

2011-2012 CEDAR RIVER SOCKEYE HATCHERY ANNUAL REPORT

Cory Cuthbertson

Washington Department of Fish and Wildlife
Olympia, Washington 98051

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Introduction

Since 1991 the Washington Department of Fish and Wildlife (WDFW) has operated the Cedar River Sockeye Hatchery at Landsburg, Washington at river mile (RM) 22 on the Cedar River. The program was started in response to a decline in naturally spawning sockeye salmon in the Cedar River watershed. In addition to the goal of stabilizing declining populations the program was designed to provide an opportunity to evaluate culture methods that are unique to sockeye culture and test their effectiveness.

In response to declining sockeye populations in the Cedar River basin WDFW began a supplementation program in the main tributary of Lake Washington, the Cedar River. In 1991, after a few years of minimal success with an egg box program on the Cedar River, the WDFW began operation of the interim hatchery at Landsburg Dam near Ravensdale, Washington. After almost 20 years in the interim hatchery, operations were moved to a newly-constructed, permanent facility during the 2011-2012 season.

The interim hatchery was situated on Seattle Public Utilities (SPU) property at the bottom of the Cedar River Watershed parcel on the south side of the Landsburg Diversion Dam. It was built in stages over 19 years of operation and consisted mostly of temporary structures and facilities and was capable of incubating up to 18,700,000 eggs. In the first year of operation 2,079,100 sockeye fry were released from the hatchery. This was the lowest number of fry released during the program's history. The largest number of fry released was in the spring of 2001 (brood year 2000) when 17,209,000 fry were released. The average from 1991 through 2011 was 8,820,000 per year.

Construction of the permanent hatchery at Landsburg began in July, 2010 and was completed during the fall of 2011. The entire facility was occupied in October, 2011. The new facility has the capacity to incubate, rear, and release up to 34 million fry and provides the flexibility to adjust operations in accordance with the implementation of the Cedar River Sockeye Hatchery Adaptive Management Plan (AMP). The AMP addresses key concerns about the impacts and capability of the Cedar River sockeye program by utilizing experts in pertinent fields like fish health and hatchery reform to guide hatchery operations. The new hatchery has systems designed to limit stress on the fish, produce hatchery fish more similar to their wild cohorts, and further reduce the risk of pathogen transfer between fish and eggs. The new hatchery is also significantly less vulnerable to component failure from freezing, tree falls, flooding, and exposure to the elements. Additionally, the new components allow staff to more easily monitor key operational functions. Finally, the hatchery is safer for the fish and staff, has more reliable core systems, and is vastly more comfortable and functional.

For the first two years of the program adult broodstock were captured by gillnet in the lower river at various locations. From 1993 to 2007, WDFW collected broodstock at a temporary trap or weir at Cavanaugh Ponds Park (RM 6.4). In the fall of 2008 SPU completed a new access road and other amenities to allow for the installation of a new floating resistance-board weir and trap near the Renton Community Center (RM 1.8). As

available and necessary, broodstock are also collected at the fish ladder at the Landsburg diversion dam.

Program Goals

The overall goals of the Cedar River Hatchery program are to enhance the Lake Washington sockeye population to levels allowing for sport and tribal fishing opportunities; to afford scientists the opportunity to study and learn about sockeye salmon and their life cycle; and to avoid negatively impacting other species in the Cedar River watershed.

Specific goals are to collect, hold, and spawn enough adult sockeye broodstock to achieve a maximum green egg take of 37,700,000 eggs and release a maximum of 34,000,000 fry after a normal egg to fry loss of approximately 10%. Additionally, the hatchery serves to ensure stable sockeye fry production in years when floods impact the survival of natural production in the river.

Methods and Results

To achieve the program goals, adults were collected at the floating resistance-board weir and trap located in Renton, Washington (RM 1.8). Adults were then hauled by truck to one of four 6 foot wide, 65 foot long adult raceways at the new hatchery. When the adults were ready to be spawned gametes were collected at the adult pond area, fertilized, rinsed, and water-hardened in the fertilization room adjacent to the adult raceways. Before occupancy of the new hatchery was permitted, fertilized, water-hardened eggs were transported to the interim hatchery and then put down in one of either the 40 vertical Heath-type or 55 kitoi incubators. Eggs taken after occupancy was permitted were fertilized, water-hardened and then transported to the incubation room of the new facility and put down in one of 140 kitoi incubators. Occupancy of the new hatchery was permitted by the time the first eggs were in the eyed stage so they were all shocked, picked, and put down in incubators in the new hatchery to continue incubation until they swam up and were ready to be ponded. At defined times during incubation chilled water was substituted for ambient temperature water to provide distinguishing thermal marks on the otolith bones of all of the hatchery fish. Tempered spring water – spring water with the temperature conditioned to follow river water temperature fluctuations - was also used to slow development of eggs and fry. Once the fry swam up and were ready to be ponded they were allowed to volitionally migrate to one of the 47 19-foot by 3-foot rectangular fiberglass raceways. In the 2011-2012 season all of the fry were fed for approximately 14 days and then either released at the hatchery or hauled by truck and released in the middle river (RM 13.5) or at the mouth of the Cedar River (RM 0.1).

Adult sockeye counts through the fish ladder at the Ballard Locks conducted by the WDFW and Muckleshoot Indian Tribe indicated that the 2011 run was small but exceeded pre-season estimates. While the preseason estimate was 34,683, the total count during the normal counting period (6/12/2010-7/31/2010) was 42,641 (<http://wdfw.wa.gov/fish/sockeye/counts.htm>).

