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Grande Ronde Endemic Spring Chinook Salmon Supplementation Program

Satellite Facilities Operation and Maintenance

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Grande Ronde Endemic Spring Chinook Salmon Supplementation Program Satellite Facilities Operation and Maintenance

Annual Report

1 January 2005 through 31 December 2005

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ABSTRACT

There were 2 acclimation periods at the Catherine Creek Acclimation Facility (CCAF) in 2005. During the early acclimation period, 130,748 smolts were delivered from Lookingglass Hatchery (LGH) on 7 March. This group contained progeny of both the captive (53%) and conventional broodstock programs. The size of the fish at delivery was 23.9 fish/lb. Volitional releases began 14 March 2005 and ended 27 March with an estimated total (based on PIT tag detections of 3,187) of 29,402 fish leaving the raceways. This was 22.5% 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 around 1900 hours. The size of the fish just before the volitional release was 23.9 and the size of the fish remaining just before the forced release was 23.2 fish/lb. The total mortality for the acclimation period was 204 (0.16 %). The total number of fish released from the acclimation facility during the early period was 130,544. During the second acclimation period 59,100 smolts were delivered from LGH on 28 March. This group was comprised entirely of progeny from the conventional broodstock program. The size of the fish at delivery was 21.8 fish/lb. Volitional releases began 3 April 2005 and ended with a force out emergency release on 7 April. The size of the fish just before the volitional release was 21.8. The total mortality for the acclimation period was 64 (0.11 %). The total number of fish released from the acclimation facility during the late period was 59,036.

There was only 1 planned acclimation period at the Upper Grande Ronde Acclimation Facility (UGRAF) in 2005. During the early acclimation period 105,418 smolts were delivered from LGH on 8 March. This group was comprised entirely of progeny from the conventional broodstock program. The size of the fish at delivery was 21.0 fish/lb. There was no volitional release in 2005 due to freezing air and water conditions prompting an early release. The total mortality for the acclimation period was 49 (0.05 %). The total number of fish released from the acclimation facility during the late period was 105,369.

Maintenance and repair activities were conducted at the acclimation facilities in 2005. Facility maintenance work consisted of snow removal, installation of drainage lines, removal of gravel from intake area, installation of new gate at the CCAF, and complete overhaul of 2 travel trailers.

The Catherine Creek Adult Capture Facility (CCACF) was put into operation on 11 February 2005. The first adult summer steelhead was captured on 4 March. A total of 190 adult summer steelhead were trapped and released from 4 March to 16 May 2005. Peak arrival at the trap was the week of 8 April. The first adult spring Chinook salmon was captured at CCACF on 6 May 2005. A total of 226 spring Chinook salmon were trapped from 6 May to 8 July 2005. There were 56 adults and 4 jacks unmarked and 136 adult and 30 jack marked spring Chinook salmon trapped. Peak arrival at the trap was the week of 10 June for the unmarked and marked fish.

None of the captive broodstock returns were collected for broodstock. Broodstock was collected systematically over the entire return from 31 May to 6 July 2005. Ten of the 34 broodstock collected and transported from CCACF to LGH were unmarked fish trapped. About 18% 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 30 age 4 and 5 and 4 age 3 fish were transported to LGH for broodstock. The hatchery component of the broodstock was 66.7%.

Five weekly spawning surveys were conducted below the weir on Catherine Creek beginning 30 June 2005. During these surveys no live or dead fish were observed. The trap was removed from Catherine Creek on 3 August 2005.

Temperatures at the CCACF ranged from -0.1^{o}C on 14 February to 23.7 ^{o}C on 21 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 construction of a debris barrier in front of the intake, maintenance of weir, and weed abatement.

The Upper Grande Ronde Adult Collection Facility (UGRACF) was put into operation on 10 March 2005. The first adult summer steelhead was captured on 8 April. A total of 41 adult summer steelhead were trapped and released from 8 April to 11 May 2005. Peak arrival at the trap was the week of 22 April. The first adult spring Chinook salmon was captured at UGRACF on 31 May 2005. A total of 277 spring Chinook salmon were trapped from 31 May to 3 August 2005. There were 14 adults and no jacks unmarked and 257 adult and 6 jack marked spring Chinook salmon trapped. Peak arrival at the trap for both unmarked and marked fish was 10 June.

The broodstock collected and transported from UGRACF was made up almost entirely of marked fish (64 conventional, 7 unmarked). Broodstock was collected systematically over the entire return from 31 May to 3 August 2005. Every other unmarked male and female sampled was taken to LGH (50%) for broodstock, while 100% of the conventional return was taken. A total of 7 age 4 and 5 and no age 3 unmarked fish and 59age 4 and 5 and 5 age 3 marked fish were transported to LGH for broodstock.

On the Upper Grande Ronde River 7 weekly surveys were conducted from the weir to 1 mile below the weir from beginning 1 July 2005. There was an average of 42 live fish observed and 1 carcass was recovered on these surveys.

Temperatures at the UGRACF ranged from 0.0^{o}C on 11 March to 26.1^{o}C on 1 August. The hourly temperatures at the adult trap during the period of operation showed that the lowest water temperatures usually occurred between 0600 and 0800 hours and the highest water temperatures usually occurred between 1500 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.

A total of 17 females, 12 males, and 5 jacks were spawned from the Catherine Creek stock spring Chinook salmon at LGH in 2005. The peak spawning date at LGH occurred on 8 September. A total of 40 females, 21 males, and 5 jacks from the Grande Ronde stock were spawned at LGH in 2005. The peak spawning date at LGH occurred on 25 August.

CTUIR assisted the captive broodstock program with the collection of parr from Catherine Creek and the Upper Grande Ronde River. The collection goal of 500 parr from each tributary was achieved in 2005. CTUIR also assisted with the spawning of the captive broodstocks (Catherine Creek, Upper Grande Ronde, and Lostine River) at Bonneville Hatchery in 2005.

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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 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. 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) 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 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 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 2005 there were two acclimation periods for CCAF and only 1 for UGRAF. 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 single acclimation at UGRAF would encompass both periods. 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 in the afternoon. At the CCAF 11% of the first group of fish acclimated, 2 raceways of captive broodstock and 2 raceways of conventional broodstock, and 12% of the second group acclimated (conventional broodstock) were tagged with Passive Integrated Transponders (PIT). At the UGRAF 1% of the fish acclimated were PIT tagged (conventional broodstock). 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.

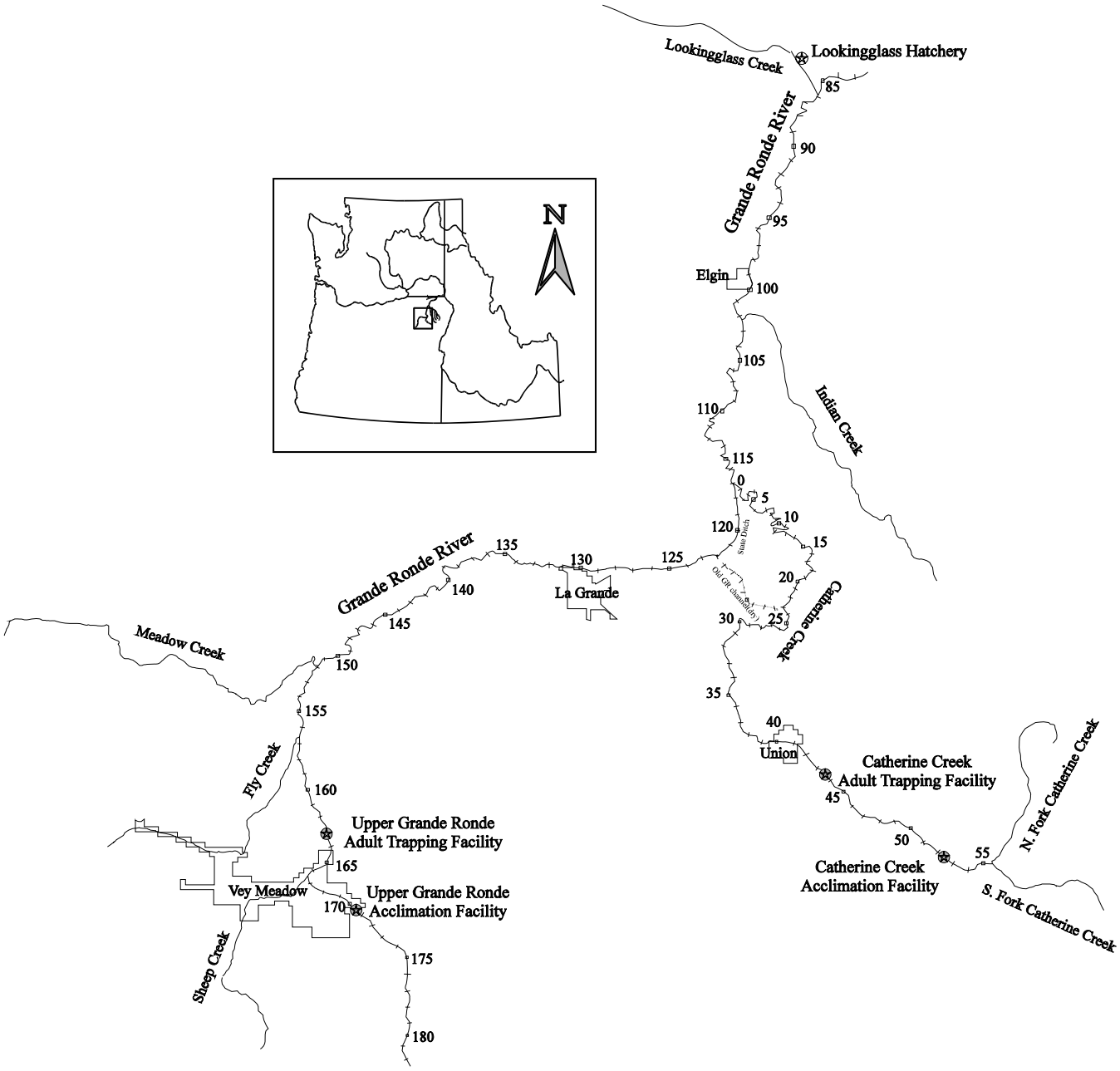

Figure 1. Map of the upper Grande Ronde River basin showing locations (rm) of Lookingglass Hatchery and Catherine Creek and Upper Grande Ronde juvenile acclimation and adult capture facilities.

