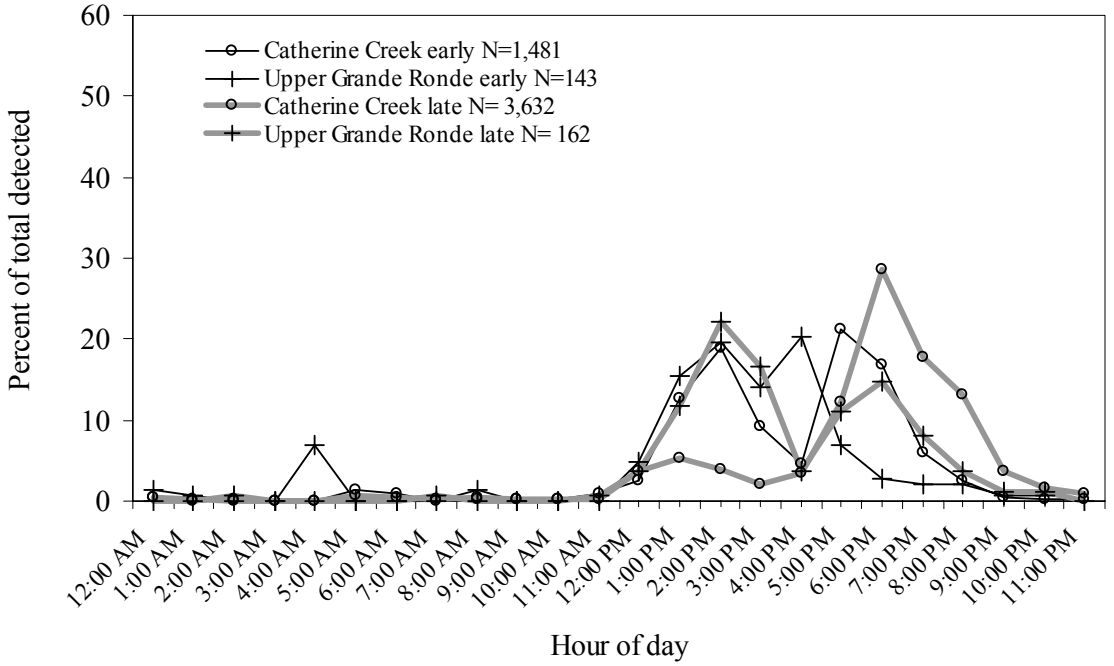

Figure 6. Hourly PIT tag detections of fish leaving the raceways during the volitional release period at the Catherine Creek and Upper Grande Ronde acclimation facilities in 2004.

The UGRAF received the early group of 78,930 smolts from LGH on 9 March 2004 (Table 1). This group was comprised entirely of progeny from the captive broodstock program. The average size of the fish at delivery was 20.3 fish/lb (Table 2). The densities in the raceways ranged from 0.43 to 0.53 lbs/ft3. The fish were allowed to volitionally leave the raceways beginning 16 March 2004. Any fish remaining on 22 March were forced from the facility after 1200 hours. During the volitional release period there was a total of 143 PIT-tagged fish scanned. Based on the number of PIT-tagged fish in the population (1.3%), an estimated 12,889 fish left during this time, this was 16.3% of the fish delivered to the facility (Table 3). Of the fish that left, 39.2% left the first 3 days of the 7 day volitional release (Figure 5). Hourly detections of PIT-tagged fish showed that most of the fish left from 1300 to 1900 hours (88.1%) peaking at 1700 hours (Figure 6). The total mortality for the acclimation period was 214 (0.27%). One of the raceways contained a group of fish that were labeled as a "high BKD" group. The mortality from this raceway was 116 fish, which was 54.2% of the total mortality. Removing this group from the total made the mortality from the early group 0.16%. Pathology examined 5 mortalities from raceway 1 and 5 from raceways 2 to 4 (personal communication, Sam Onjukka, Fish Pathologist, ODFW La Grande). There was an indication of gross bacterial kidney disease (BKD) in the mortality examined from all ponds. Two of fifteen fish grab sampled from raceway 1 had gross signs of BKD and ELISA values >0.800 the remaining fish had ELISA values ≤ 0.134. Two of fifteen fish grab sampled from raceways 2 to 4 had elevated ELISA values of 0.370 and 0.609 the remaining fish had ELISA values ≤ 0.140. All bacterial and viral cultures from these fish were negative. The fish were fed a total of 57.6 lbs of food for the acclimation period. The total number of fish in the early group that were released from the acclimation facility in 2004 was 78,716. 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 20.8 fish/lb.

The UGRAF received the late group of 70,098 smolts from LGH on 25 March 2004 (Table 1). This group was comprised entirely of conventional broodstock progeny. The average size of the fish at delivery was 22.4 fish/lb (Table 2). The raceway that held the "high BKD" group in the first acclimation group was left empty for this acclimation period for disinfection purposes. The densities in the raceways (3) ranged from 0.49 to 0.51 lbs/ft3. The fish were allowed to volitionally leave the raceways beginning 31 March 2004. Any fish remaining on 12 April were forced from the facility after 1200 hours. During the volitional release period there was a total of 242 PIT-tagged fish scanned. Based on the number of PIT-tagged fish in the population (0.7%), an estimated 34,085 fish left during this time, this was 48.6% of the fish delivered to the facility (Table 3). Of the fish that left, 81.5% left the first 6 days of the 13 day volitional release (Figure 5). Hourly detections of PIT-tagged fish showed that most of the fish left from 1200 to 2000 hours (98.1%) peaking at 1400 hours and again at 1800 hours (Figure 6). The total mortality for the acclimation period was 10 (0.01%). Pathology did not examine juveniles from this period since there were few mortalities recovered (personal communication, Sam Onjukka, Fish Pathologist, ODFW La Grande). The fish were fed a total of 78.5 lbs of food for the acclimation period. The total number of fish in the late group that were released from the acclimation facility in 2004 was 70,088. The size of the fish just before the

volitional release began was 22.4 fish/lb. The size of the fish that were forced from the facility was 22.4 fish/lb.

Hourly water temperatures were taken at both facilities in 2004 (Figures 7-10). The hourly movement of fish from the raceways at both facilities appears to be similar to the hourly water temperature fluctuations. Fish begin to leave the raceways around 1200 hours with numbers decreasing around 2200 which is the same curve as the hourly water temperature.

Maintenance and repair activities were conducted at the acclimation facilities in 2004. Facility maintenance work at the CCAF consisted of snow removal, installation of drainage lines around the compound, hand excavation of the intake area, overhaul of the travel trailer. Facility maintenance work at the UGRAF consisted of snow removal, removal of gravel from intake area, complete overhaul of the travel trailer, and replacement and repair of the raceway liners.

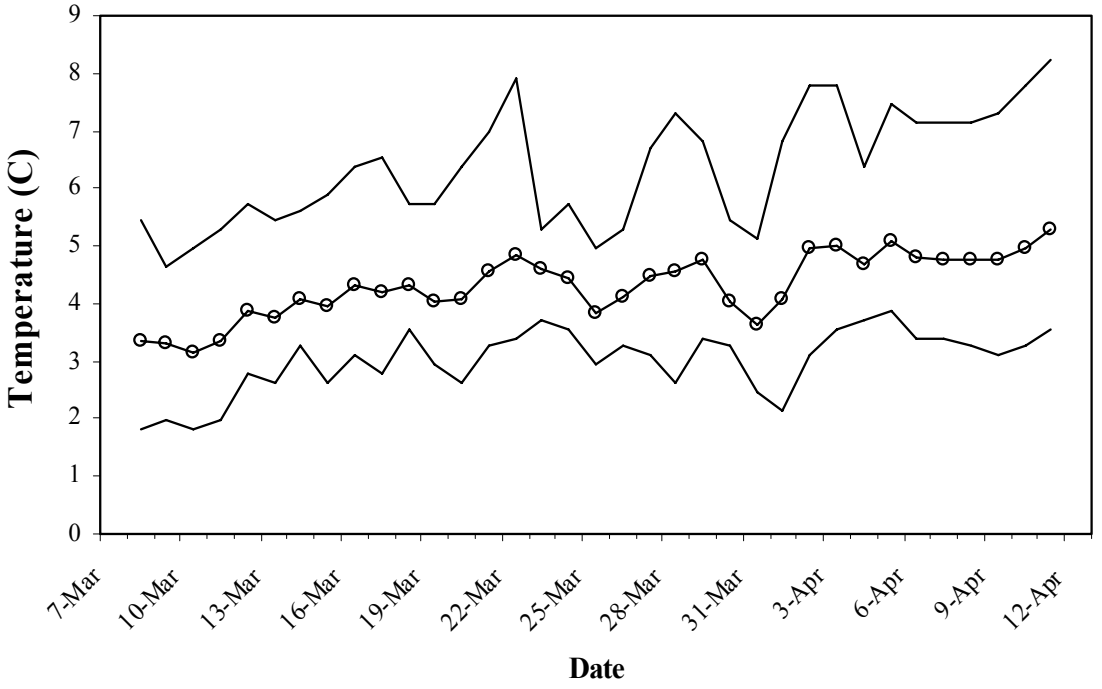

Figure 7. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Catherine Creek juvenile acclimation facility in 2004.