Trap and Weir Operations

The weir structure is made up of 3-foot by 20-foot panels of 1-inch diameter schedule 40 PVC pipe with 1-inch spaces between them. Panels are linked together with stringers woven through overlapping pieces of adjoining panels. The panels are anchored to the river bottom at the upstream edge of the structure by hooking to a substrate cable. The substrate cable runs through eyelets on a substrate rail that is anchored to the river bottom by 38-inch rebar stakes driven into the gravel substrate. The weir panels float downstream from the substrate rail.

Improvements to the weir for the 2011-2012 season included new HDPE resistance boards which replaced the original wood resistance boards, and three 12 foot long, 16 inch diameter inflatable pontoons placed between the resistance boards and the weir panels for floatation. The 2-foot by 3-foot HDPE resistance boards were attached at the downstream end of each panel to add additional “lift” to the weir during higher flows. The inflatable pontoons, made from materials similar to inflatable raft material, were inflated through a system of 1 ½ inch hoses from shore. In lower flows the pontoons could be inflated using a backpack leaf blower. In higher flows when more pressure was required to inflate the pontoon hatchery technicians used an air compressor. When the pontoons were inflated they set the resistance boards at the required angle to provide “lift” to the panels.

At either side of the weir there are vertical bulkheads that prevent fish from passing around the end of the submerged portion of the panels. The weir is connected to the riverbank at the south end by a customizable, rigid aluminum picket section and at the north end with a custom, rigid aluminum picket section with a 2-foot wide tip gate. The tip gate was designed to allow unimpeded upstream fish passage and is operated by hatchery technicians from the walkway on top of the rock wall on the north bank. The aluminum picket and tip gate structure are propped up against the river current by tripods and attached to the weir panels by connecting to the bulkheads.

The trap itself is a 6-foot by 12-foot by 6-foot high cage made of aluminum. It consists of individual frame panels that are bolted together, individual pickets that slide into holes in the frame, lids that are bolted to hinges on the top of the walls, and an adjustable vee-trap entrance leading into the cage. An aluminum debris shield installed upstream of the trap deflects large debris floating down the river, protecting the trap.

On September 9, 2011 WDFW and SPU installed the weir at Renton in approximately three hours. Low flows, good weather, and the ease of access to the river promoted this quick install. In response to a slightly different river flow pattern at the site, the trap was placed approximately 24 feet from the edge of the driveway on the south bank of the river in 2011, 3 feet farther north than in 2010. Technicians also painted the aluminum vee entrance to the trap black and provided shade cover over the bulkhead entrance to the trap in an effort to promote Chinook and coho movement into the trap.

Trapped sockeye were sorted by sex from the trap into two aluminum live boxes for holding until they were loaded into rubber carrying boots, and loaded into the tanker trucks to be hauled to the adult holding ponds at the Cedar River Hatchery.

Hatchery technicians monitored fish activity at the trap, weir, and stretch of river above and below the weir regularly and passed any Chinook, coho, or other non-target species upstream out of the trap as soon as possible. Technicians also changed the weir configuration to accommodate unimpeded upstream passage of Chinook according to the protocols for operation the weir (Appendix 2). A total of 16 Chinook and 5 coho were trapped and passed upstream in 2011.

Other adjustments to the physical installation and operation of the weir included placing a row of gravel bags below the weir panels as close to the substrate rail as possible to minimize the risk of Chinook and sockeye getting stuck below the weir panels as was experienced in 2010. Technicians also responded to suggestions by the Adaptive Management Work Group (AMWG) to only open the tip gate for targeted periods of time to allow Chinook unimpeded passage rather than leaving the tip gate open for extended periods of time which results in lost opportunity to catch sockeye.

In addition to the 5,840 sockeye trapped and hauled from the weir, 897 sockeye were transported to the hatchery from the SPU fish ladder at the Landsburg Diversion Dam.

WDFW and SPU staff removed the trap and weir by hand from the river on November 10 in under four hours. The substrate rail and substrate cable were left in place.

Trap Configuration (Hours Closed/Fishing)			
Date	Trap (fishing)	Deep End Panels (not submerged)	Tip Gate (closed)
10-Sep	24	24	20
11-Sep	24	24	21
12-Sep	24	24	24
13-Sep	24	24	10
14-Sep	24	24	9
15-Sep	24	24	8
16-Sep	24	24	8
17-Sep	24	24	9
18-Sep	24	24	6
19-Sep	24	24	7
20-Sep	24	24	11
21-Sep	24	24	0
22-Sep	24	24	0
23-Sep	24	24	4
24-Sep	24	24	8
25-Sep	24	24	22
26-Sep	24	24	21
27-Sep	24	24	17
28-Sep	24	24	16
29-Sep	24	24	16
30-Sep	24	24	17
01-Oct	24	24	13
02-Oct	24	24	13
03-Oct	24	24	1
04-Oct	24	24	2
05-Oct	24	24	11
06-Oct	24	24	12
07-Oct	24	24	10
08-Oct	24	24	16
09-Oct	24	24	13
10-Oct	24	24	13
11-Oct	13	13	5
12-Oct	6	0	0
13-Oct	24	17	9
14-Oct	24	24	24
15-Oct	24	24	22
16-Oct	24	24	21
17-Oct	24	24	24
18-Oct	24	24	24
19-Oct	24	24	24
20-Oct	24	24	21
21-Oct	24	24	19
22-Oct	24	10	9
23-Oct	24	0	0
24-Oct	24	16	16
25-Oct	24	24	24
26-Oct	24	24	24
27-Oct	24	24	24
28-Oct	15	15	15
29-Oct	0	0	0
30-Oct	0	0	0
31-Oct	0	0	0
01-Nov	24	0	0
02-Nov	24	24	15
03-Nov	24	24	24
04-Nov	24	24	24
05-Nov	24	24	24
06-Nov	24	24	24
07-Nov	24	24	24
08-Nov	24	24	24
09-Nov	24	24	24
10-Nov	8	8	8
TOTALS:	1,362	1,279	854