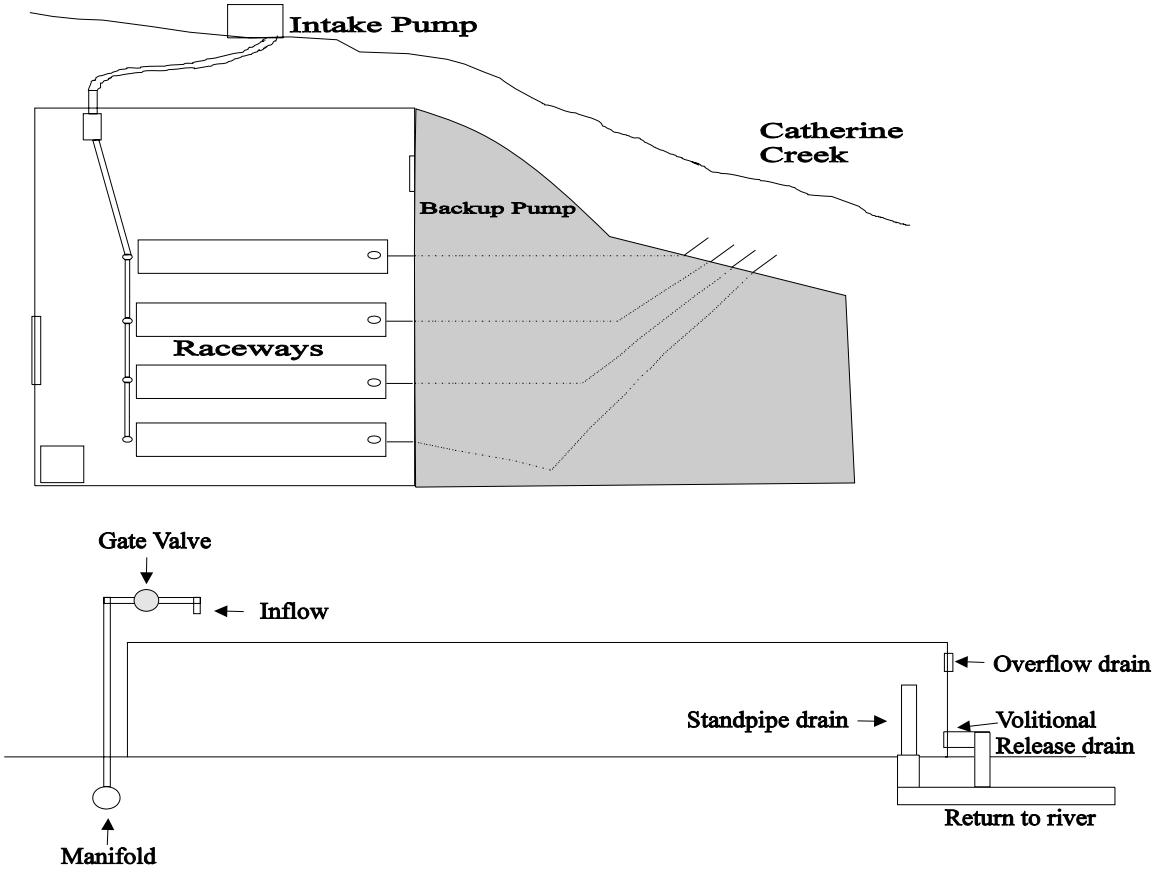

Figure 2. Diagram of the Catherine Creek acclimation facility. PIT tag reader boxes in the shaded area are underground.

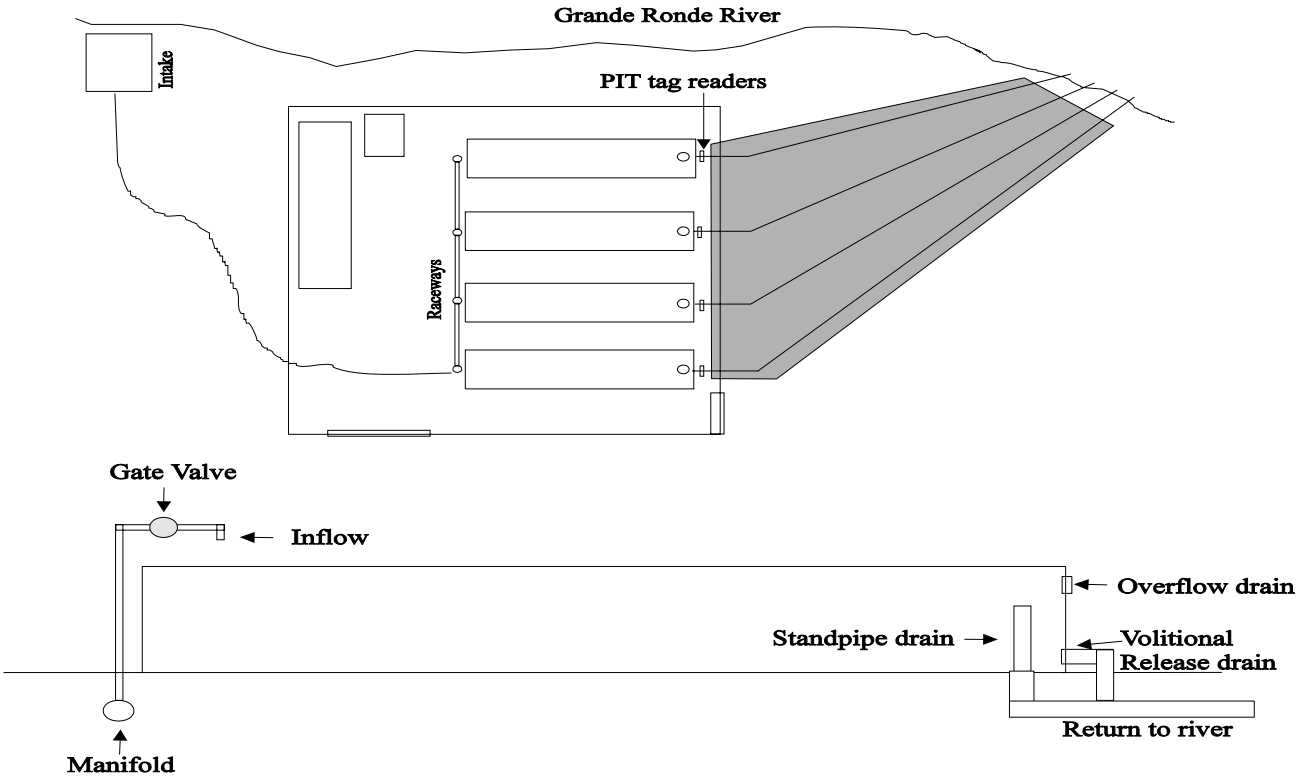

Figure 3. Diagram of the Upper Grande Ronde acclimation facility. The lines passing through the shaded area represent underground return pipes.

Adult Collections

The Catherine Creek Adult Collection Facility (CCACF) is located at rm 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 (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 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 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 is 90 at CCACF and 28 at UGRACF using 10 ft^3/adult.

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 (2005 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 handling. 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. Any 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 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. Fish collected for broodstock were taken systematically by sex and age (adult/jack).

Fish collected for broodstock and transported to LGH before 15 July 2005, received prophylactic dorsal sinus injections of oxytetracycline and erythromycin upon loading. Dosage of each antibiotic was 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) 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 or net. Broodstock were transported from each weir site to LGH using 300 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.

An experimental fish passage device was tested at the CCACF in June of 2005. The principle of operation is to allow fish to pass low head obstacles through the device where high velocity flows create a passage barrier. The device is about 4 feet in length and about 6 feet wide and made of aluminum (Figure 5). The device can be operated by the water pressure behind the barrier or electrically by a motor. The water pressure or motor drives 3 gates inside the device, which regulate the water velocity leaving the machine and move the fish upstream to the exit (similar to a revolving door of a hotel). There was piping attached to the device to provide additional attraction flows at the entrance if needed. In this installation of the device the downstream passage capabilities were not being tested (one way door on upstream side) due to the fact that the fish being captured on the upstream side of the machine were being collected for broodstock and were not to escape after capture. The device was to be installed in 5 day blocks 5 different times during the upstream migration of the spring Chinook salmon and evaluated after each block. Underwater cameras videotaped fish activity at the entrance and exit of the device. Differences in the number of fish captured in the trap before installation (5 day block), during operation (5 day block), and after removal (5 day block) was evaluated.

Figure 5. Fish passage device being installed in the fish ladder. From top left clockwise: upstream side of device showing attraction flow gates and exit (round hole), downstream side of device, entrance with no flow passing through device, top view of device installed (technician is on upstream side).

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 broodstocks held at LGH. The Lookingglass Creek and Catherine Creek stocks were held in the outdoor adult holding pond at LGH, while the Upper Grande Ronde River broodstock was held in the captive brood building. All stocks were checked for ripeness once a week over a 5 week period beginning 18 August. 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 main hatchery or 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 2005. These juveniles are used for the captive broodstock program (Hoffnagle et. al. 2006). Assistance was also provided to ODFW for the spawning of the Grande Ronde Basin captive broodstocks at Bonneville Hatchery in 2005 (Hoffnagle et. al. 2006).

RESULTS AND DISCUSSION

Juvenile Acclimation

The CCAF received the early group of 130,748 smolts from LGH on 7 March 2005 (Table 1). This group contained progeny of both the captive (53%) and conventional broodstock programs. The average size of the fish at delivery was 23.9 fish/lb (Table 2). The densities in the raceways ranged from 0.55 to 0.84 lbs/ft3. The fish were allowed to volitionally leave the raceways beginning 14 March 2005. Any fish remaining on 27 March were forced from the facility after 1200 hours. During the volitional release period there was a total of 3,187 PIT-tagged fish scanned. Based on the number of PIT-tagged fish in the population (10.7%), an estimated 29,402 fish left during this time, this was 22.5% of the fish delivered to the facility (Table 3). Of the fish that left, 86.6% left the first 4 days of the 14 day volitional release (Figure 6). Hourly detections of PIT-tagged fish showed peak detections at 1900 hours (34.1%) with a smaller peak at 0600 hours (5.8%) (Figure 7). The fish were fed a total of 209 lbs of food for the acclimation period. The total number of fish in the early group that were released from the acclimation facility in 2005 was 130,544. The size of the fish just before the volitional release began was 23.9 fish/lb. The size of the fish that were forced from the facility was 23.2 fish/lb.

The total mortality for the early acclimation period was 204 (0.16 %). A total of 20 mortalities from the early group (10 captive, 10 conventional) were provided to ODFW Fish Pathology. The captive production ELISA values were ≤ 0.067 OD units and the conventional production ELISA values were ≤ 0.106 OD units indicating the fish did not have a BKD problem. No significant levels of systemic bacteria were detected. However, chronic infectious hematopoietic necrosis (IHN) loss in the captive production that started at Lookingglass Hatchery continued at acclimation with this group of fish. Losses averaged ~0.01%/day while at acclimation. Clinical signs of IHN such as petechial body fat hemorrhaging, internal hemorrhaging, hemorrhaging behind the eyes and exophthalmia were noted in over 50% of the mortalities examined. Four of six (66.7%) individual gill/kidney/spleen virus samples were positive for IHNV. IHN was not detected in the conventional production.

The CCAF received the late group of 59,100 smolts from LGH on 28 March 2005 (Table 1). This group was comprised entirely from progeny of the conventional broodstock program. The average size of the fish at delivery was 21.8 fish/lb (Table 2). Only 2 raceways were needed to acclimate the late group. The densities in both raceways were 0.66 lbs/ft3. The fish were allowed to volitionally leave the raceways beginning 3 April 2005. In the early morning hours of 5 April the generator that runs the water pump for the facility stopped operating. The generator was immediately (<30 minutes) restarted and the volitional release gates were closed to allow the fish to recover from any stress induced by the low water levels. The release gates were reopened on 6 April. The generator malfunctioned again the morning of 7 April and was again immediately (<5 minutes) restarted. It was decided not to risk the fish remaining in the raceways with a faulty generator and only 1 week remained until

forceout, so the fish were released that evening. The fish were fed a total of 59.9lbs of food for the acclimation period. The total number of fish in the late group that were released from the acclimation facility in 2005 was 59,036. The size of the fish just before the volitional release began was 21.8 fish/lb.

The total mortality for the late acclimation period was 64 (0.11%). A total of 10 mortalities were provided to ODFW Fish Pathology. These fish had ELISA values that were ≤ 0.106 OD units indicating that these fish did not have a BKD problem. Two of 10 (20%) mortalities had a low level of aeromonad-pseudomonad bacteria. All mortalities were tested individually for virus and found to be negative.