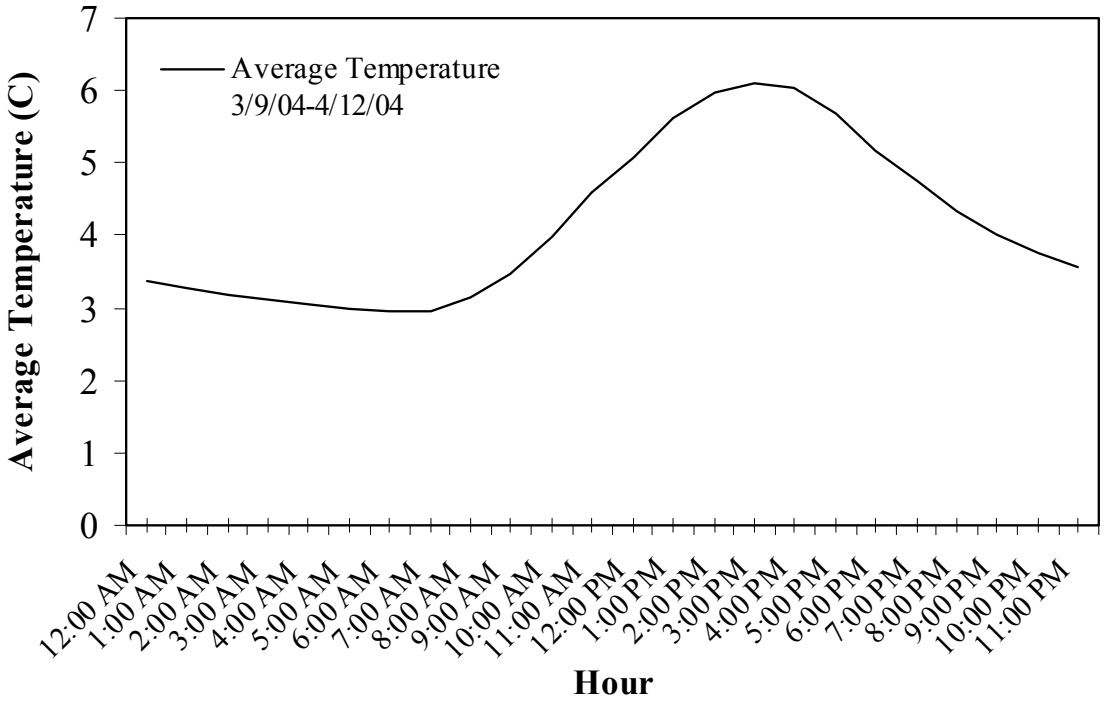

Figure 8. Average hourly water temperature at the Catherine Creek juvenile acclimation facility in 2004.

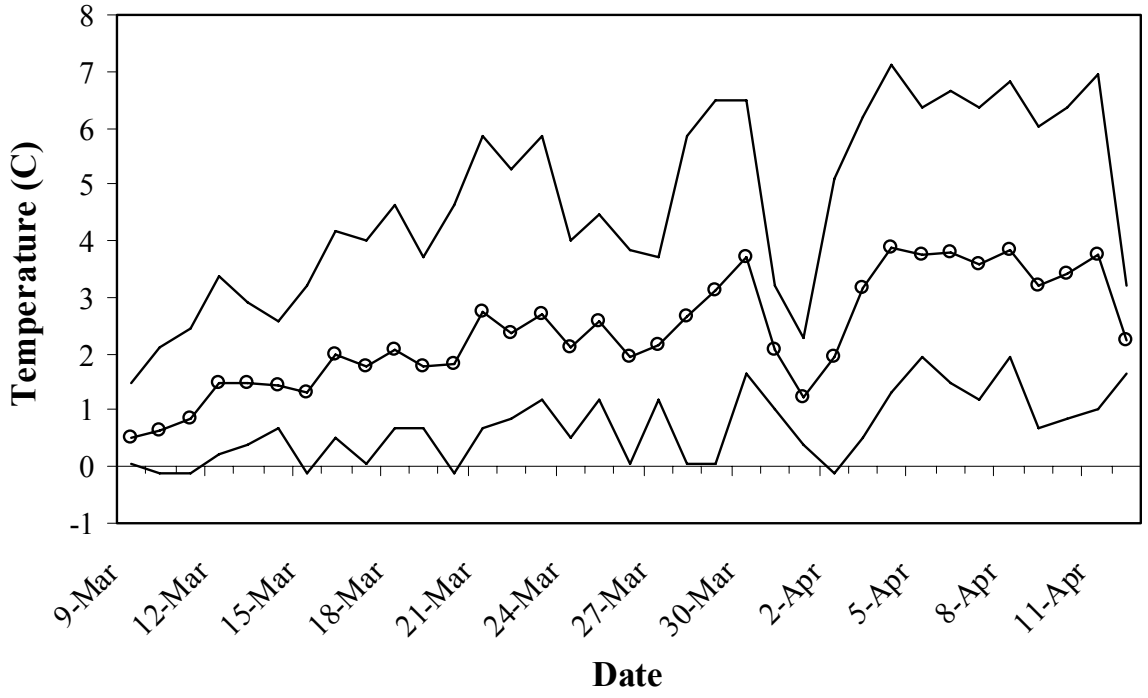

Figure 9. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Upper Grande Ronde juvenile acclimation facility in 2004.

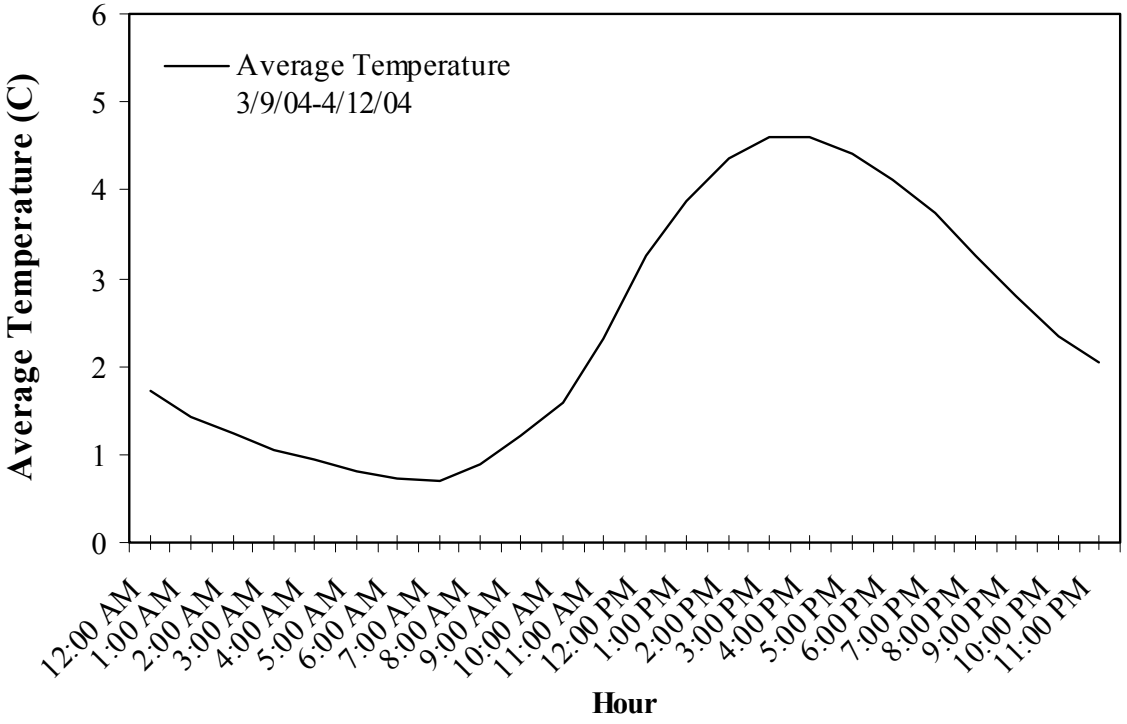

Figure 10. Average hourly water temperature at the Upper Grande Ronde juvenile acclimation facility in 2004.