Broodstock Collected and Fish Activity at the Weir				
Sockeye Hauled (Trap)	Sockeye Hauled (Landsburg)	SO PASSED	CK PASSED	CO PASSED
78			2	
38				
			1	
41	180			
62				
121				
167			1	
189				
198				
189	68			
76				
33			1	
			1	
60			2	
133	165		1	
364				
157	51		1	
219		2	1	
201				
297		1		
156	52			
93				
221	74	1	2	
162		1		
142		1		
108				1
377	65	1		
123				
168				
0				
0			1	
212		4		
307				
104	106	56		
74		2		
0		3		
187			2	
396		4		2
134		1		1
53				
0	82			
0				
13				
0				
35		1		
28				
0				
0	36			
0				
0				
0				
0		1		
28				
0	18			
0				
60				
0		1		1
36				
5,840	897	80	16	5

Spawning Operations

The 2011-2012 spawning season began on September 15 and ended on November 23. All spawning operations occurred at the new facility. Broodstock were delivered to one of four 6 foot wide, 65 foot long adult raceways through an aluminum flume adjacent to the raceways. Pond loading capacities were estimated using standards developed at the interim hatchery and were similar to ones used at other hatcheries. WDFW staff monitored all of the measurable metrics affected by fish densities as loadings were increased. Eventually, maximum loadings of 1,000 fish per raceway with 450 gallons of river water per minute per raceway were tested and found to be suitable for the fish.

On spawn days, fish were crowded in their ponds, females were checked for ripeness, and ripe fish were killed using a pneumatic fish stunner developed by Seafood Innovations Pty Ltd, Australia. Dead fish were placed on an electric conveyor that lifted them from the lower pond level to a screen-bottom collection table in the spawning area. Females were dipped in a solution of 1:100 iodophor and left on the screen-bottom drying/disinfection table for 10 minutes to ensure proper disinfection of the outside of the fish. Males were not disinfected due to sperm mortality from any contact with iodophor however they were wiped down with paper towels. Gametes were collected in stainless steel bowls, combined with approximately one tablespoon of spring water, stirred to ensure fertilization, and then passed through the roll-up window into the fertilization room.

Flexibility afforded by the adult raceways and mechanical crowders allowed for management of pond loadings and spawning schedules that minimized the number of times each fish was handled and ensured that the older fish were spawned sooner than younger fish. Green females were sorted by their relative ripeness. Females that were very green (not ripe) were placed in a pond with other very green females and were left alone for at least one week to decrease handling stress. Females that were close to being ripe would be placed in a pond that would be sorted on the next spawn day, usually only a few days later. Male ponds could also be loaded and managed to ensure that the older males would be spawned sooner than younger ones.

Because of disparity in the number of males and females returning to the adult trap and Landsburg Fish Passage Facility, and higher mortality rates in the male ponds, variance from the 1:1 spawning ratio protocol occurred. As female pond populations started to outnumber male pond populations the spawning matrix was adjusted to either a 3:2 or 2:1 ratio depending on pond populations on a given spawn day. WDFW biological, fish health, and hatchery reform staffs were consulted to make sure no additional genetic diversity or fish health vulnerability was incurred with this adjustment.

After sitting for 5 minutes to ensure total fertilization, fertilized eggs were rinsed and immersed in a solution of 1:100 iodophor for one hour to ensure proper IHNV disinfection. After one hour eggs from up to 12 females were combined into a disinfected bucket and transported to the interim hatchery for spawn dates before October 27, and to the incubation room of the new hatchery for spawn dates of October 27 and later. Used

stainless steel bowls were washed and thermally disinfected with hot water in a commercial dish washer and then set to air dry until the next spawn day. Fertilized, disinfected eggs were put down for incubation in either heath-type vertical or kitoi incubators. Eggs incubated in the interim hatchery were served by either “gravity” water from springs immediately above the spring pond at the interim hatchery, spring assembly #3 water, or water from the spring pond at the interim hatchery. Eggs incubated in the new facility were served by water from spring assembly #1.

Mortality rates in the adult broodstock were significantly higher in the 2011-2012 season than in previous years. 1,067 male and 703 female sockeye died in the adult raceways before they were spawned. Technicians and fish health specialists analyzed mortalities, water chemistry, dissolved oxygen content, and any other potentially contributing factors. IHN levels were exceptionally high in the broodstock, low levels of furunculosis were found, and conventional hatchery wisdom would indicate that concrete raceways lead to slightly higher mortality rate than fiberglass round ponds, but none of these factors were found to be significant enough to account for the level of mortality seen.