The UGRAF received the early and only group of 105,418 smolts from LGH on 8 March 2005 (Table 1). This group was comprised entirely of progeny from the conventional broodstock program. The average size of the fish at delivery was 21.0 fish/lb (Table 2). The densities in the raceways ranged from 0.56 to 0.64 lbs/ft3. Drought conditions coupled with freezing air and water conditions severely affected the water supply to the facility in 2005. The low water alarms began to go off in the early morning hours of 13 and 14 March due to freezing temperatures. As the sun would warm the water and ground in the afternoon the water levels would rise to operational levels. The weather forecast for the coming week called for more of the same freezing conditions so a decision was made to release the fish into the river were they would be at less risk. The fish were force out of the raceways in the afternoon of 14 March (highest flow conditions). The fish were fed a total of 10.1 lbs of food for the acclimation period. The total number of fish in the early group that were released from the acclimation facility in 2005 was 105,369.

The total mortality for the short acclimation period was 49 (0.05%). There was no significant fish health problem detected in this group of fish evidenced by mortalities provided to ODFW Fish Pathology. All 10 mortalities examined had died prior to 15 March 2005. Preliberation examination virus results were negative for IHN virus. However, a fish from this release group was recaptured at the Grande Ronde River screw trap on 13 April and was positive for IHNV. All 10 mortalities from the release group examined had *Renibacterium salmoninarum* (Rs) ELISA values ≤ 0.064 OD units indicating that these fish did not have a BKD problem. Five of 10 (50%) mortalities from the acclimation site had aeromonad-pseudomonad bacteria.

Hourly water temperatures were taken at both facilities in 2005 (Figures 8-11). The water temperatures at CCAF ranged from 0.7^{o}C to 8.7 ^{o}C during the acclimation period and was usually at the lowest temperature around 0700 with the peak temperatures around 1600 (Figures 8 and 9). The water temperatures at UGRAF ranged from -0.1^{o}C to 7.1 ^{o}C during the acclimation period and was usually at the lowest temperature around 0700 with the peak temperatures around 1500 (Figures 10 and 11).

Maintenance and repair activities were conducted at the acclimation facilities in 2005. 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 and installation of a 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 2005.

	Raceway			
	1	2	3	4
Catherine Creek early				
No. of fish	29,420	30,872	30,871	39,585
Total lbs.	1,136	1,276	1,342	1,736
Mortality	87	12	14	91
Density lbs/ft^3	0.55	0.62	0.65	0.84
lbs/gpm	3.25	3.64	3.83	4.96
Flow gpm	350	350	350	350
Treatment	Captive	Conventional	Conventional	Captive
Catherine Creek late				
No. of fish	Empty	29,491	29,609	Empty
Total lbs.		1,353	1,358	
Mortality		34	30	
Density lbs/ft^3		0.66	0.66	
lbs/gpm		3.87	3.88	
Flow gpm		350	350	
Treatment		Conventional	Conventional	
Upper Grande Ronde early				
No. of fish	25,425	24,418	29,150	25,425
Total lbs.	1,278	1,150	1,319	1,278
Mortality	14	9	3	23
Density lbs/ft^3	0.62	0.56	0.64	0.62
lbs/gpm	3.65	3.29	3.77	3.65
Flow gpm	350	350	350	350
Treatment	Conventional	Conventional	Conventional	Conventional
Upper Grande Ronde late				
No. of fish	Empty	Empty	Empty	Empty
Total lbs.				
Mortality				
Density lbs/ft^3				
lbs/gpm				
Flow gpm				
Treatment				

Table 2. Group, number, size, and receive and release dates of fish acclimated at Catherine Creek and the Upper Grande Ronde facilities in 2005.

Facility	Group	No. received	Size fish/lb	Accl. period	Volit begin
CCAF	Early	130,748	24.0	3/7-3/27	14-Mar
	Late	59,100	21.8	3/28-4/7	3-Apr
UGRAF	Early	105,418	21.0	3/8-3/14	None

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.^{o}C		DO mg/l		Volitional migration	
Facility	Group	Feed fed(lb.)	Total mort.(%)	min.	max.	min.	max.	Number	%
CCAF	Early	209	204 (0.16)	0.1	5.8	9.6	15.4	29,402	22.5
	Late	60	64 (0.11)	0.6	8.7	8.9	12.7	None	
UGRAF	Early	10	49 (0.05)	-0.1	3.4	10.3	11.9	None	

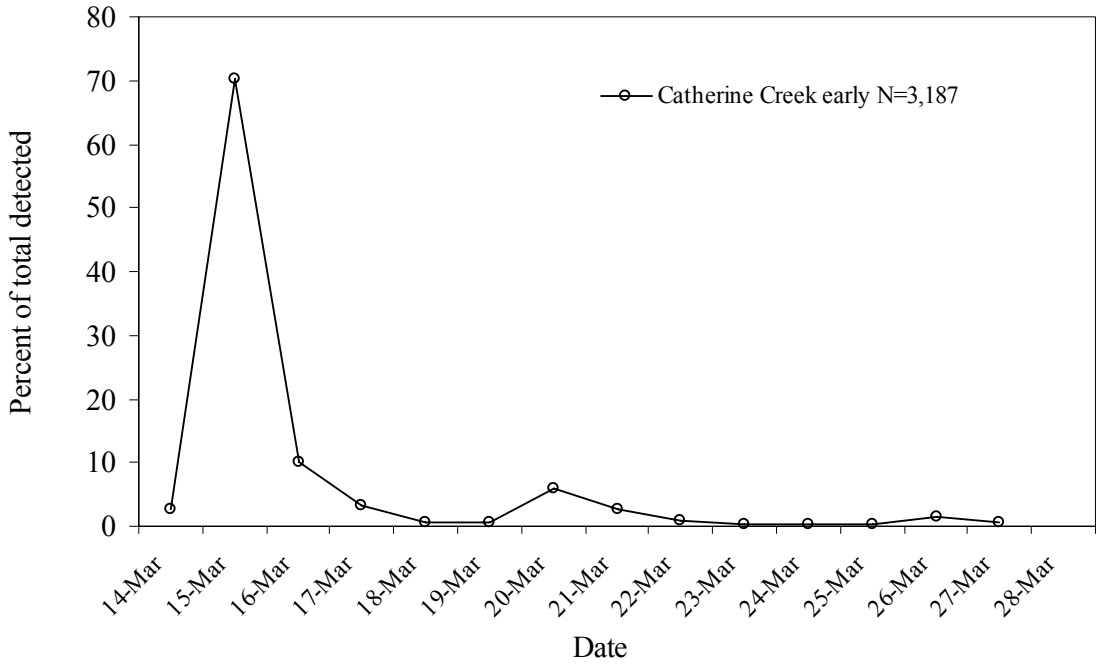

Figure 6. Daily PIT tag detections of fish leaving the raceways during the volitional release period at the Catherine Creek acclimation facility in 2005.

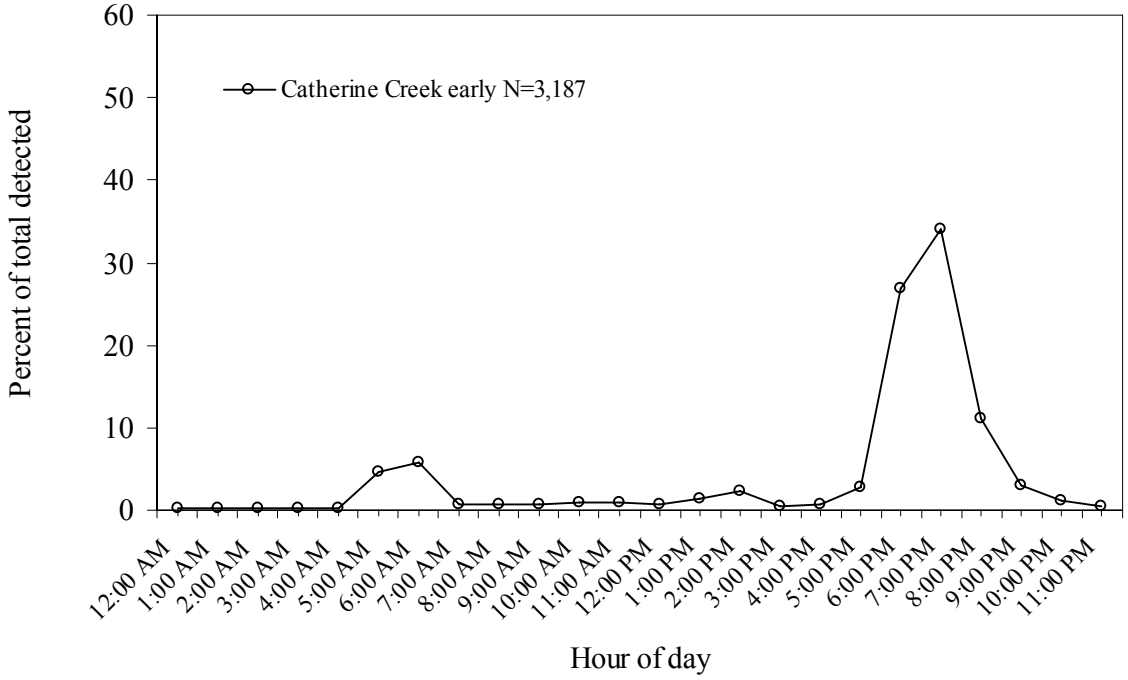

Figure 7. Hourly PIT tag detections of fish leaving the raceways during the volitional release period at the Catherine Creek acclimation facility in 2005.

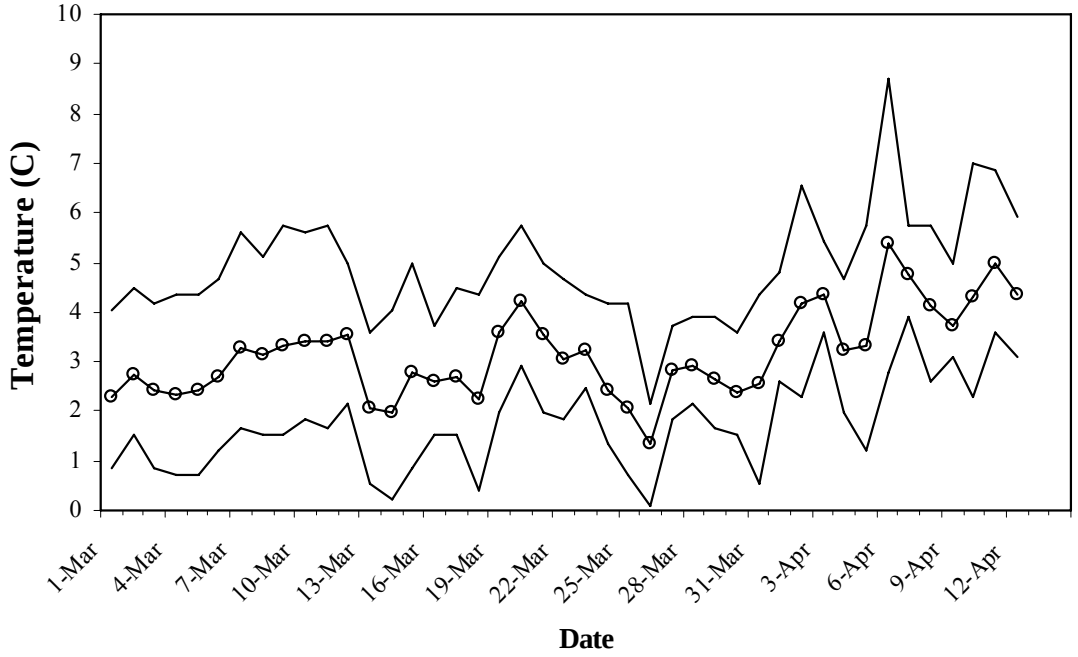

Figure 8. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Catherine Creek juvenile acclimation facility in 2005.