Adult Collections

The CCACF was put into operation on 1 March 2004. The first adult summer steelhead was captured on 9 March. A total of 181 unmarked adult summer steelhead were trapped and released from 9 March to 5 June 2004 (Table 4, Figure 11). No adipose-clipped fish were captured. Peak arrival at the trap was the week of 25 March. Six previously trapped fish, as indicated by the presence of an opercle mark, were trapped and released, and 20 previously trapped kelts were recovered dead on the weir. There were 2 kelts recovered on the weir that were not previously punched. There was an unknown number of live kelts that passed downstream over the weir without handling.

The first adult spring chinook salmon was captured at CCACF on 17 May 2004. A total of 724 spring chinook salmon were trapped from 17 May to 12 August 2004 (Table 5, Figure 12). The total catch was made up of 83 age 4 and 5, and 6 age 3 unmarked and 575 age 4 and 5, and 60 age 3 marked spring chinook salmon. Peak arrival at the trap was the week of 3 June for the unmarked fish and 17 June for the marked fish with a smaller peak the week of 3 June for the marked fish. By the week of 3 June, 41.6% of the unmarked fish had been trapped compared to 28.7% of the marked fish. There were 5 mortalities (2 unmarked, 3 marked) in the trap in 2004. The 2 unmarked fish were intentionally sacrificed because of the presence of tumors on the fish. The sacrificing of these fish was done with co-manager approval (2004 LSRCP AOP) to investigate the type and possible cause of the tumors on these fish. One carcass (male) was recovered on the weir and the carcass had been previously handled at the trap.

Three weekly spring chinook spawning surveys were conducted below the weir on Catherine Creek beginning 15 July 2004. During these surveys only one jack was observed below the weir. The trap was removed from Catherine Creek on 18 August. Surveys conducted by ODFW above and below the weir in 2004 resulted in 94 redds counted above the weir and 2 redds counted below the weir. A total of 56 carcasses were recovered above the weir which was 28.0% of the total trapped and passed (200) above the weir and none were recovered below the weir. There were 53 punched fish in the recovery (94.3% trap efficiency) (2004 Spawning Ground Survey Results, ODFW, unpublished).

Table 4. Summer steelhead trap capture data from the Catherine Creek adult collection facility in 2004. Trapping began 1 March and ended 20 August.

	Trap Capture		Kelt	
Week	First time	Reruns	Not punched[a]	Punched
4-Mar	0			
11-Mar	7			
18-Mar	8			
25-Mar	56			
1-Apr	38			
8-Apr	17	2		1
15-Apr	24	1		
22-Apr	10	2		3
29-Apr	12			2
6-May	5			5
13-May	2			2
20-May	1	1		5
27-May	0			
3-Jun	0			1
10-Jun	1		1	
17-Jun	0			
24-Jun	0		1	1
1-Jul	0			
8-Jul	0			
15-Jul	0			
22-Jul	0			
29-Jul	0			
Totals	181	6	2	20

[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.*

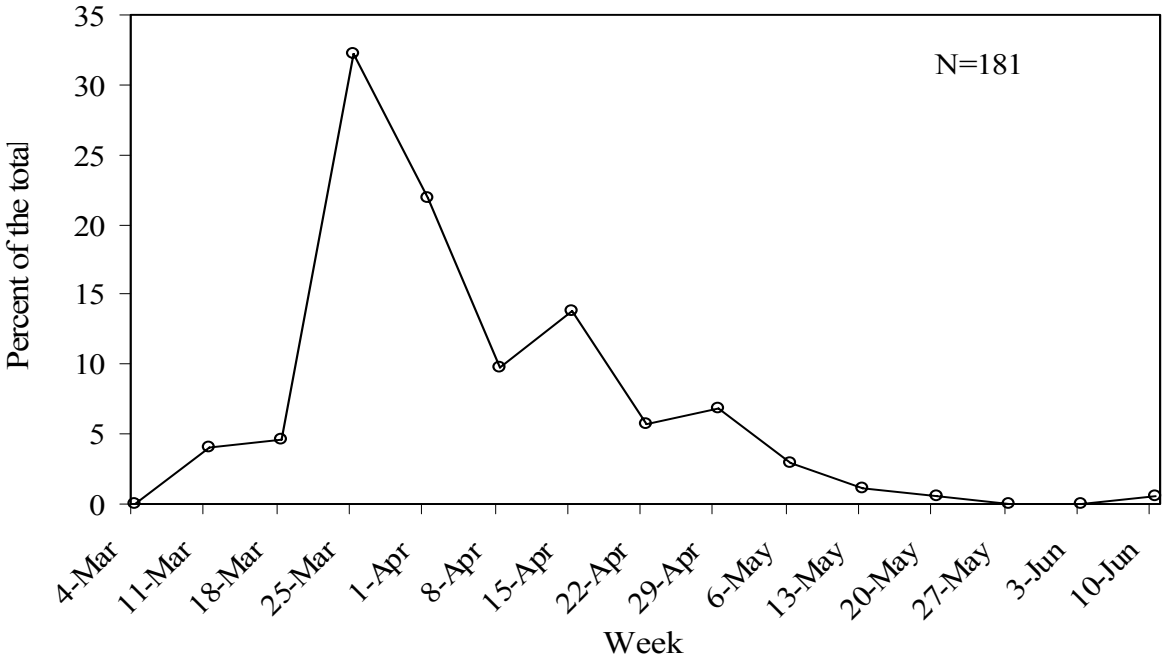

Figure 11. Summer steelhead arrival timing at the Catherine Creek adult collection facility in 2004.

Table 5. Spring chinook salmon trap capture, transport, and mortality data for the Catherine Creek stock at the adult collection facility in 2004. Trapping began 1 March and ended 18 August.

	Trap Capture		Brood	Trap
Week	Natural	Hatchery	hauled	mort
13-May	0	0		
20-May	4	18		
27-May	12	32	1	
3-Jun	21	132	6	1
10-Jun	14	107	4	1
17-Jun	13	164	1	1
24-Jun	11	118	5	1
1-Jul	8	36		
8-Jul	1	12		
15-Jul	2	9		1
22-Jul	1	2		
29-Jul	1	3		
5-Aug	0	1		
12-Aug	1	1	1	
19-Aug	0	0		
Totals	89	635	18	5[a]

[a] *This number includes 2 natural fish that were sacrificed due to the presence of tumors in the mouth area*

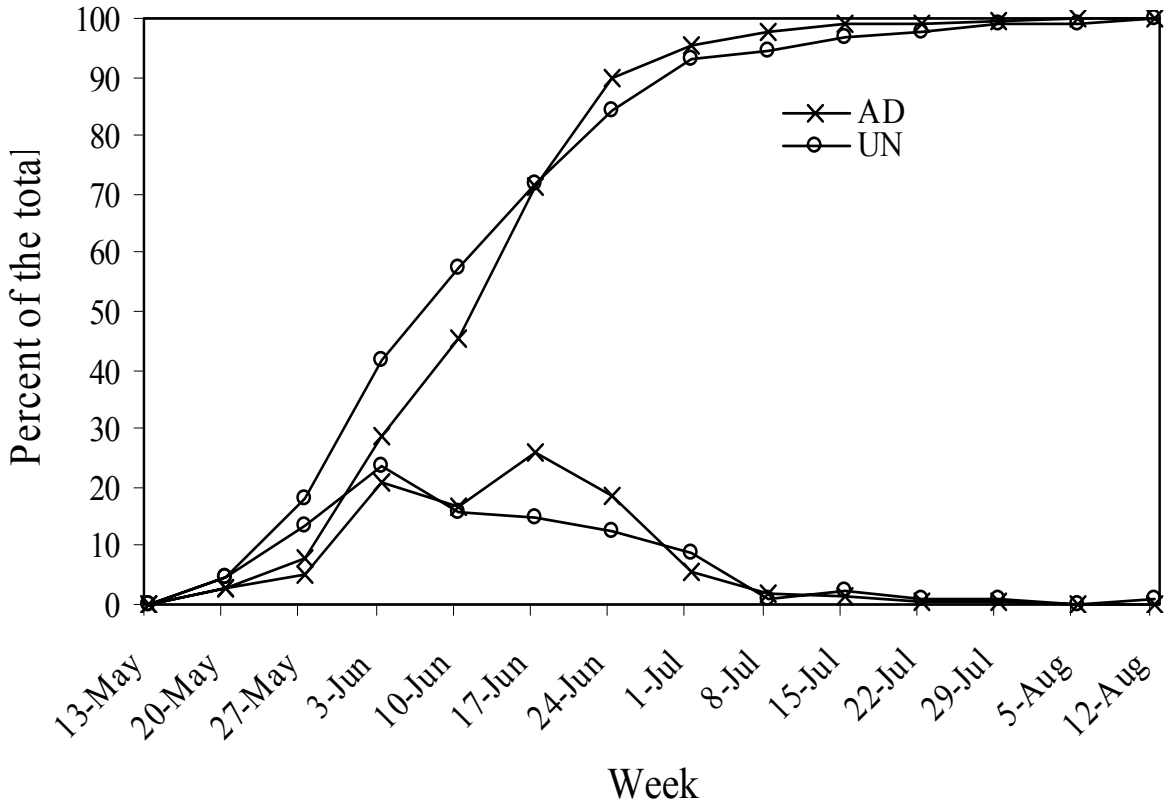

Figure 12. Hatchery and natural spring chinook salmon arrival timing at the Catherine Creek adult collection facility in 2004.