2,717 females were spawned during this season, giving an egg take of 9,015,531 with a higher than average fecundity of 3,318 eggs per female. 7,108,000 eggs were incubated in the interim hatchery until the eyed stage when they were shocked, picked, and moved to incubators in the new hatchery. Of those eggs that started at the interim hatchery, 818,000 were placed in vertical incubators served by gravity-fed spring water from the springs immediately above the spring pond at the interim hatchery. The remaining 1,907,000 eggs were incubated exclusively at the new hatchery.

On spawn days, WDFW hatchery and biological staff collected otolith, ovarian fluid, kidney and spleen, and fecundity samples. There were 1,100 otolith, 216 ovarian fluid and 75 kidney/spleen samples taken in addition to fecundity assessment of 200 females. 170 of the ovarian fluid samples tested positive for IHN virus.

Incubation and Picking Operations

Between the second day after fertilization and hatching the eggs were treated with formalin to control fungus growth. At the interim hatchery this was done by dumping a prescribed amount of formalin into the inflow of each individual incubator and allowing the formalin to flush through the incubator. This method is called the California Flush. The California Flush method was also used at the new hatchery until a pump and drip system was completed, allowing for a much safer, more reliable delivery of formalin to the eggs. In response to lower levels of sediment and fungus in the kitois in the new hatchery the duration and frequency of formalin treatments were decreased without any increase in fungus on the eggs. The same concentration was still achieved on treatment days ensuring proper effectiveness, but the time of each treatment was lowered to 15 minutes and was only done three days per week instead of 20 minute treatments seven days per week. Hatchery staff and the WDFW fish health specialist monitored the results of this change to the formalin treatment protocol and determined that the new levels were sufficient.

The otolith bones of the eggs and alevins received thermal marks by delivering chilled water to their incubators for prescribed periods of time. To accomplish this, ambient spring water was cooled at least 4 degrees Celsius by a chiller and heat exchangers in the headworks of the new hatchery before going through incubators. When an incubator was scheduled to be chilled the ambient temperature spring water supply to that incubator was replaced by the chilled water for the number of hours prescribed by the chilling schedule (Appendix 4). When the mark was complete ambient temperature spring water was returned as the water source for the incubator.

During periods of incubation when thermal marks were not being applied, and average river water temperatures were colder than the 48 degree ambient spring water, tempered spring water was used to slow down egg and fry development. One of the goals of the Cedar River Hatchery Adaptive Management Plan is to synch the development and release timing of hatchery fry with natural origin fry. This goal is reflected in the design and operation of the tempered spring water system which uses the colder river water to cool down spring water through a heat exchanger before delivery to the incubators, therefore slowing down the development of the eggs and fry to mimic natural production in the river.

Because thermal mark periods correspond with eggs reaching the eyed stage or hatching, eggs were taken on different days through the spawning period, and at least one week of static baseline temperature (ambient spring water) needs to occur before and after each thermal marking period, a water budget and schedule were developed to assign which water type was used for each incubator for each week of incubation and rearing. The table below shows which kitois or ponds were on which kind of water for each week of incubation and rearing. The table also shows how much of each kind of water was needed for each week. Hatchery staff adjusted flows in headworks according to the water budget each week.

Table 2, Incubation Water Budget

When the eggs reached the eyed stage they were siphoned out of their incubators and physically shocked (bumped) to help distinguish healthy eggs from dead ones. 24 hours after they were shocked they were picked by a Jensorter egg picker initially and secondarily by hand. Once the eggs were picked they were put back into their incubators layered with 1 inch plastic saddle substrate. During the picking operation eggs were sampled to determine size and weighed to establish accurate populations and rates of loss. The rate of loss for the 2011-2012 season was 6.06%.

Table 3, Egg Inventory and Distribution

EGG INVENTORY AND DISTRIBUTION										
I.D. CODE:		SO:NA:CEDA:11:M			CEDAR RIVER					
TAKE	New Hat		GREEN EGGS		EYED EGGS		EGG	%	ADJUSTED	Fecundity
DATE	Inc. #	Females	NUMBER	PICK DATE	NUMBER	SAMPLE	LOSS	LOSS	EGG TAKE	(eggs/female)
09/15/11	2	65	208,000	10/28/2011	200,000	3440	13,000	6.10	213,000	3,277
09/19/11	4	41	131,200	11/01/2011	146,000	3440	3,531	2.36	149,531	3,647
09/22/11	8	68	217,000	11/04/2011	200,000	3572	13,000	6.10	213,000	3,132
09/26/11	10,14	145	464,000	11/08/2011	441,000	3554	30,000	6.37	471,000	3,248
09/29/11	16,20	119	380,000	11/09/2011	361,000	3448	14,000	3.73	375,000	3,151
10/03/11	22,26,28,32	294	940,000	11/15/2011	910,000	3448	63,000	6.47	973,000	3,310
10/06/11	34,38,40,44	264	844,000	11/16/2011	794,000	3409	37,000	4.45	831,000	3,148
10/10/11	46,50,52	195	624,000	11/22/2011	549,000	3409	92,000	14.35	641,000	3,287
10/12/11	56,58,62,64	278	889,000	11/23/2011	807,000	3448	83,000	9.33	890,000	3,201
10/17/11	68,72,74	211	675,000	11/29/2011	685,000	3448	39,000	5.39	724,000	3,431
10/20/11	78,80,84	180	576,000	11/30/2011	603,000	3571	34,000	5.34	637,000	3,539
10/24/11	86,90,92,96	296	947,000	12/06/2011	950,000	3650	41,000	4.14	991,000	3,348
10/27/11	98,102,104	219	700,000	12/07/2011	718,000	3650	29,000	3.88	747,000	3,411
10/31/11	108,110,114	166	531,000	12/12/2011	554,000	3650	20,000	3.48	574,000	3,458
11/03/11	116	57	182,000	12/14/2011	176,000	3650	15,000	7.85	191,000	3,351
11/07/11	118	72	230,000	12/19/2011	232,000	3650	14,000	5.69	246,000	3,417
11/09/11	122	17	54,000	12/20/2011	50,000	3650	1,000	1.96	51,000	3,000
11/17/11	124	21	67,000	12/28/2011	66,000	3650	3,000	4.35	69,000	3,286
11/23/11	128	9	28,000	01/03/2012	27,000	3650	2,000	6.90	29,000	3,222
TOTAL		2,717	8,687,200		8,469,000	0	546,531	6.06	9,015,531	3,318