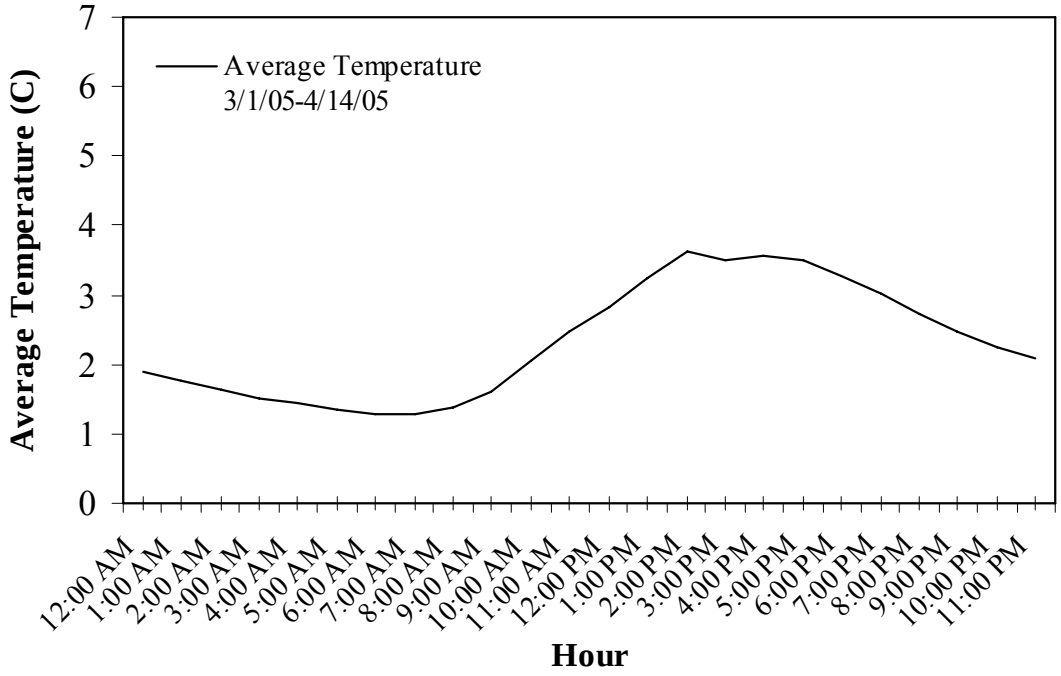

Figure 9. Average hourly water temperature at the Catherine Creek juvenile acclimation facility in 2005.

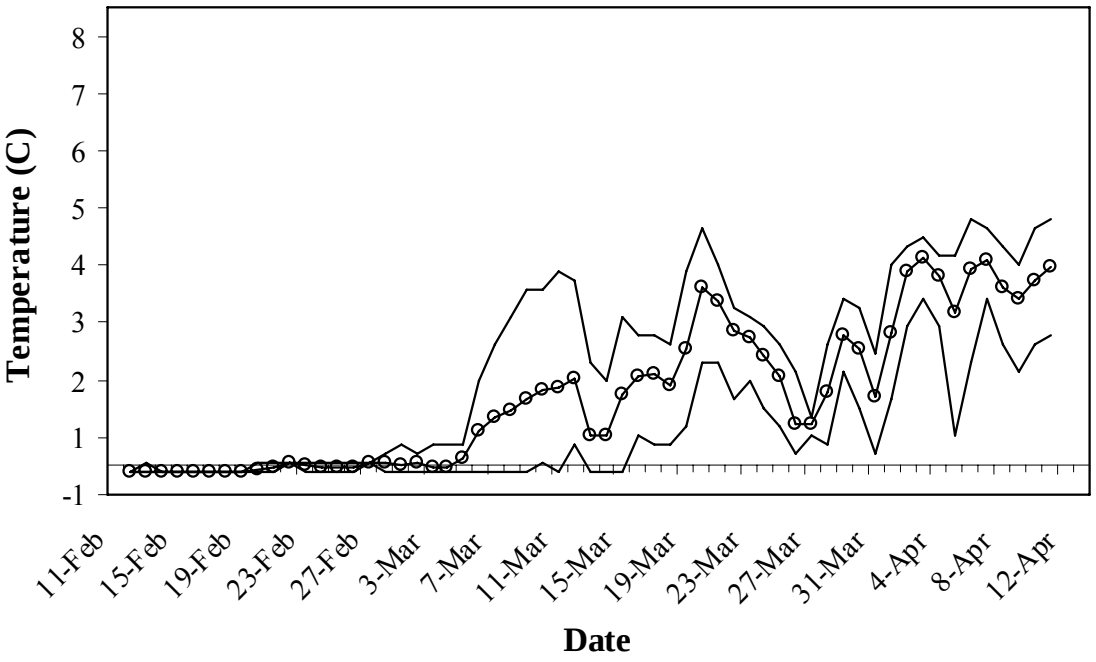

Figure 10. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Upper Grande Ronde juvenile acclimation facility in 2005.

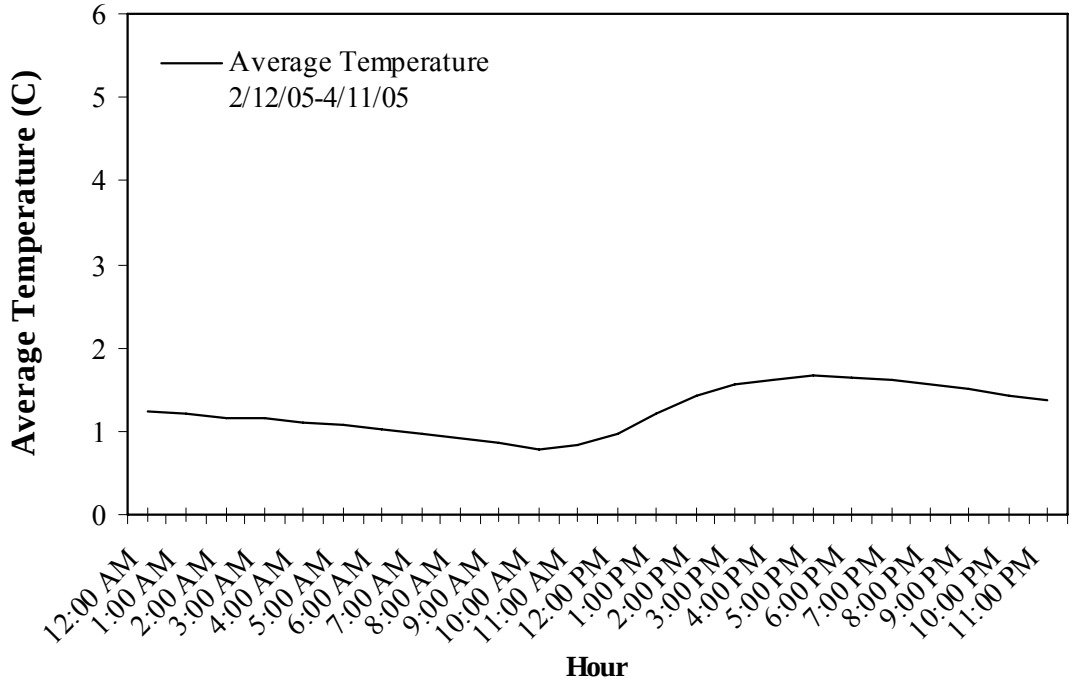

Figure 11. Average hourly water temperature at the Upper Grande Ronde juvenile acclimation facility in 2005.

Adult Collections

The CCACF was put into operation on 11 February 2005. The first adult summer steelhead was captured on 4 March. A total of 190 unmarked adult summer steelhead were trapped and released from 4 March to 16 May 2005 (Table 4, Figure 12). One adipose-clipped fish was captured on 27 April. Peak arrival for unmarked fish at the trap was the week of 8 April (26.3%) with a second peak the week of 29 April (22.1%). Six previously trapped fish, as indicated by the presence of an opercle mark, were trapped and released, and 17 previously trapped kelts were recovered dead on the weir. There were no kelts recovered on the weir that were not previously punched. There were 26 kelts that were passed downstream over the weir that were still alive, all of which were previously trapped.

The first adult spring Chinook salmon was captured at CCACF on 6 May 2005. A total of 226 spring Chinook salmon were trapped from 6 May to 8 July 2005 (Table 5, Figure 13). Three different groups of fish from the same stock returned to Catherine Creek in 2005. The total catch was made up of 56 age 4 and 5, and 4 age 3 unmarked (no fin clip, naturally-produced) and 108 age 4 and 5, and 19 age 3 captive broodstock (ad-clipped) and 28 age 4, and 11 age 3 conventional broodstock (ad-clipped and Visual Implant Elastomer (VIE)) spring Chinook salmon. Peak arrival for age 4 and 5 fish at the trap was the week of 10 June for the unmarked, conventional, and captive fish. By the week of 10 June, 62.5% of the age 4 and 5 unmarked fish had been trapped compared to 53.7% and 60.7% of the captive and conventional fish respectively. The peak arrival for the age 3 fish was the week of 17 June for the conventional fish, the week of 24 June for the captive fish, and the week of 1 July for the natural fish. There were 2 captive broodstock mortalities in the trap in 2005. One of the 2 fish was killed when it became impinged in an experimental fish passage device installed in the trap entrance. The device was immediately removed after the incident. Two carcasses (female, captives) were recovered on the weir and the carcass had been previously handled at the trap. Twenty-one captive broodstock adults, surplus to needs on Catherine Creek, were hauled to LGH for use with the Lookingglass Creek stock.

Five weekly spring Chinook spawning surveys were conducted below the weir on Catherine Creek beginning 30 June 2005. During these surveys no live or dead fish were observed below the weir. The trap was removed from Catherine Creek on 3 August. Surveys conducted by ODFW above and below the weir in 2005 resulted in 72 redds counted above the weir and 2 redds counted below the weir. A total of 49 adult carcasses were recovered above the weir which was 35.3% of the total trapped and passed (139) above the weir and none were recovered below the weir. There were 48 punched fish in the recovery (98.0% trap efficiency) (2005 Spawning Ground Survey Results, ODFW, unpublished).

Table 4. Summer steelhead trap capture data from the Catherine Creek adult collection facility in 2005. Trapping began 11 February and ended 3 August.