Weekly maximum temperatures at the CCACF ranged from 2.3°C to 23.7 °C on 3 March and 25 July respectively (Figure 13). Weekly minimum temperatures at the trap ranged from -0.1°C to 17.1°C on 3 March and 16 August respectively. The hourly temperatures at the adult trap during the period of operation showed that the lowest water temperatures usually occurred between 0500 and 0800 hours and the highest water temperatures usually occurred between 1500 and 1800 hours (Figure 14). The period of low water temperatures set the time of day that the trap was checked and the fish worked up. High stream flows that occurred the first weeks of June did not cause problems with the weir in 2004. In past years these high flows moved rocks down the creek which became lodged between the weir panel slats making it very difficult to lift the weir to the full upright position. Modifications that were made to the weir prior to the 2004 trapping season (removal of small rocks immediately above weir, and new panels that were fabricated with 1 inch round pipe pickets on the panels instead of the existing ½ x 4 inch flat HDPE slats) appeared to reduce the pressure on the weir.

Maintenance and repair activities were conducted at the facility in 2004. Maintenance work at the CCACF consisted of construction of debris barrier in front of the intake, maintenance of weir, removal of gravel from the fishway and trapping channel, and weed abatement.

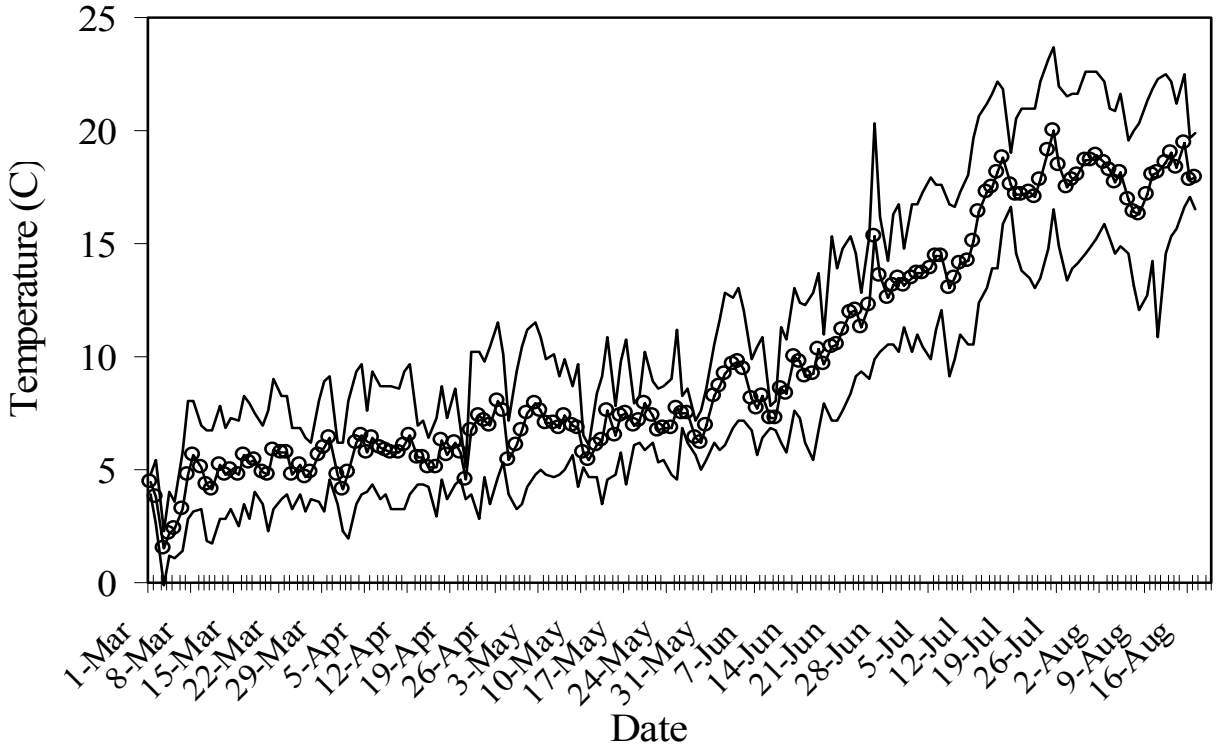

Figure 13. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Catherine Creek adult collection facility in 2004.

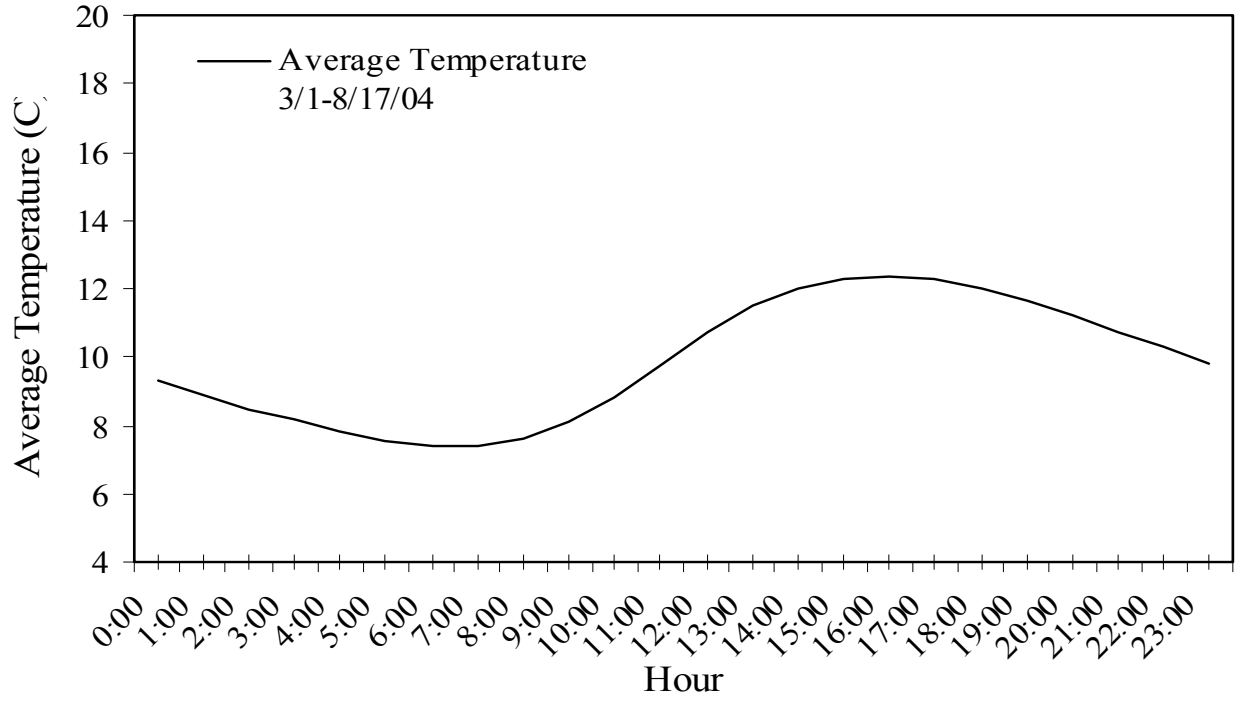

Figure 14. Average hourly water temperature at the Catherine Creek adult collection facility in 2004.

The UGRACF was put into operation on 1 March 2004. The first adult summer steelhead was captured on 17 March 2004. A total of 63 unmarked adult summer steelhead were trapped and released from 17 March to 26 May 2004 (Figure 15, Table 6). No fin clipped fish were captured. Peak arrival at the trap was the week of 1 April with a smaller peak the week of 29 April. Four previously trapped fish were trapped a second time, and 3 previously trapped kelts were recovered dead on the weir. There was an unknown number of live kelts that passed downstream over the weir without handling.

The first adult spring chinook salmon was captured at UGRACF on 26 May 2004. A total of 466 spring chinook salmon were trapped from 26 May to 31 July 2004 (Figure 16, Table 7). The total catch was made up of 28 age 4 and 5, and 5 age 3 unmarked and 376 age 4 and 5, and 57 age 3 marked spring chinook salmon. Peak arrival at the trap for both unmarked and marked fish was the week of 24 June. There was trap mortality on 18 and 21 June, and 2 on 22 June.