Ponding, Rearing, and Planting Operations

When fry began to swim up in their incubators the outlet screen was removed to allow them volitional migration through the incubator drain hose and into the adjacent fiberglass rearing pond. The first incubators were allowed to volitionally migrate for 5-17 days before any remaining fry were manually moved from the incubator to their rearing pond. When only 5 days of volitional migration were allowed before manual removal there were still as many as 40% of the fry in the incubator, some of which still had small amounts of yolk present indicating that they weren't ready to be ponded. When 17 days of volitional migration were allowed 2%-5% of the fry remained in the incubator and appeared to be past the normal developmental stage when feeding is initiated. These "pinheads" were manually moved to the rearing pond, but did not start eating readily and could be observed as a skinnier sub-population until they were released. Through further testing it was determined that about 12-14 days of volitional migration was adequate for the majority of fry, and didn't result in many, if any, pinheads.

As soon as fry started to migrate into the pond fish were fed hourly during the normal workday, seven days per week. For most ponds there was a clear peak of swimming up that lasted one or two days. This peak usually occurred around day 7 of volitional

migration and was designated as day one of the 14 day feeding schedule. Fish that migrated into their pond before day one got more than 14 days of feeding, but fry that migrated after day one or were manually moved to the incubator at the end of the volitional migration period were fed less than 14 days. The average for each pond was 14 days of feeding. Rangen Soft Moist Starter was fed at a rate of between 3-4% body weight per feed day. Hatchery personnel were instructed and shown how to watch the fish's feeding behavior carefully, make sure feed wasn't going to the bottom of the pond, and adjust feed rates according to those factors in addition to the rate of feed. This feeding to satiation ensured that all of the fish in each pond were getting enough feed to achieve their maximum growth.

As stated above, one of the goals of the AMP is to synchronize the release timing of hatchery fry with the outmigration of naturally produced sockeye in the river. This has been measured by calculating the median migration dates, the date at which half of the fry have migrated. As Table 4 shows the median release date for the interim hatchery since the 2004-2005 season was February 24 and the median release date for the 2011-2012 season was March 8, almost two weeks later. Because broodstock collection has happened on a very similar schedule over these years, and because the ambient spring water temperature has remained constant since the inception of the interim hatchery, this shift in median release date can be attributed to the delayed development resulting from the use of cooler tempered spring water and having the capacity to feed all production for 14 days. This delay is also attributed to the capacity at the new hatchery to place incubators on colder water for chilling for longer periods of time. With over 80 gallons of water chilled to approximately 38 degrees Fahrenheit incubators could be placed on chilled water for 24 hours instead of 8 or 16 hours as was the case in the interim hatchery where only 28 gallons of approximately 42 degree water was available.

Table 4, Median Fry Plant Date

Year	Median Plant Date
2004-2005	22-Feb
2005-2006	23-Feb
2006-2007	16-Feb
2007-2008	06-Mar
2008-2009	06-Mar
2009-2010	04-Mar
2010-2011	18-Feb
Average	24-Feb
2011-2012	08-Mar

Fish were sampled to determine size when they were ponded and again when they were planted. Fry were either passively transported through a 4" PVC fry transfer line from the pond to the planting truck or were released through the fry transfer line directly into the Cedar River at the hatchery site (RM 24). Trucked fish were released either at the mouth of the Cedar River (RM 0.1) in the Cedar Trails Park, or at the Trestle (RM 13.5). The

numbers of fry, locations, and schedule for releases were developed by the AMWG and the WDFW. 29% of the fry were released at the Hatchery in the upper river, 37% were released at the Trestle in the middle river, and 34% were released at Cedar Trails Park in the lower river. This strategy was employed in to accommodate for presumed better survival of fry released in the lower river while still encouraging anticipated wide spatial distribution throughout the river of adult recruits from fry released in the middle and upper river. Overall mortality from the green egg stage to released fry was 9.8% resulting in a planted fry total of 8,125,000.

In response to questions about in-river survival of fry released in the upper and middle river, and also about delayed outmigration, a pilot experiment was developed and implemented to explore options for evaluation of these questions. Calcein dye was used to mark four ponds of fry from two upper river (Landsburg) release groups and then fry captured at the fry trap in the lower river on the nights of release and the two following nights were evaluated and enumerated in an attempt to assess survival and delayed migration rates. Calcein dye is a bright green dye that produces a distinct, iridescent mark on the calcium in fin rays and bones. The mark is not visible under normal light, but shows up clearly when the fish are illuminated with a bright blue light and viewed through a special lens.