	Trap Capture		Kelt	
Week	First time	Reruns	Not punched[a]	Punched
4-Mar	1			
11-Mar	8			
18-Mar	12			
25-Mar	12			1
1-Apr	13	1		1
8-Apr	50			
15-Apr	22			
22-Apr	20			2
29-Apr	43	1		
6-May	9	1		
13-May	0	1		5
20-May	1	1		6
27-May	0			
3-Jun	0	1		2
10-Jun	0			
17-Jun	0			
24-Jun	0			
1-Jul	0			
8-Jul	0			
15-Jul	0			
	191	6	0	17

[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.*

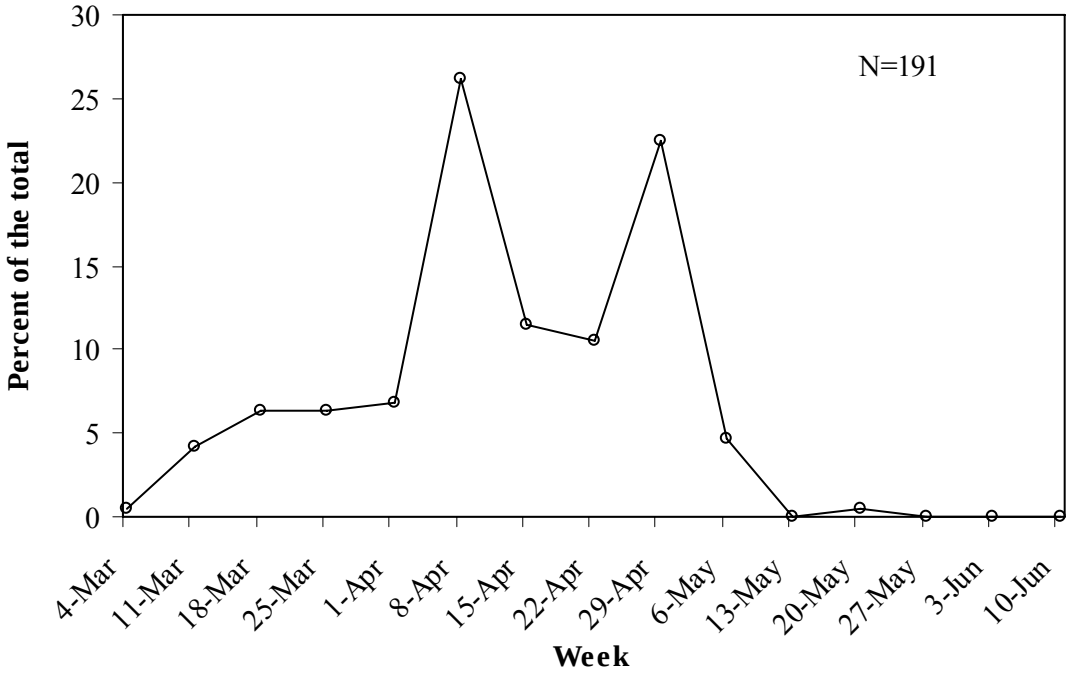

Figure 12. Summer steelhead arrival timing at the Catherine Creek adult collection facility in 2005.

Table 5. Spring Chinook salmon trap capture, transport, and mortality data for the Catherine Creek stock at the adult collection facility in 2005. Trapping began 11 February and ended 3 August.

	Trap Capture[a]						Brood		Trap
Week	Nat.(jack)		Capt. (jack)		Conv.(jack)		hauled (jack)		mort
6-May	1		0		0				
13-May	0		0		0				
20-May	1		0		0				
27-May	0		1		0				
3-Jun	16		17		8		6		
10-Jun	17		41	1	8		9		1
17-Jun	13		24	3	6	5	9	3	1
24-Jun	0	1	3	8	0	2			
1-Jul	6	2	19	7	1	3	2		
8-Jul	2	1	4		4	1	4	1	
15-Jul	0		0		0				
22-Jul	0		0		0				
29-Jul	0		0		0				
5-Aug	0		0		0				
	56	4	109	19	27	11	30	4	2

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

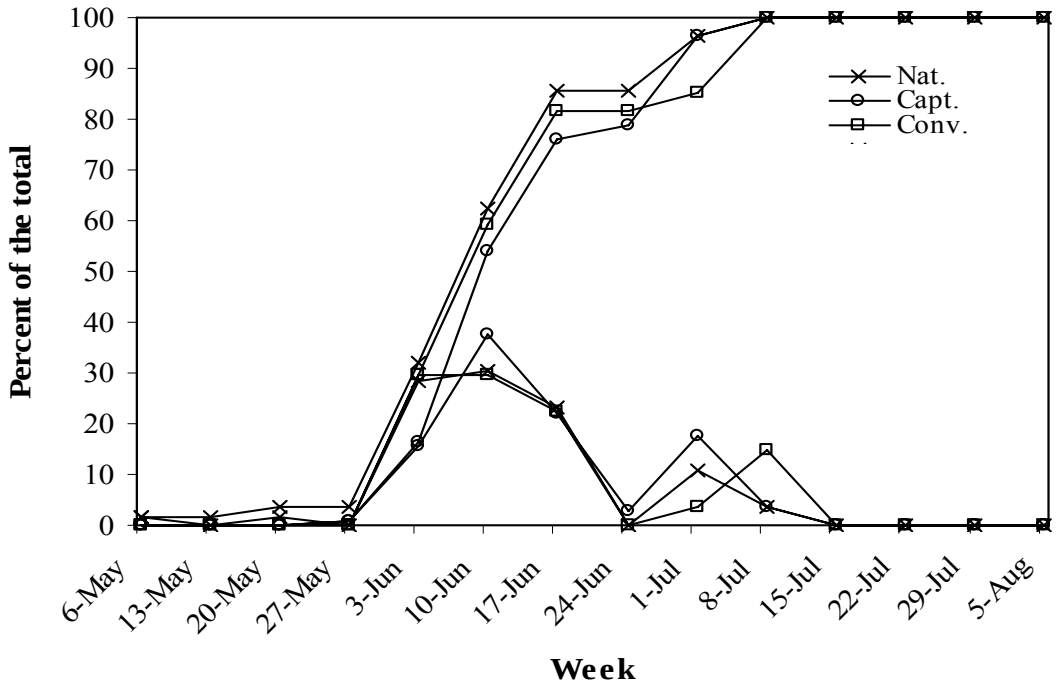

Figure 13. Arrival timing of age 4 and 5 spring Chinook salmon at the Catherine Creek adult collection facility in 2005.

Hourly water temperatures were taken at the CCACF in 2005 (Figures 14 and 15). The water temperatures at CCACF during the operation of the adult collection facility ranged from -0.1^{o}C on 14 February to 23.7 ^{o}C on 21 July and was usually at the lowest temperature around 0700 with the peak temperatures around 1600. 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 in 2005 did not cause problems with the weir in 2005.

Maintenance and repair activities were conducted at the facility in 2005. Maintenance work at the CCACF consisted of construction of debris barrier in front of the intake, maintenance of weir, and weed abatement.

The device was operational from 1 June to 5 June 2005. On 1 June all systems were in place, however, there was not enough water pressure to turn the water wheel moving the 3 gates. An electric motor was installed to drive the gates. On 2 June the device was fully operational. On the 3 June trap check 3 adult spring Chinook salmon and 1 sucker (*Catostomus spp.*) used the device. The videotape for this period showed that the salmon would test the entrance then return downstream before entering the device while the suckers would face downstream and lay waiting. There was no videotape of the suckers entering the experimental device. During the resetting of the flows for the device after the 3 June trap check, the motor shut down and had to be removed. A 4" diameter PVC pipe with a 90-degree elbow was installed that day to run the water wheel. On the 4 June trap check 4 adult spring Chinook salmon and 3 suckers passed through the device. There was a videotape problem for this period (lighting) so no behavior observations were made. During the

resetting of the flows for the device a problem with the rotation of the gates was discovered. The gates would slow at a certain point every revolution. To fix this problem a piece of rubber was installed on the elbow increasing the flow of water on the wheel. On the 5 June trap check 10 adult spring Chinook salmon and 8 suckers successfully passed through the device. There was 1 adult spring Chinook salmon mortality wedged between one of the gates and the exit of the device and 1 bull trout (*Salvelinus malma*) mortality wedged in the grating of the attraction flow opening at the entrance. Due to this mortality the device was removed from the trap and all testing was discontinued for the duration of the trapping season.

The UGRACF was put into operation on 10 March 2005. The first adult summer steelhead was captured on 8 April 2005. A total of 41 unmarked adult summer steelhead were trapped and released from 8 April to 11 May 2005 (Figure 16, Table 6). No fin clipped fish were captured. Peak arrival at the trap was the week of 22 April. No previously trapped fish were trapped a second time, and no 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 31 May 2005. A total of 277 spring Chinook salmon were trapped from 31 May to 3 August 2005 (Figure 17, Table 7). Three different groups of fish from the same stock returned to the upper Grande Ronde River in 2005. The total catch was made up of 14 age 4 and 5, and no age 3 unmarked (no fin clip, naturally-produced) and 197 age 4 and 5, and no age 3 captive broodstock (ad-clipped) and 60 age 4, and 6 age 3 conventional broodstock (ad-clipped and VIE) for the 4 year fish and no ad-clip and a Coded-Wire-Tag (CWT) for the 3 year fish) spring Chinook salmon. Peak arrival for age 4 and 5 fish at the trap was the week of 10 June for all groups returning to the weir. By the week of 10 June, 64.3% of the age 4 and 5 unmarked fish had been trapped compared to 49.7% and 50.0% of the captive and conventional fish respectively. The peak arrival for the age 3 fish was the week of 17 June for the conventional fish, which had the only jack returns. There was only one captive broodstock mortality in the trap in 2005. No carcasses were recovered on the weir.

On the Upper Grande Ronde River seven weekly spring Chinook surveys were conducted from the weir to 1 mile below the weir beginning 1 July 2005. During these surveys an average of 41.9 live fish were observed and 1 carcass was recovered. Surveys conducted by ODFW above and below the weir in 2005 resulted in 52 redds counted above the weir and 38 redds counted below the weir. A total of 19 adult carcasses were recovered above the weir which was 9.3% of the total trapped and passed (204). There were 19 punched fish in the recovery (100.0% trap efficiency) for a population estimate of 204 fish (2005 Spawning Ground Survey Results, ODFW, unpublished).

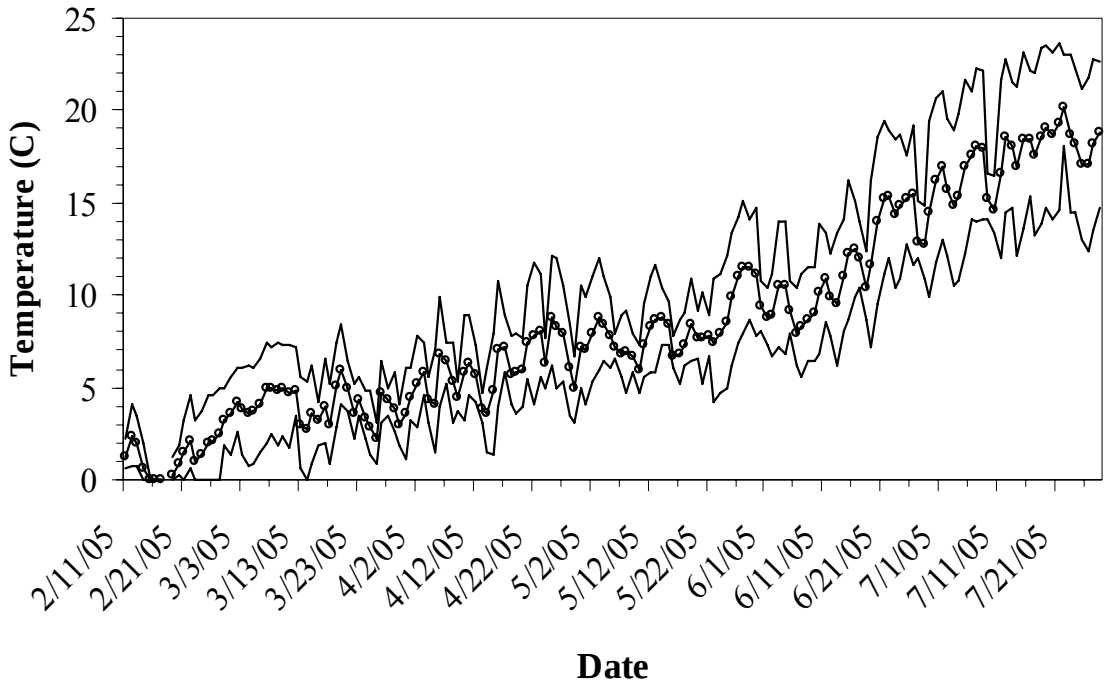

Figure 14. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Catherine Creek adult collection facility in 2005.