On the Upper Grande Ronde River 3 weekly spring chinook surveys were conducted from the weir to 1 mile below the weir beginning 8 July 2004. During these surveys an average of 15 live fish were observed and no carcasses were recovered. Surveys conducted by ODFW above the weir in 2004 resulted in 134 redds counted above the weir and 51 redds counted below the weir. A total of 128 carcasses were recovered above the weir which was 30.7% of the total trapped and passed (417). There were 115 punched fish in the recovery (89.8% trap efficiency) for a population estimate of 464 fish (2004 Spawning Ground Survey Results, ODFW, unpublished).

In 2003 there was a problem with fish jumping at the front of the trapbox. The jumping occurred during the receding of the higher spring flows. The jumping may have been due to the fact that the new trapbox in use was 10 feet wide and flat (not angled into the trap). We observed at least 5 fish jump over the weir in 2003. This did not provide the fish with the guidance they needed to find the entrance to the trap causing them to jump and possibly resulting in the high number of fish holding just below the weir (39% of the total above the weir). The trapping efficiency in 2003 was 78.9% compared to the near 90% seen in 2004. In 2004 the front of the trapbox was redesigned with angled panels that guided the fish in the fyke opening (Figure 4). There were still fish holding below the weir but because we trapped considerably more fish in 2004 the percentage of the total population was low (4%).Weekly maximum temperatures at the UGRACF ranged from 0.3^{o}C to 26.1^{o}C on 5 March and 25 July respectively (Figure 17). Weekly minimum temperatures at the trap ranged from 0.0^{o}C to 16.0^{o}C on 5 March and 18 July respectively. The hourly temperatures at the adult trap during the period of operation showed that the lowest water temperatures usually occurred between 0500 and 0800 hours and the highest water temperatures usually occurred between 1500 and 1800 hours (Figure 18). The period of low water temperatures set the time of day that the trap was checked and the fish worked up.

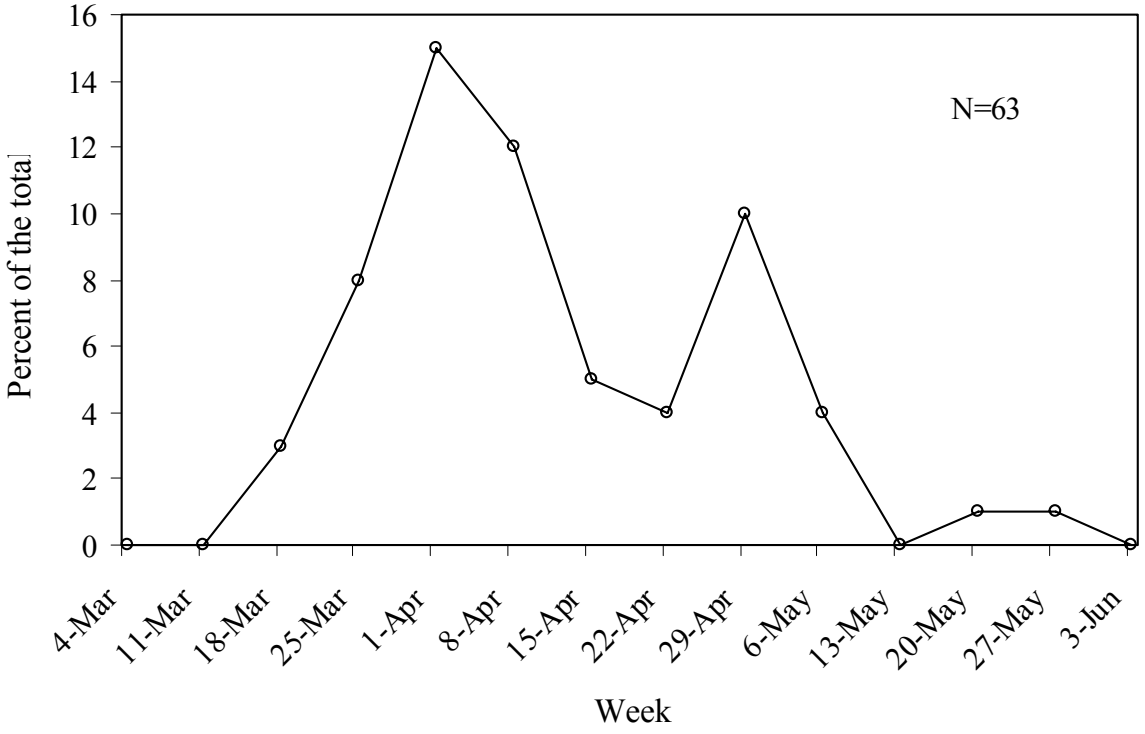

Figure 15. Summer steelhead arrival timing at the Upper Grande Ronde adult collection facility in 2004.

Table 6. Summer steelhead trap capture data from the Upper Grande Ronde adult collection facility in 2004. Trapping began 1 March and ended 9 August.

	Trap Capture		Kelt	
Week	First time	Reruns	Not punched[a]	Punched
3/18	3			
3/25	8	1		
4/1	15	3		
4/8	12	1		
4/15	5	2		
4/22	4	2		
4/29	10			
5/6	4			1
5/13	0	1		1
5/20	1			1
5/27	1			
Totals	63	10	0	3

[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.*

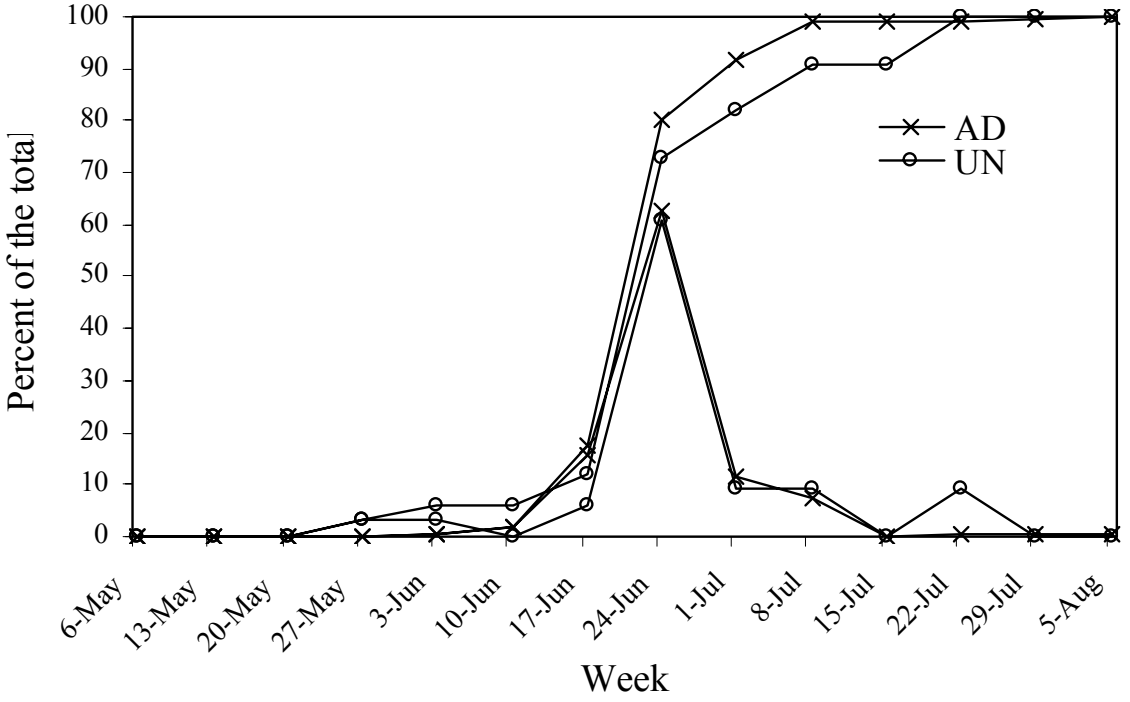

Figure 16. Hatchery and natural spring chinook salmon arrival timing at the Upper Grande Ronde adult collection facility in 2004.

Table 7. Spring chinook salmon trap capture, transport, and mortality data for the Grande Ronde Creek stock at the adult collection facility and Lookingglass Hatchery in 2004. Trapping began 1 March and ended 9 August.