Because calcein dye is not yet approved for use on animals an Investigational New Animal Drug (INAD) permit from the Aquatic Animal Drug Approval Partnership Program, administered by the U.S. Fish and Wildlife Service was required. The INAD process included a thorough application process, adherence to certain study protocols, strict monitoring of drug inventory and disposal, and thorough reporting on the results of our use of the drug.

Fry to be marked were crowded to one end of their ponds and kept separate from marked fry by intermediate pond screens. Approximately 5,000 fry at a time were dip-netted from the unmarked section of the pond, placed in a 4 gallon bath of 2% saline solution for 6 minutes, placed in a 4 gallon bath of 5% calcein solution for 6 minutes, and then dumped into the marked portion of the pond. On days when fry were marked they were not fed to minimize stress. The saline solution was exchanged regularly to further minimize stress on the fish and each batch of calcein was only used for two ponds despite still making strong, visible marks at the end of marking the second pond. Exchanging the calcein bath also decreased any pathogen concerns of using the same bath between different release groups.

A total of 360,000 fry from ponds 26 and 27 (kitois 78 and 80) and 500,000 fry from ponds 33 and 34 (kitois 98 and 102) were marked and released from Landsburg. Fry were marked during the week prior to release and each of the four ponds took about a day and a half to mark. A few hundred marked fish from each pond were kept at the hatchery for 14 extra days to ensure that no deferred mortality or loss of mark clarity was incurred.

All fry captured at the fry trap on nights of release were kept in a holding tank until the following mornings when WDFW and SPU staffs were available to read and enumerate

marked fish. Fry were brought inside the fry trap barge room to provide the necessary darkness required for reading the calcein marks. Once inside the dark room, staffs netted the fish out of a bucket, or other container, and looked at them through a specialized calcein mark reader. Several different holding buckets, containers, nets, “paddles”, and processes were tried and evaluated to achieve the most efficient, reliable method for accurately reading marked fry.

During the three nights and one day of trapping following the March 18 release of 360,000 calcein marked hatchery fry 25,098 fry were caught at the trap and interrogated for marks. A total of 5,771 were found to have calcein marks. During the three nights and one day of trapping following the March 25 release of 500,000 calcein marked hatchery fry, 52,117 fry were caught at the trap and interrogated, 7,757 of which were found to have calcein marks.

In response to requests from the AMWG trapped fry were also sampled for otolith analysis. 500 fish from the total fry trap catch on nights of each upper and middle release were kept for otolith extraction and analysis. On nights when hatchery fry caught at the fry trap were also calcein marked the 500 fry for otolith sampling were also interrogated for calcein marks.

Disease

Groups of fry swam up according to their relative age in most cases except for kitoi 104. Kitoi 104 started swimming up earlier than their companion incubators from same spawn day (same age), and showed above average mortality in the kitoi before the outlet screen was removed. Once the incubator outlet screen was removed significant numbers of fry migrated into the pond despite still having visible yolk present. As early swim up and mortality are early symptoms of IHN, samples were sent immediately to the WDFW fish health lab for analysis. Fry with yolk present continued to migrate into the pond, the rate of mortality increased, and many fish developed red spots (necrosis) around their vents and eyes, symptomatic of an IHN outbreak. By the fourth day after the incubator outlet screen was removed, when results from the fish health lab confirmed the presence of IHN, over 70% of the fry had died in the pond. The remaining fry were euthanized with methane tricaine-sulfate (MS222), disinfected with bleach, and flushed into the settling abatement tank. The euthanized fry and contaminated substrate in the incubator were left in a solution of bleach until all of the other fry in the hatchery were released and the risk of transmission of virus from kitoi 104 to healthy fish was eliminated. Once all of the other fish were released, kitoi 104 was cleaned out and disinfected thoroughly and the substrate from kitoi 104 was disposed of. If the loss associated with kitoi 104 is taken out of the total egg to fry mortality calculation the total loss drops to 7.4% with an eyed egg to release mortality of only 2%.

When fry were planted, 60 fish from each rearing vessel were collected and sent to the WDFW fish health lab for analysis. While 170 of the ovarian fluid samples taken from the adult broodstock tested positive for IHN virus, only kitoi 104 tested positive as fry. No other fish health concerns were revealed during the analysis.