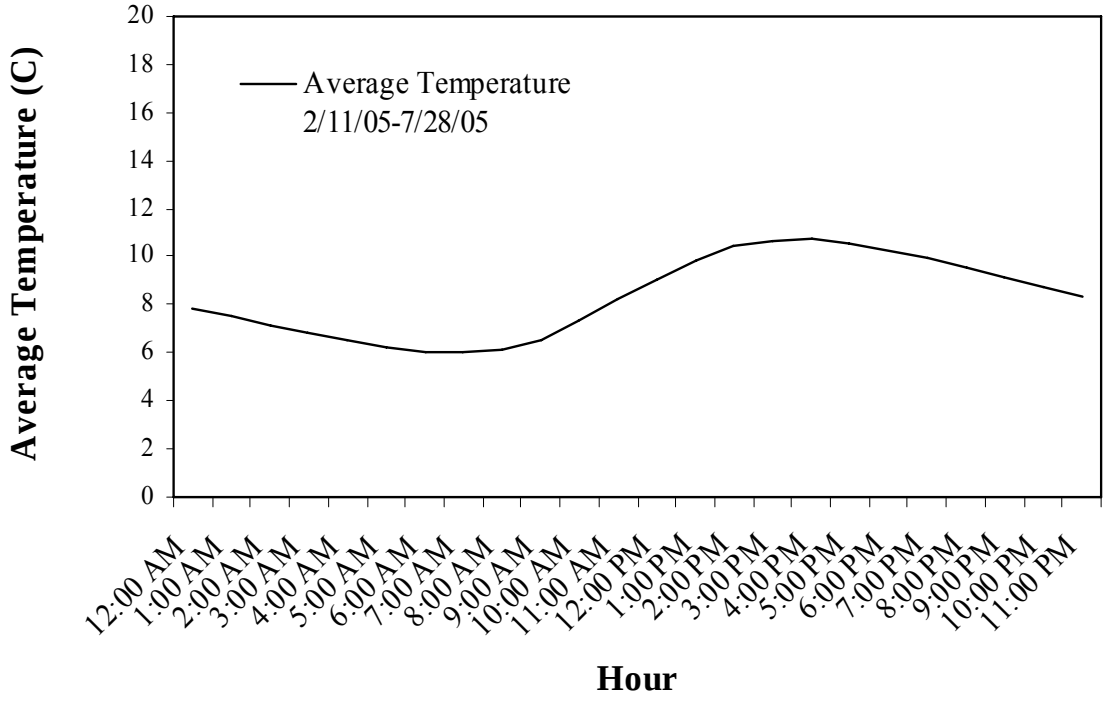

Figure 15. Average hourly water temperature at the Catherine Creek adult collection facility in 2005.

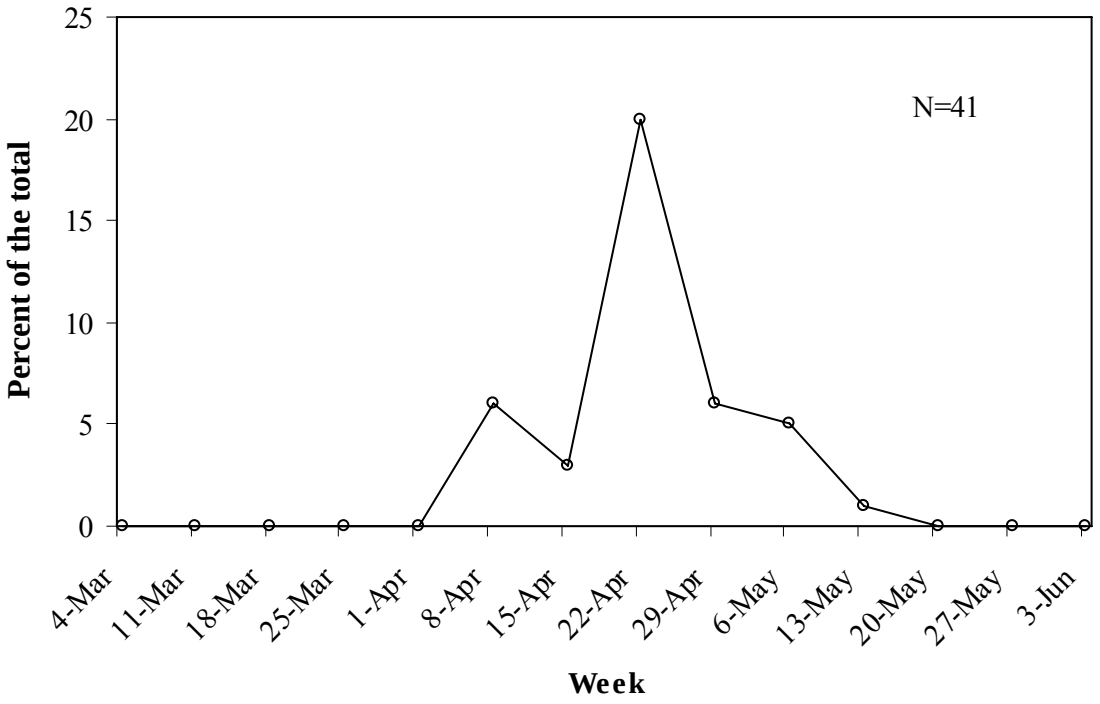

Figure 16. Summer steelhead arrival timing at the Upper Grande Ronde adult collection facility in 2005.

Table 6. Summer steelhead trap capture data from the Upper Grande Ronde adult collection facility in 2005. Trapping began 10 March and ended 3 August.

	Trap Capture		Kelt	
Week	First time	Reruns	Not punched[a]	Punched
8-Apr	6			
15-Apr	3			
22-Apr	20			
29-Apr	6			
6-May	5			
13-May	1			
20-May	0			
27-May	0			
3-Jun	0			
10-Jun	0			
	41	0	0	0

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

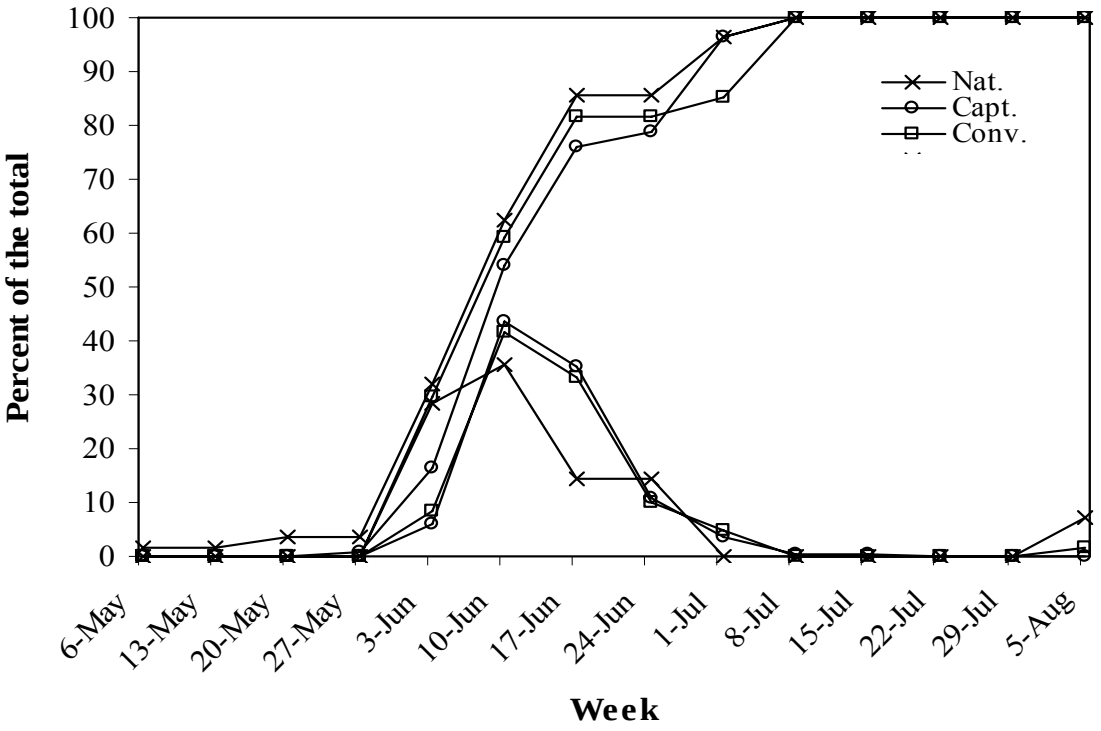

Figure 17. Arrival timing of age 4 and 5 spring Chinook salmon at the Upper Grande Ronde adult collection facility in 2005.

Table 7. Spring Chinook salmon trap capture, transport, and mortality data for the Grande Ronde River stock at the adult collection facility in 2005. Trapping began 10 March and ended 3 August.

	Trap Capture[a]						Brood		Trap
Week	Nat.(jack)		Capt. (jack)		Conv.(jack)		hauled (jack)		mort
3-Jun	4		12		5		6		
10-Jun	5		86		25		28		1
17-Jun	2		69		20	4	20	3	
24-Jun	2		21		6	2	7	2	
1-Jul	0		7		3		3		
8-Jul	0		1		0		0		
15-Jul	0		1		0		0		
22-Jul	0		0		0		0		
29-Jul	0		0		0		0		
5-Aug	1		0		1		2		0
	14	0	197	0	60	6	66	5	1

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

Hourly water temperatures were taken at the UGRACF in 2005. The water temperatures during operation of the adult collection facility ranged from ranged from 0.0oC to 26.1oC on 11 March and 1 August respectively (Figure 18). The hourly temperatures at the adult trap during the period of operation showed that the lowest water temperatures usually occurred between 0600 and 0800 hours and the highest water temperatures usually occurred between 1500 and 1700 hours (Figure 19). The period of low water temperatures set the time of day that the trap was checked and the fish worked up.

Maintenance and repair activities were conducted at the facility in 2005. 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. 2004. 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 age 4 and 5 spring Chinook salmon return to Catherine Creek for 2005 was 653 (102 natural + 373 captive + 178 conventional). 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. Fish that were not passed above the weir had three possible dispositions: transported to Lookingglass Creek for a fishery/natural spawning, taken as broodstock for the Lookingglass Hatchery program, and outplanted into Indian Creek. The actual number of captive broodstock hatchery adults trapped was 109 and from these fish 86 were passed upstream (78.9%). The natural adult return was 56 fish which was 55.0% of the predicted number. The percentage of hatchery fish above the weir in 2005 was 66.9%. There were no hatchery fish outplanted to Lookingglass Creek, 21 adults were taken as broodstock, and no fish were outplanted into Indian Creek. Natural jacks were collected for broodstock at a rate of 1 jack for every 5 males in the broodstock.