	Trap Capture		Brood	Trap
Week	Natural	Hatchery	hauled	mort
13-May	0	0		
20-May	0	0		
27-May	1	0	0	
3-Jun	1	1	0	
10-Jun	0	7	0	
17-Jun	2	68	2	
24-Jun	20	271	9	4
1-Jul	3	50	2	
8-Jul	3	32	2	
15-Jul	0	0	0	
22-Jul	3	1	2	
29-Jul	0	2	0	
5-Aug	0	1	0	
Totals	33	433	17	4

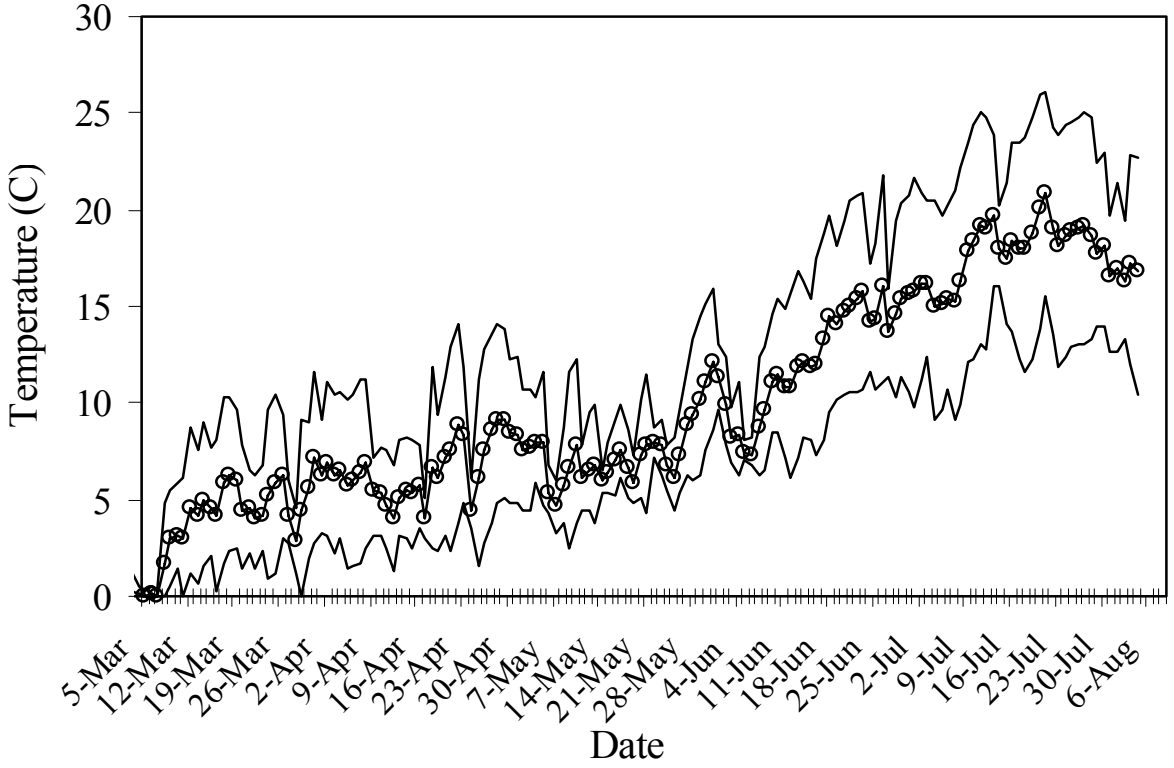

Figure 17. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Upper Grande Ronde adult collection facility in 2004.

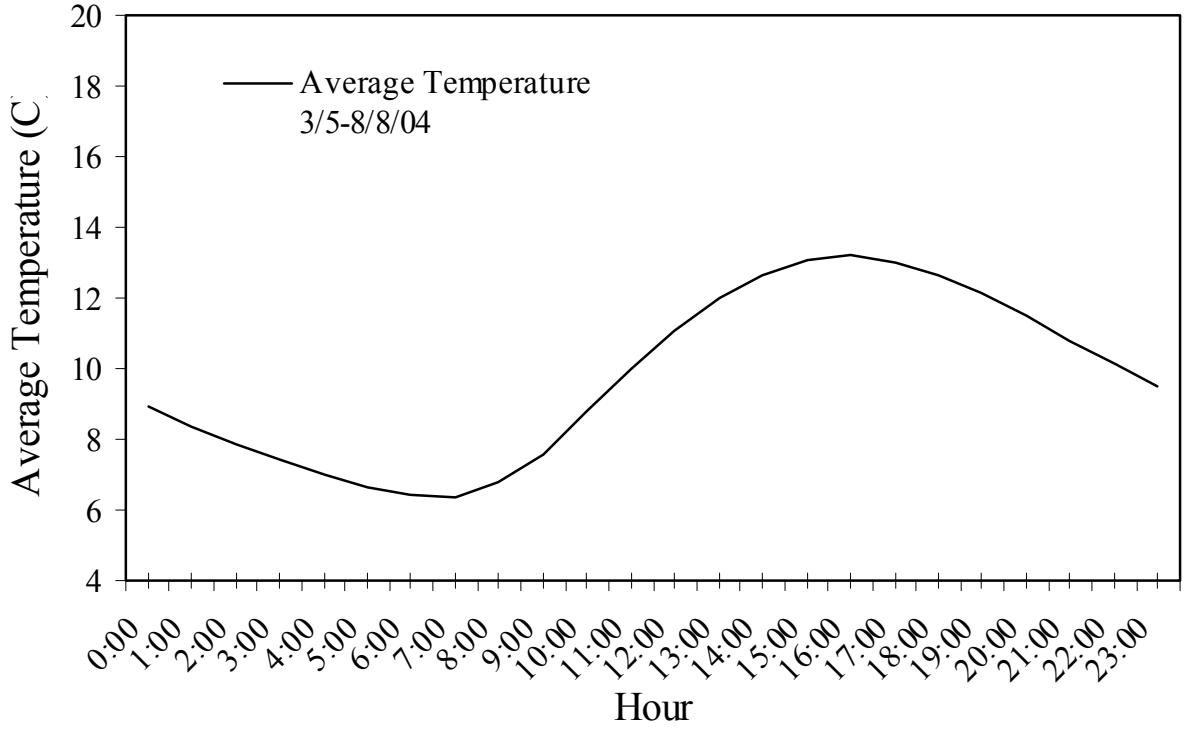

Figure 18. Average hourly water temperature at the Upper Grande Ronde adult collection facility in 2004.

Maintenance and repair activities were conducted at the facility in 2004. 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.

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. 2003. 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. 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 spring chinook salmon return to Catherine Creek for 2004 was 1,023 (159 natural + 864 captive returns). Based on these predictions the sliding scale called for retaining 20% of the adult (age 4 and 5) returning natural population. Since the predicted total return was more than 500 fish the percent of adults released above the weir that can be of hatchery origin is 50. Before the return began a harvest plan was implemented to deal with the surplus of hatchery fish that would result from the sliding scale. It was agreed by co-managers that 1 of 4 captive hatchery returns would be passed above the weir. Fish that were not passed above the weir had three dispositions: transported to Lookingglass Creek for a fishery/natural spawning, taken as broodstock for the Lookingglass Hatchery program, and outplanted into Indian Creek. There was no conventional hatchery program until the 2001 broodyear so all returning hatchery fish (with the exception of jacks) were of captive broodstock origin and were not to be taken for broodstock. The actual number of hatchery adults trapped was 575 and from these fish 125 were passed upstream (21.7%). The natural adult return was 83 fish which was 52.2% of the predicted number. The percentage of hatchery fish above the weir in 2004 was 65.8%. There were 226 hatchery fish (201 adult, 25 jack) outplanted to Lookingglass Creek, 87 adults were taken as broodstock, and 48 (45 adults, 3 jacks) were outplanted into Indian Creek. Natural jacks were collected for broodstock at a rate of 1 jack for every 5 males in the broodstock.

The broodstock collected and transported from CCACF were entirely from the unmarked fish trapped with the exception of 1 conventional broodstock jack. None of the captive broodstock returns, which comprised the entire return of hatchery fish (with the exception of the jacks), were collected for broodstock. Adult broodstock was collected systematically over the entire return from 24 May to 12 August 2004. Every 5th adult male and female sampled was taken to LGH for broodstock (conventional). One unmarked jack was collected for every 5 adult males that were taken to LGH. A total of 16 age 4 and 5 unmarked, 1 age 3 unmarked, and 1 age 3 hatchery fish were transported to LGH for broodstock. The adult portion of the broodstock was 20.5% of the adult natural return trapped (Appendix Table 4). The estimation of the sex of the adult fish at the weir was 87.5% accurate based on the

accuracy of 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.

The predicted spring chinook salmon return to the Upper Grande Ronde River for 2004 was 886 (189 natural + 697 captive returns). 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 (3 year fish only in 2004). The actual number of hatchery adults trapped was 376 and from these fish 372 were passed upstream (98.9%)(4 trap mortalities). The natural adult return was 28 fish which was 14.8% of the predicted number. The percentage of hatchery fish above the weir in 2004 was 96.4%. Jacks were collected for broodstock at a rate of 1 jack for every 5 males in the broodstock.