Table 5, Ponding, Rearing, and Planting Schedule

Take Date	Incubator Vessel #	Pond #	Timing E, M, L	Treatment Groups*	Pick Date	Swim Up	Eyed Eggs Number	Release	
9/15/11	2	1	EARLY		10/28/11	1/26/12	200,000	2/9/12	
9/19/11	4	2				11/1/11	2/2/12	146,000	2/16/12
9/22/11	8	3			546,000	11/4/11	2/8/12	200,000	2/16/12
9/26/11	10	4				11/8/11	2/9/12	230,000	2/21/12
	14	5			441,000	11/8/11	2/9/12	211,000	2/21/12
9/29/11	16	6				11/9/11	2/12/12	224,000	2/27/12
	20	7			360,000	11/9/11	2/12/12	136,000	2/27/12
10/3/11	22	8				11/15/11	2/13/12	229,000	3/1/12
	26	9			471,000	11/15/11	2/13/12	242,000	3/1/12
	28	10				11/15/11	2/13/12	241,000	3/1/12
	32	11			439,000	11/15/11	2/13/12	198,000	3/1/12
10/6/11	34	12				11/16/11	2/20/12	232,000	3/5/12
	38	13				11/16/11	2/20/12	228,000	3/5/12
	40	14			622,000	11/16/11	2/20/12	162,000	3/5/12
	44	15	MIDDLE	172,000	11/16/11	2/20/12	172,000	3/5/12	
10/10/11	46	16				11/22/11	2/23/12	211,000	3/8/12
	50	17				11/22/11	2/23/12	153,000	3/8/12
	52	18			549,000	11/22/11	2/23/12	185,000	3/8/12
10/12/11	56	19				11/23/11	2/23/12	250,000	3/8/12
	58	20				11/23/11	2/23/12	250,000	3/8/12
	62	21				11/23/11	2/23/12	250,000	3/8/12
	64	22			807,000	11/23/11	2/23/12	57,000	3/8/12
10/17/11	68	23				11/29/11	2/27/12	258,000	3/12/12
	72	24				11/29/11	2/27/12	215,000	3/12/12
	74	25			685,000	11/29/11	2/27/12	212,000	3/12/12
10/20/11	78	26				11/30/11	3/1/12	180,000	3/18/12
	80	27			360,000	11/30/11	3/1/12	180,000	3/18/12
	84	28			243,000	11/30/11	3/1/12	243,000	3/19/12
10/24/11	86	29	LATE		12/6/11	3/5/12	250,000	3/22/12	
	90	30			500,000	12/6/11	3/5/12	250,000	3/22/12
	92	31				12/6/11	3/5/12	244,000	3/22/12
	96	32			450,000	12/6/11	3/5/12	206,000	3/22/12
10/27/11	98	33				12/7/11	3/8/12	240,000	3/25/12
	102	34			500,000	12/7/11	3/8/12	260,000	3/25/12
	104	35			218,000	12/7/11	3/8/12	218,000	IHN
10/31/11	108	36				12/12/11	3/12/12	173,000	3/29/12
	110	37				12/12/11	3/12/12	174,000	3/29/12
	114	38			554,000	12/12/11	3/12/12	207,000	3/29/12
11/3/11	116	39				12/14/11	3/15/12	176,000	4/12/12
11/7/11	118	40				12/19/11	3/19/12	232,000	4/12/12
11/9/11	122	41			458,000	12/20/11	3/21/12	50,000	4/12/12
11/17/11	126	42				12/28/11	3/29/12	66,000	4/19/12
11/23/11	128	43		93,000	1/3/12	4/4/12	27,000	4/19/12	
Totals				8,250,000					

* Treatment group numbers are based on eyed egg populations. Actual release numbers will be slightly different.

Upper
Middle
Lower

Summary	Upper	Middle	Lower	Total	
Early	912,000	982,000	985,000	2,879,000	35%
Middle	909,000	979,000	928,000	2,816,000	34%
Late	593,000	1,054,000	908,000	2,555,000	31%
Total	2,414,000	3,015,000	2,821,000	8,250,000	
	29%	37%	34%		

Discussion and Conclusions

With the transition of hatchery operations to the new facility several significant improvements were realized in 2011-2012. The ability to temper spring water to delay the development of eggs and fry, feed all of the fry for 14 days, and decrease stress by allowing volitional migration from the incubators to the rearing ponds were all notable improvements. Additionally, physical and operational adjustments at the weir resulted in a better adult trapping results. Finally, results from the Calcein pilot project showed promise for evaluating questions about fry release strategy and in river survival.