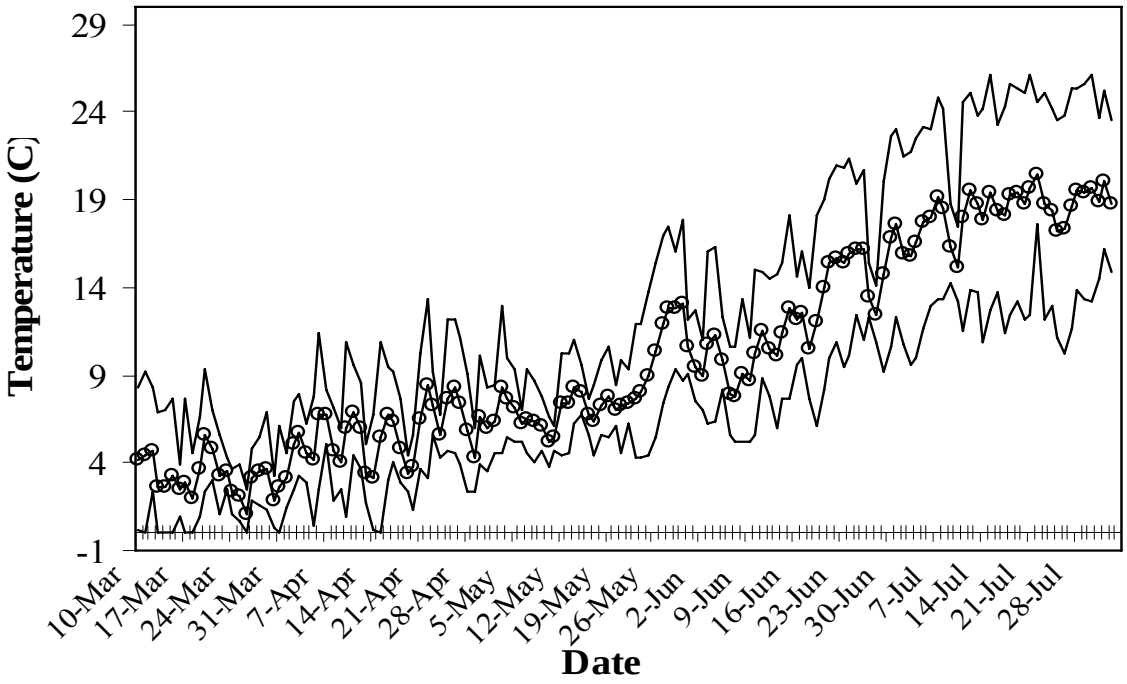

Figure 18. Daily maximum, minimum, and average water temperatures (recorded hourly) at the Upper Grande Ronde adult collection facility in 2005.

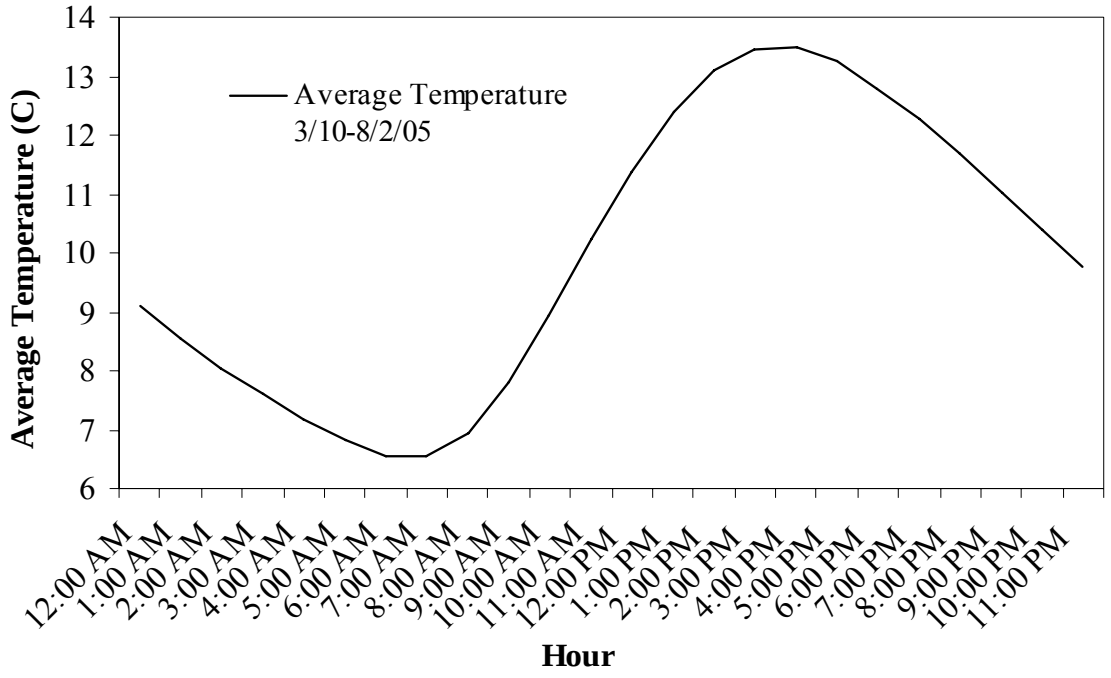

Figure 19. Average hourly water temperature at the Upper Grande Ronde adult collection facility in 2005.

The broodstock collected and transported from CCACF consisted of 10 unmarked, 24 conventional broodstock. None of the captive broodstock returns were collected for broodstock. Adult broodstock was collected systematically over the entire return from 31 May to 6 July 2005. Every 5th 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. A total of 10 age 4 and 5 and no age 3 unmarked, and 20 age 4 and 5 and 4 age 3 conventional returns were transported to LGH for broodstock. The unmarked adult portion of the broodstock was 17.9% of the adult natural return trapped (Appendix Table 4). The hatchery adult portion of the entire broodstock was 66.7%. The estimation of the sex of the adult fish at the weir was 81.3% 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 age 4 and 5 spring Chinook salmon return to the Upper Grande Ronde River for 2005 was 599 (54 natural + 472 captive + 73 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 (3 and 4 year fish only in 2005). The actual number of hatchery adults trapped was 257 (197 captive + 60 conventional) and from these fish 197 were passed upstream (76.7%)(1 trap mortality). The natural adult return was 14 fish which was 26.9% of the predicted number. The percentage of hatchery fish above the weir in 2005 was 96.6%. 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 consisted of both natural and hatchery fish. Broodstock was collected systematically over the entire return from 31 May to 3 August 2005. Every other adult male and female sampled was taken to LGH for broodstock. A total of 7 age 4 and 5 and no age 3 unmarked, and 59 age 4 and 5 and 5 age 3 marked fish (conventional broodstock) were transported to LGH for broodstock. The natural adult portion of the broodstock was 50.0% of the adult natural return trapped (Appendix Table 4) while the adult hatchery portion was 23.0% of the adult hatchery return trapped. The estimation of the sex of the adult fish at the weir was 97.1% 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 of the conventional fish that returned to the weir in 2005 were collected for broodstock, the male: female sex ratio observed for these fish was 1.77: 1 (no jacks).

Broodstock Activities

Lookingglass Hatchery

A total of 17 females and 12 males and 5 jacks were spawned from the Catherine Creek stock spring Chinook salmon at LGH in 2005 (Table 8). Eight of the 9 family groups were 2 females with 2 males. The remaining family group was 1 female with 2 males. Recycled males were used in only 1 of the family groups. There were a

total of 3 mortalities (pre-spawn) at the hatchery, 2 females and 1 male. One jack was sacrificed due to the size of the fish (175 mm). Peak and last spawning date at LGH occurred on 8 September 2005. Only 5 of the 17 females had spawned prior to this date. A total of 5 fish (2 males and 3 jacks) positively identified as Catherine Creek production swam into the Lookingglass Creek trap and were used in the Catherine Creek broodstock. All 17 females had ELISA values of 0.116 OD units or less.

A total of 40 females, 21 males, and 5 jacks were spawned from the Grande Ronde stock spring Chinook salmon at LGH in 2005 (Table 9). Nine of the 16 family groups were 3 females with 2 males. The remaining 7 family groups were 2x2 (5), 1x2 (1), and 2x3 (1). A total of 6 males were used more than one time. There was 1 natural male used in 3 different family groups. There were 3 females and 4 males that did not contribute to the spawning. Two of the 4 males were killed because of blood in the sperm. Peak spawning date at LGH occurred on 25 August 2005. The median spawn date was 1 September 2005 (>50% of females had spawned). A total of 2 fish (1male and 1 female) positively identified as Grande Ronde production swam into the Lookingglass Creek trap and were used in the Grande Ronde broodstock. All 40 females had ELISA values of 0.166 OD units or less.

In 2004 the circular tanks in the endemic building had a large amount of sediment accumulating on the bottom of the tanks. This sediment could be a source of pathogens and recommendations were made in 2005 that the ponds be swept out when sediment begins to accumulate. In 2005 the sediment accumulation in the circular tank holding the Grande Ronde Stock was minimal.
There was a large amount of gill fungus observed on the fish that were spawned the week of 1 September 2005. CTUIR requested that the remaining fish be treated with either formalin or hydrogen peroxide to slow the advancement of the gill fungus. The fish were treated that week with formalin by ODFW.

No fish were spawned from the Lookingglass Creek stock spring Chinook salmon at LGH in 2005. All of the fish captured at the Lookingglass Creek trap and transported in from Catherine Creek were released above the weir to spawn naturally (Appendix Table 8). Twenty-one captive broodstock adults, surplus to needs on Catherine Creek, were hauled to LGH for use with the Lookingglass Creek stock.

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 2005. Details of the spawning operation can be obtained in Hoffnagle et. al. 2006.

Table 8. Spawning information from Catherine Creek spring Chinook salmon broodstock at Lookingglass Hatchery in 2005.

	Mortality			Spawned			
Date	Female	Male	Jack	Female	Male	Jack	Recycled male
Till 8/5	2						
11-Aug							
18-Aug							
25-Aug				1	2		
1-Sep			1	4	4		
8-Sep		1		12	6	5	1
Totals	2	1	1	17	12	5	1

Table 9. Spawning information from Grande Ronde spring Chinook salmon broodstock at Lookingglass Hatchery in 2005.

	Mortality			Spawned			
Date	Female	Male	Jack	Female	Male	Jack	Recycled male
Till 8/5	1	1					
11-Aug	1			1	2		
18-Aug				2	2		
25-Aug				13	9	1	
1-Sep	1	1		10	6	3	
8-Sep		2		12	2	1	4
14-Sep				2			2
Totals	3	4		40	21	5	6

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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	37,902	23.6	0.20	2/28-4/18	4/2
CC 01	Single	137,816	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
CC 04	Early	92,475	23.1	0.49	3/8-3/22	3/15
CC 04	Late	70,977	23.4	0.37	3/24-4/12	3/30
GR 00	Single	1,512	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
GR 04	Early	78,930	20.3	0.48	3/9-3/22	3/15
GR 04	Late	70,098	22.4	0.50	3/25-4/12	3/31

[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
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
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

[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.

Brood Year	Rel. loc.	Life Stage	Rearing type	Number released	Returns 3	4	5	SAR
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		
2001	Acc.	Smolt	Conventional	26,923	9	60		
2001	River	Parr	Captive	32,800	unk	unk		
2002	Acc.	Smolt	Captive	78,716	0			
2002	Acc.	Smolt	Conventional	70,088	6			
2003	Acc.	Smolt	Captive	1,020				
2003	Acc.	Smolt	Conventional	104,349				

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

Brood Year	Rel. loc.	Life Stage	Rearing type	Number released	Returns 3	4	5	SAR
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		
2001	Acc.	Smolt	Conventional	24,392	22	28		
2002	Acc.	Smolt	Captive	92,413	19			
2002	Acc.	Smolt	Conventional	70,959	11			
2003	Acc.	Smolt	Captive	68,827				
2003	Acc.	Smolt	Conventional	120,753				

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

Brood Year	Rel. loc.	Life Stage	Rearing type	Number released	Returns 3	4	5	SAR
2000	Acc.	Parr	Captive	51,864	2	35	1	0.07
2001	Acc.	Parr	Captive	17,880	10	21		
2002	Acc.	Smolt	Conventional	53,195	7			
2003	Acc.	Smolt	Conventional	98,023				

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

	Adults captured			Passed	Est.	Redds		Adult broodstock taken		
Year	Nat.	Capt.	Conv.	above	above	abv.	bel.	Nat.	Capt.	Conv.
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	14	0	0
2005	14	197	60	204	205	52	38	7	0	59

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

	Adults captured			Passed	Est.	Redds		Adult broodstock taken		
Year	Nat.	Capt.	Conv.	above	above	abv.	bel.	Nat.	Capt.	Conv.
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	49	0	0
2004	83	575	--	190	209	94	2	16	0	0
2005	56	108	28	131	155	72	2	10	0	20

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

	Adults captured			Passed	Est.	Redds		Adult broodstock taken		
Year	Nat.	Capt.	Conv.	above	above	abv.	bel.	Nat.	Capt.	Conv.
2004	73	37	--	100	100	49	49	0	136	0
2005	22	22	--	45	43	29	10	0	0	0

Appendix Table 10. Daily summer steelhead trapping data from the Catherine Creek adult collection facility in 2005.