The broodstock collected and transported from UGRACF were also made up entirely of unmarked fish with the exception of 1 conventional broodstock jack. Broodstock was collected systematically over the entire return from 15 June to 20 July 2004. Every other adult male and female sampled was taken to LGH for broodstock. A total of 14 age 4 and 5, 2 age 3 unmarked fish and 1 age 3 marked fish (conventional broodstock) were transported to LGH for broodstock. The adult portion of the broodstock was 50.0% of the adult natural return trapped (Appendix Table 4). The estimation of the sex of the adult fish at the weir was 92.9% 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.

Broodstock Activities

Lookingglass Hatchery

A total of 9 females and 6 males were spawned from the Catherine Creek stock spring chinook salmon at LGH in 2004 (Table 8). Six of the 7 family groups were 1 female with 2 males. The remaining family group was 3 females with 2 males. Recycled males were used in 4 of the family groups. There were no mortalities (pre-spawn) at the hatchery and 2 males (killed not spawned) that did not have viable gametes. Peak spawning date at LGH occurred on 2 September 2004.

A total of 7 females and 8 males were spawned from the Grande Ronde stock spring chinook salmon at LGH in 2004 (Table 9). There were 3, 2, 1, and 1 females in each of the 4 family groups spawned and 2 males were used with each. There was 1 male used in 2 different family groups. There was one female and one jack mortality at the hatchery. These 2 fish died after they jumped out of the pond. Peak spawning date at LGH occurred on 9 September 2004.

In 2004 the tanks that the broodstock are placed into to were switched to rule out a tank effect on the fish that may have been causing the higher mortality seen in the Grande Ronde stock in previous years. There was no mortality (not including the

jumpouts) in the Grande Ronde stock and no mortality for the Catherine Creek stock. The Catherine Creek pond, however, had much more sediment accumulating at the bottom than the Grande Ronde pond. This sediment could be a source of pathogens and recommendations will be made in 2005 that the ponds are swept out when sediment begins to accumulate.

A total of 53 females and 56 males were spawned from the Lookingglass Creek stock spring chinook salmon at LGH in 2004 (Table 10). There were 2 females in 25 of the 26 family groups spawned and 3 females in 1. There were 2 males were used in 25 family groups and 3 jacks combined in 1. There were no males used in multiple family groups. There were 6 female and 5 male mortalities at the hatchery. Peak spawning date at LGH occurred on 9 September 2004. The total egg take for the Lookingglass Creek stock was 151,853 which was below the goal of 200,000 (75% survival from egg to smolt). Prior to spawning, 73 female broodstock had been collected. Estimated fecundity of 4,000 eggs/female was used to get close to the egg take goal of 200,000. It was decided to release 18 females and 22 males back into Lookingglass Creek to avoid surplus production. The actual fecundity of the fish spawned was 2,865 which put us well below the egg take goal. The low fecundity was due to the fact that all of the fish collected were 4-year-olds and the original fecundity estimate used a mixture of 4 and 5-year-old fish.

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. 2005. Assistance was also provided to ODFW for the spawning of the Grande Ronde Basin captive broodstocks at Bonneville Hatchery in 2004. Details of the spawning operation can be obtained in Hoffnagle et. al. 2005.

Table 8. Spawning information from Catherine Creek spring chinook salmon broodstock at Lookingglass Hatchery in 2004.

	Mortality		Spawned		
Date	Female	Male	Female	Fresh male	Recycled male
Till 8/5					
12-Aug					
19-Aug					
26-Aug					
2-Sep			3	2	
9-Sep			1	2	
13-Sep			1		2
16-Sep			1		2
20-Sep			1	2	
23-Sep			1		2
27-Sep			0		
30-Sep			1		2
Totals	0	0	9	6	8

Table 9. Spawning information from Grande Ronde spring chinook salmon broodstock at Lookingglass Hatchery in 2004.

	Mortality [a]		Spawned		
Date	Female	Male	Female	Fresh male	Recycled male
Till 8/5	1	1			
12-Aug					
19-Aug			1	1	
26-Aug					
2-Sep			2	2	
9-Sep			3	2	
13-Sep			1	1	1
Totals	1	1	7	6	1

a These fish jumped out of the circular tank and died on 18 and 21 June..

Table 10. Spawning information from Lookingglass Creek spring chinook salmon broodstock at Lookingglass Hatchery in 2004.

	Mortality		Spawned		
Date	Female	Male	Female	Fresh male	Recycled male
Till 7/19	3	2			
12-Aug	1	1			
19-Aug	1	1			
26-Aug		1	2	2	
2-Sep			16	16	
9-Sep	1		20	23	
13-Sep			15	15	
Totals	6	5	53	56	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	Group[a]	No. received	Size fish/lb	Density lbs/f^3	Accl. period	Volit begin
CC 00	Single	38,009	23.6	0.20	2/28-4/18	4/2
CC 01	Single	137,588	19.6	0.85	3/8-4/16	4/2
CC 02	Single	180,912	17.4	1.26	2/26-4/15	4/2
CC 03	Early	105,352	12.8	1.00	3/7-3/23	3/13
CC 03	Late	24,404	12.6	0.47	3/24-4/14	3/31
GR 00	Single	1,540	19.4	0.04	2/28-3/14	(none)
GR 01	Single	2,570	13.9	0.09	2/27-3/27	(none)
GR 02	Single	201,958	18.4	1.33	2/27-4/15	4/2
GR 03	Early	110,169	14.2	1.14	3/10-3/23	3/17
GR 03	Late	127,631	13.6	0.94	3/24-4/14	3/30

[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	Group[a]	Feed fed	Total mort.(%)	Temp.°C min.	Temp.°C max.	DO mg/l min.	DO mg/l max.	Volit. migr.	%
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
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

[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. Daily summer steelhead trapping data from the Catherine Creek adult collection facility in 2004.

		Trapped		Sacrificed/mort		Recaptures at trap	
Date	Total	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.
9-Mar	3	0	3	0	0	0	0
10-Mar	4	0	4	0	0	0	0
17-Mar	8	0	8	0	0	0	0
19-Mar	24	0	24	0	0	0	0
21-Mar	6	0	6	0	0	0	0
22-Mar	11	0	11	0	0	0	0
24-Mar	15	0	15	0	0	0	0
26-Mar	7	0	7	0	0	0	0
29-Mar	19	0	19	0	0	0	0
31-Mar	12	0	12	0	0	0	0
MAR	109	0	109	0	0	0	0
2-Apr	5	0	5	0	0	0	2
5-Apr	11	0	11	0	0	0	1
7-Apr	1	0	1	0	0	0	0
9-Apr	3	0	3	0	0	0	0
12-Apr	14	0	14	0	0	0	0
14-Apr	7	0	7	0	0	0	1
16-Apr	3	0	3	0	0	0	0
19-Apr	4	0	4	0	0	0	1
21-Apr	3	0	3	0	0	0	1
22-Apr	0	0	0	0	0	0	0
26-Apr	3	0	3	0	0	0	0
28-Apr	9	0	9	0	0	0	0
30-Apr	3	0	3	0	0	0	0
APR	66	0	66	0	0	0	6
3-May	1	0	1	0	0	0	0
5-May	1	0	1	0	0	0	0
7-May	0	0	0	0	0	0	0
13-May	2	0	2	0	0	0	0
17-May	1	0	1	0	0	0	1
18-May	0	0	0	0	0	0	0
20-May	0	0	0	0	0	0	0
MAY	5	0	5	0	0	0	1
1-Jun	0	0	0	0	0	0	0
2-Jun	0	0	0	0	0	0	0
5-Jun	1	0	1	0	0	0	0
7-Jun	0	0	0	0	0	0	0
17-Jun	0	0	0	0	0	0	0
21-Jun	0	0	0	0	0	0	0
23-Jun	0	0	0	0	0	0	0
JUN	1	0	1	0	0	0	0
Total	181	0	181	0	0	0	7

Appendix Table 5. Daily spring chinook salmon trapping data from the Catherine Creek adult collection facility in 2004.(Hatchery brood was for Lookingglass Creek)