		Trapped		Sacrificed/mort		Recaptures at trap	
Date	Total	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.
4-Mar	1	0	1	0	0	0	0
9-Mar	3	0	3	0	0	0	0
11-Mar	5	0	5	0	0	0	0
14-Mar	8	0	8	0	0	0	0
16-Mar	3	0	3	0	0	0	0
18-Mar	1	0	1	0	0	0	0
21-Mar	10	0	10	0	0	0	0
22-Mar	0	0	0	0	0	0	0
23-Mar	2	0	2	0	0	0	0
28-Mar	7	0	7	0	0	0	1
30-Mar	6	0	6	0	0	0	0
MAR	46	0	46	0	0	0	1
1-Apr	0	0	0	0	0	0	0
4-Apr	10	0	10	0	0	0	0
6-Apr	6	0	6	0	0	0	0
8-Apr	34	0	34	0	0	0	0
11-Apr	19	0	19	0	0	0	0
12-Apr	0	0	0	0	0	0	0
13-Apr	3	0	3	0	0	0	0
16-Apr	0	0	0	0	0	0	0
18-Apr	11	0	11	0	0	0	0
20-Apr	2	0	2	0	0	0	0
22-Apr	7	0	7	0	0	0	0
23-Apr	0	0	0	0	0	0	0
25-Apr	21	0	21	0	0	0	0
27-Apr	18	1	17	1	0	0	1
29-Apr	4	0	4	0	0	0	0
APR	135	1	134	1	0	0	1
2-May	5	0	5	0	0	0	0
3-May	0	0	0	0	0	0	0
4-May	2	0	2	0	0	0	0
6-May	2	0	2	0	0	0	1
9-May	0	0	0	0	0	0	0
10-May	0	0	0	0	0	0	0
11-May	0	0	0	0	0	0	0
12-May	0	0	0	0	0	0	1
15-May	0	0	0	0	0	0	0
16-May	1	0	1	0	0	0	1
17-May	0	0	0	0	0	0	0
18-May	0	0	0	0	0	0	0
23-May	0	0	0	0	0	0	0
27-May	0	0	0	0	0	0	0
30-May	0	0	0	0	0	0	1
MAY	10	0	10	0	0	0	4
Total	191	1	190	1	0	0	6

Appendix Table 11. Daily spring Chinook salmon trapping data from the Catherine Creek adult collection facility in 2005.

		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.
6-May	1	0	1	0	0	0	0	0	0	0	0	0	0
16-May	1	0	1	0	0	0	0	0	0	0	0	0	0
23-May	1	1	0	0	0	0	0	0	0	0	0	0	0
30-May	10	7	3	0	0	0	0	0	0	0	0	0	0
31-May	19	10	9	0	0	0	0	0	0	4	2	0	0
MAY	32	18	14	0	0	0	0	0	0	4	2	0	0
1-Jun	3	1	2	0	0	0	0	0	0	0	0	0	0
2-Jun	6	5	1	0	0	0	0	0	0	0	0	0	0
3-Jun	3	2	1	0	0	0	0	0	0	0	0	0	0
4-Jun	4	3	1	0	0	0	0	0	0	1	1	0	0
5-Jun	11	10	1	0	0	1	0	0	0	2	1	0	0
6-Jun	39	27	11	1	0	0	0	0	0	2	2	0	0
8-Jun	5	3	2	0	0	0	0	0	0	0	0	0	0
10-Jun	8	6	2	0	0	0	0	0	0	0	0	0	0
13-Jun	31	23	5	3	0	1	0	0	0	4	1	0	0
15-Jun	8	4	1	3	0	0	0	0	0	1	1	1	0
17-Jun	12	3	7	2	0	0	0	0	0	1	1	2	0
20-Jun	4	1	0	3	0	0	0	3	0	0	0	0	0
22-Jun	6	2	0	4	0	0	0	4	0	0	0	0	0
24-Jun	4	0	0	3	1	0	0	3	0	0	0	0	0
27-Jun	5	2	0	2	1	0	0	2	0	0	0	0	0
29-Jun	9	6	0	3	0	0	0	3	0	1	0	0	0
JUN	158	98	34	24	2	2	0	15	0	12	7	3	0
1-Jul	24	12	6	5	1	0	0	5	0	0	1	0	0
4-Jul	10	7	2	1	0	0	0	0	0	3	0	1	0
6-Jul	1	1	0	0	0	0	0	0	0	1	0	0	0
8-Jul	1	0	0	0	1	0	0	0	0	0	0	0	0
JUL	36	20	8	6	2	0	0	5	0	4	1	1	0
Total	226	136	56	30	4	2	0	20	0	20	10	4	0

Appendix Table 12. Daily summer steelhead trapping data from the Upper Grande Ronde adult collection facility in 2005.

		Trapped		Sacrificed/mort		Recaptures at trap	
Date	Total	Hat.	Wld.	Hat.	Wld.	Hat.	Wld.
8-Apr	6	0	6	0	0	0	0
11-Apr	1	0	1	0	0	0	0
12-Apr	2	0	2	0	0	0	0
18-Apr	16	0	16	0	0	0	0
20-Apr	1	0	1	0	0	0	0
22-Apr	3	0	3	0	0	0	0
25-Apr	4	0	4	0	0	0	0
27-Apr	1	0	1	0	0	0	0
29-Apr	1	0	1	0	0	0	0
APR	35	0	35	0	0	0	0
1-May	1	0	1	0	0	0	0
4-May	4	0	4	0	0	0	0
11-May	1	0	1	0	0	0	0
MAY	6	0	6	0	0	0	0
Total	41	0	41	0	0	0	0

Appendix Table 13. Daily spring Chinook salmon trapping data from the Upper Grande Ronde adult collection facility in 2005.

		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.
31-May	5	3	2	0	0	0	0	0	0	0	1	0	0
MAY	5	3	2	0	0	0	0	0	0	0	1	0	0
2-Jun	11	9	2	0	0	0	0	0	0	2	0	0	0
3-Jun	5	5	0	0	0	0	0	0	0	3	0	0	0
4-Jun	26	23	3	0	0	0	0	0	0	2	2	0	0
6-Jun	55	53	2	0	0	0	0	0	0	14	1	0	0
8-Jun	24	24	0	0	0	1	0	0	0	5	0	0	0
10-Jun	11	11	0	0	0	0	0	0	0	4	0	0	0
13-Jun	57	55	1	1	0	0	0	0	0	14	0	0	0
15-Jun	15	12	1	2	0	0	0	0	0	1	1	2	0
17-Jun	23	22	0	1	0	0	0	0	0	4	0	1	0
20-Jun	17	15	0	2	0	0	0	0	0	1	0	2	0
22-Jun	11	9	2	0	0	0	0	0	0	2	1	0	0
24-Jun	3	3	0	0	0	0	0	0	0	3	0	0	0
27-Jun	6	6	0	0	0	0	0	0	0	1	0	0	0
JUN	264	247	11	6	0	1	0	0	0	56	5	5	0
1-Jul	4	4	0	0	0	0	0	0	0	2	0	0	0
6-Jul	1	1	0	0	0	0	0	0	0	0	0	0	0
11-Jul	1	1	0	0	0	0	0	0	0	0	0	0	0
JUL	6	6	0	0	0	0	0	0	0	2	0	0	0
1-Aug	1	1	0	0	0	0	0	0	0	1	0	0	0
3-Aug	1	0	1	0	0	0	0	0	0	0	1	0	0
AUG	2	1	1	0	0	0	0	0	0	1	1	0	0
Total	277	257	14	6	0	1	0	0	0	59	7	5	0

Appendix Table 14. Daily spring Chinook salmon trapping data from the Lookingglass Creek adult collection facility in 2005.

		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.
30-May	2	1	1	0	0	0	1	0	0	1	0	0	0
31-May	6	2	4	0	0	0	4	0	0	2	0	0	0
MAY	8	3	5	0	0	0	5	0	0	3	0	0	0
1-Jun	2	1	1	0	0	0	1	0	0	1	0	0	0
3-Jun	3	2	1	0	0	0	1	0	0	2	0	0	0
4-Jun	0	0	0	0	0	0	0	0	0	0	0	0	0
5-Jun	0	0	0	0	0	0	0	0	0	0	0	0	0
6-Jun	10	2	8	0	0	0	8	0	0	2	0	0	0
8-Jun	1	0	0	1	0	0	0	0	0	0	0	1	0
10-Jun	2	2	0	0	0	0	0	0	0	2	0	0	0
13-Jun	5	1	1	3	0	0	1	0	0	1	0	3	0
15-Jun	3	2	0	1	0	0	0	0	0	2	0	1	0
17-Jun	8	5	3	0	0	0	3	0	0	4	0	0	0
20-Jun	2	1	0	1	0	0	0	0	0	1	0	1	0
22-Jun	1	1	0	0	0	0	0	0	0	1	0	0	0
24-Jun	4	0	1	2	1	0	1	0	1	0	0	1	0
27-Jun	1	1	0	0	0	0	0	0	0	0	0	0	0
29-Jun	1	1	0	0	0	0	0	0	0	0	0	0	0
JUN	43	19	15	8	1	0	15	0	1	16	0	7	0
1-Jul	2	1	1	0	0	0	1	0	0	1	0	0	0
4-Jul	1	0	1	0	0	0	1	0	0	0	0	0	0
6-Jul	1	0	0	1	0	0	0	0	0	0	0	0	0
20-Jul	1	1	0	0	0	0	0	0	0	1	0	0	0
25-Jul	1	1	0	0	0	0	0	0	0	0	0	0	0
JUL	6	3	2	1	0	0	2	0	0	2	0	0	0
15-Aug	1	1	0	0	0	0	0	0	0	1	0	0	0
24-Aug	3	2	0	1	0	0	0	0	0	1	0	0	0
29-Aug	5	1	2	2	0	0	2	0	0	1	0	2	0
AUG	9	4	2	3	0	0	2	0	0	3	0	2	0
2-Sep	1	0	0	1	0	0	0	0	0	0	0	1	0
7-Sep	3	2	0	1	0	0	0	0	0	2	0	1	0
SEP	4	2	0	2	0	0	0	0	0	2	0	2	0
Total	70	31	24	14	1	0	24	0	1	26	0	11	0

Appendix Table 15. Adult summer steelhead trapping summary from the Catherine Creek adult collection facility in 1997-2004.

		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
2004	181	0	181	0	0	0	7

Appendix Table 16. Adult summer steelhead trapping summary from the Upper Grande Ronde River adult collection facility in 1997-2004.

		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
2004	63	0	63	0	0	0	8