		Trapped				Sacrificed/mort				Brood collected			
		Adults		Jacks		Adults		Jacks		Adults		Jacks	
Date	Total	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.
17-May	9	8	1	0	0	0	0	0	0	0	0	0	0
18-May	8	7	1	0	0	0	0	0	0	0	0	0	0
20-May	5	3	2	0	0	0	0	0	0	2	0	0	0
23-May	21	13	8	0	0	0	0	0	0	0	0	0	0
24-May	3	2	1	0	0	0	0	0	0	2	1	0	0
26-May	6	5	1	0	0	0	0	0	0	5	0	0	0
27-May	14	12	2	0	0	0	0	0	0	0	0	0	0
28-May	23	23	0	0	0	0	0	0	0	0	0	0	0
29-May	7	3	4	0	0	0	0	0	0	3	3	0	0
MAY	96	76	20	0	0	0	0	0	0	12	4	0	0
1-Jun	45	38	5	1	1	0	0	0	0	0	0	0	0
2-Jun	42	37	5	0	0	0	0	0	0	33	2	0	0
3-Jun	35	29	5	0	1	0	1	0	0	26	0	0	1
4-Jun	34	26	6	2	0	0	0	0	0	0	0	0	0
5-Jun	10	9	1	0	0	0	0	0	0	0	0	0	0
7-Jun	12	10	2	0	0	0	1	0	0	9	1	0	0
9-Jun	65	57	6	2	0	0	0	0	0	32	4	0	0
11-Jun	9	8	0	1	0	0	0	0	0	8	0	1	0
14-Jun	114	100	9	5	0	1	0	0	0	40	0	1	0
16-Jun	31	25	2	3	1	0	0	0	0	8	1	1	0
17-Jun	23	20	1	2	0	0	0	0	0	0	0	0	0
18-Jun	7	5	1	1	0	0	0	0	0	4	1	1	0
21-Jun	68	47	6	15	0	1	0	0	0	15	2	0	0
23-Jun	33	30	3	0	0	0	0	0	0	6	1	0	0
24-Jun	22	21	1	0	0	0	0	0	0	0	0	0	0
25-Jun	20	4	3	11	2	0	0	8	0	0	0	0	0
28-Jun	17	9	1	6	1	0	0	6	0	0	0	0	0
30-Jun	7	5	1	1	0	0	0	0	0	3	0	0	0
JUN	594	480	58	50	6	2	2	14	0	184	12	4	1
2-Jul	9	6	0	3	0	0	0	3	0	0	0	0	0
6-Jul	4	3	1	0	0	0	0	0	0	2	0	0	0
9-Jul	7	2	1	4	0	1	0	4	0	0	0	0	0
14-Jul	3	2	0	1	0	0	0	1	0	0	0	0	0
15-Jul	1	0	1	0	0	0	0	0	0	0	0	0	0
16-Jul	2	1	1	0	0	0	0	0	0	0	0	0	0
19-Jul	1	1	0	0	0	0	0	0	0	0	0	0	0
20-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0
26-Jul	3	1	1	1	0	0	0	1	0	1	0	0	0
28-Jul	1	1	0	0	0	0	0	0	0	1	0	0	0
JUL	31	17	5	9	0	1	0	9	0	4	0	0	0
4-Aug	1	0	0	1	0	0	0	0	0	0	0	0	0
5-Aug	0	1	-1	0	0	0	0	0	0	1	-1	0	0
12-Aug	2	1	1	0	0	0	0	0	0	0	1	0	0
26-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0
AUG	3	2	0	1	0	0	0	0	0	1	0	0	0
Total	724	575	83	60	6	3	2	23	0	201	16	4	1

Appendix Table 6. Daily summer steelhead trapping data from the Upper Grande Ronde adult collection facility in 2004.

		Trapped		Sacrificed/mort		Recaptures at trap	
Date	Total	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.
17-Mar	3	0	3	0	0	0	0
19-Mar	1	0	1	0	0	0	1
22-Mar	4	0	4	0	0	0	0
24-Mar	3	0	3	0	0	0	0
26-Mar	0	0	0	0	0	0	1
29-Mar	7	0	7	0	0	0	0
31-Mar	8	0	8	0	0	0	2
MAR	26	0	26	0	0	0	4
5-Apr	8	0	8	0	0	0	0
7-Apr	4	0	4	0	0	0	1
9-Apr	3	0	3	0	0	0	1
12-Apr	2	0	2	0	0	0	1
16-Apr	3	0	3	0	0	0	0
21-Apr	1	0	1	0	0	0	0
23-Apr	3	0	3	0	0	0	0
26-Apr	3	0	3	0	0	0	0
28-Apr	4	0	4	0	0	0	0
30-Apr	1	0	1	0	0	0	0
APR	32	0	32	0	0	0	3
3-May	1	0	1	0	0	0	0
4-May	1	0	1	0	0	0	0
5-May	1	0	1	0	0	0	0
7-May	0	0	0	0	0	0	1
18-May	0	0	0	0	0	0	0
19-May	1	0	1	0	0	0	0
20-May	0	0	0	0	0	0	0
26-May	1	0	1	0	0	0	0
MAY	5	0	5	0	0	0	1
Total	63	0	63	0	0	0	8

Appendix Table 7. Daily spring chinook salmon trapping data from the Upper Grande Ronde adult collection facility in 2004.

		Trapped				Sacrificed/mort				Brood collected			
		Adults		Jacks		Adults		Jacks		Adults		Jacks	
Date	Total	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.
26-May	1	0	1	0	0	0	0	0	0	0	0	0	0
MAY	1	0	1	0	0	0	0	0	0	0	0	0	0
1-Jun	1	0	1	0	0	0	0	0	0	0	0	0	0
3-Jun	1	1	0	0	0	0	0	0	0	0	0	0	0
4-Jun	1	1	0	0	0	0	0	0	0	0	0	0	0
7-Jun	1	1	0	0	0	0	0	0	0	0	0	0	0
9-Jun	5	5	0	0	0	0	0	0	0	0	0	0	0
11-Jun	2	2	0	0	0	0	0	0	0	0	0	0	0
14-Jun	21	21	0	0	0	0	0	0	0	0	0	0	0
15-Jun	29	27	1	1	0	0	0	0	0	0	1	0	0
16-Jun	9	7	1	1	0	0	0	0	0	0	1	0	0
17-Jun	9	9	0	0	0	0	0	0	0	0	0	0	0
18-Jun	87	80	1	5	1	1	0	0	0	0	1	0	1
19-Jun	22	17	3	2	0	0	0	0	0	0	0	0	0
21-Jun	98	78	5	15	0	1	0	1	0	0	4	1	0
22-Jun	38	30	4	3	1	2	0	2	0	0	0	0	0
23-Jun	22	12	2	7	1	0	0	2	0	0	2	0	0
24-Jun	24	12	2	10	0	0	0	9	0	0	0	0	0
25-Jun	12	10	0	2	0	0	0	2	0	0	0	0	0
28-Jun	22	18	2	1	1	0	0	1	0	0	1	0	1
30-Jun	19	14	0	5	0	0	0	5	0	0	0	0	0
JUN	423	345	22	52	4	4	0	22	0	0	10	1	2
2-Jul	31	22	3	6	0	0	0	6	0	0	2	0	0
6-Jul	4	4	0	0	0	0	0	0	0	0	0	0	0
16-Jul	1	0	0	0	1	0	0	0	0	0	0	0	0
20-Jul	3	1	2	0	0	0	0	0	0	0	2	0	0
26-Jul	2	2	0	0	0	0	0	0	0	0	0	0	0
31-Jul	1	1	0	0	0	0	0	0	0	0	0	0	0
JUL	42	30	5	6	1	0	0	6	0	0	4	0	0
Total	466	375	28	58	5	4	0	28	0	0	14	1	2

Appendix Table 8. Adult summer steelhead trapping summary from the Catherine Creek adult collection facility in 1997-2003.

		Trapped		Sacrificed/mort		Recaptures at trap	
Year	Total	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.
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

Appendix Table 9. Adult summer steelhead trapping summary from the Upper Grande Ronde River adult collection facility in 1997-2003.

		Trapped		Sacrificed/mort		Recaptures at trap	
Date	Total	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.
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

Appendix Table 10. Adult spring chinook salmon trapping summary from the Catherine Creek adult collection facility in 1997-2003.

		Trapped				Sacrificed/mort				Brood collected			
		Adults		Jacks		Adults		Jacks		Adults		Jacks	
Year	Total	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.
1997	2	0	2	0	0	0	0	0	0	0	0	0	0
1998	28	0	28	0	0	0	0	0	0	0	0	0	0
1999	16	0	16	0	0	0	0	0	0	0	0	0	0
2000	22	0	22	0	0	0	1	0	0	0	0	0	0
2001	124	0	84	30	10	0	0	30	0	0	21	0	3
2002	311	133	156	10	12	1	0	0	0	0	33	0	5
2003	559	235	248	70	6	1	2	51	0	0	49	0	2

Appendix Table 11. Adult spring chinook salmon trapping summary from the Upper Grande Ronde River adult collection facility in 1997-2003.

		Trapped				Sacrificed/mort				Brood collected			
		Adults		Jacks		Adults		Jacks		Adults		Jacks	
Year	Total	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.
1997	6	0	6	0	0	0	0	0	0	0	0	0	0
1998	33	0	33	0	0	0	4	0	0	0	0	0	0
1999	1	0	1	0	0	0	0	0	0	0	0	0	0
2000	17	0	17	0	0	0	2	0	0	0	0	0	0
2001	50	0	50	0	0	0	0	0	0	0	21	0	0
2002	105	3	101	0	1	0	2	0	0	0	48	0	1
2003	188	4	144	36	2	0	1	31	0	0	71	0	1