Adult Trapping and Weir Management

Chart 1, Eggs Taken vs., Ballard Locks Counts

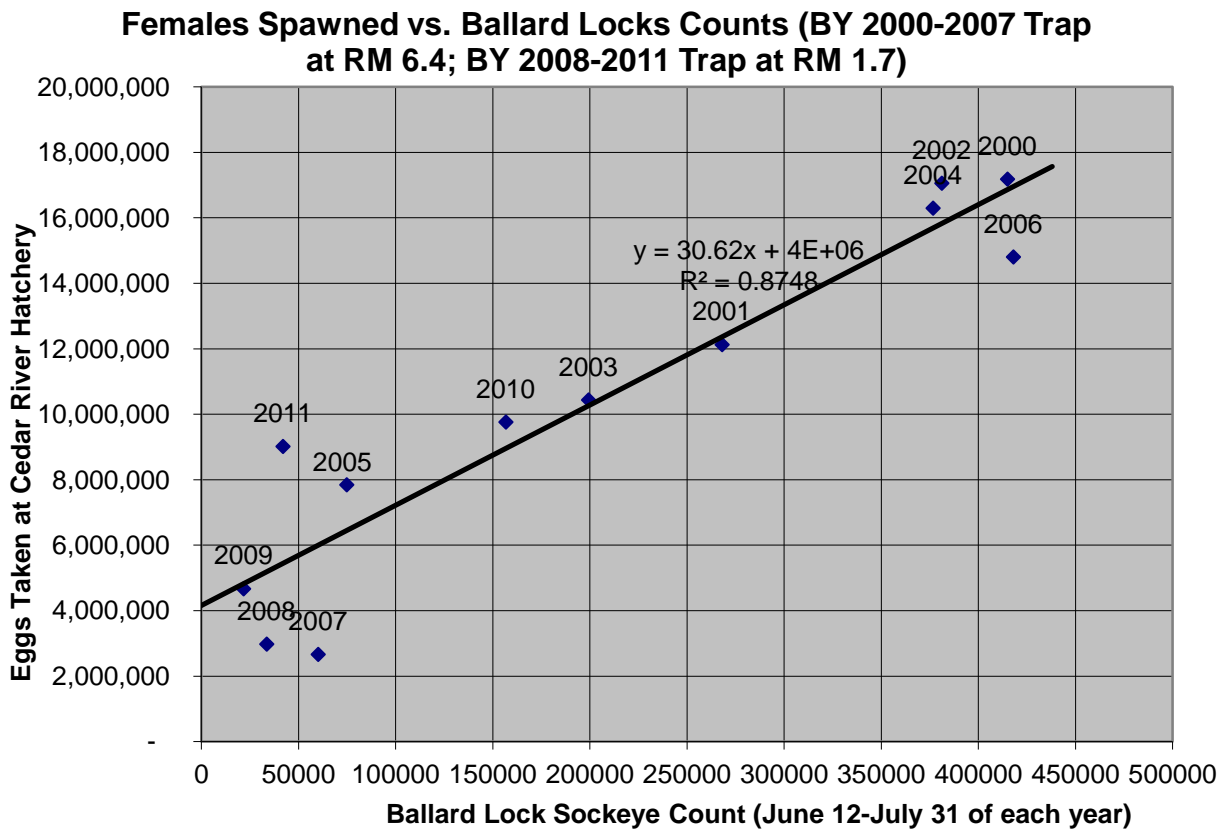


Chart 1 shows that trapping in 2011 was relatively successful compared to previous years. More broodstock were collected (eggs taken) than would be expected given the number of sockeye through the Ballard Locks. While this is expected with the newer weir in the lower Renton location Table 4 shows that benefits continue to be realized from those improvements. Additionally, changes to protocols for the operation of the weir discussed above including leaving the tip-gate closed for more hours of the night appear

to have lead to more efficient trapping. Roughly the same number of eggs was collected in 2010 and 2011 despite less than one-third as many adults returning to the Ballard Locks in 2011. This indicates that 2011 trapping efforts were much more effective than 2010 efforts.

Spawning and Incubation

Table 6, 2005-2011 Adult Prespawm Mortality

Year	Eggs Taken	Male Morts	Female Morts	Total Mort Rate	Female Mort Rate
2005	7,835,000	407	116	10.68%	2.37%
2006	14,794,000	341	358	7.56%	3.87%
2007	2,496,000	365	92	29.29%	5.90%
2008	2,971,000	241	31	14.65%	1.67%
2009	5,162,325	175	19	6.01%	0.59%
2010	9,560,190	454	86	9.04%	1.44%
2011	9,015,000	1067	703	31.41%	12.48%

Table 7 shows that the prespawm mortality rate was extremely high in 2011. Adults were sorted carefully, pond loadings were managed conservatively, and the flexibility afforded by the new adult holding and spawning facility was utilized to decrease the number of times fish were crowded, sorted, or handled, but the rate of mortality was still high. Tests conducted by fish health specialists and hatchery technicians throughout the season found no significant evidence to suggest a cause to the high level of mortality. High levels of IHN and low levels of furunculosis were found, but they were not thought to be sole causes of the high level of mortality. Future operations of the adult holding and spawning facility might yield answers to questions about the cause of mortality and a thorough evaluation of any pertinent factors will continue during future seasons.

Table 7, 2003-2012 Egg loss

Season	Total Eggs Taken	Loss
2003-2004	11,487,100	17.26%
2004-2005	16,682,000	8.99%
2005-2006	7,513,600	8.27%
2006-2007	13,465,000	8.37%
2007-2008	2,870,300	6.62%
2008-2009	2,971,400	4.75%
2009-2010	5,162,395	7.04%
2010-2011	9,560,190	5.29%
2011-2012	9,015,000	6.06%

As Table 8 shows, egg loss for the 2011-2012 season was relatively low. Lower egg loss could be attributed to slightly lighter incubator loadings, better egg quality due to favorable temperatures in Lake Washington during the 2011 summer, careful handling of eggs and meticulous management of incubator water flows. Because early egg takes during the 2011-2012 season were incubated at the interim facility on spring assembly #3 and spring pond water there was likely more sediment present causing a slightly higher rate of loss. The head troughs in the new hatchery allow fine sediment to settle, resulting in much cleaner water delivered to the incubators.

One of the only difficulties with incubating in the new hatchery occurred when the condenser water heat exchanger (CDWHX) plugged with debris from the river water supply. The CDWHX uses pumped river water to cool the hot condenser fluid from the chiller. When the heat exchanger plugged with debris the condenser fluid overheated, causing a pressure imbalance in the compressors of the chiller and triggering a chiller shut-down. Technicians were able to resolve this issue by disconnecting the river water supply to the heat exchanger and back-flushing any debris out of the heat exchanger quickly enough so that the thermal mark schedule was not interrupted. While this solution worked for the 2011-2012 season it is not a long term solution. The wear and tear on the chiller compressors resulting from the pressure imbalance and the unpredictability of the failures need to be resolved.

Ponding and Feeding

Allowing volitional migration from the incubators to ponds for 12-14 days worked exceptionally well, resulting in significantly lower stress and loss of fry, better timing of initial feeding, and markedly healthier looking fish. It is likely that these factors could contribute to better survival after the fish were released in addition to yielding better survival while they were in the hatchery.

Because of the success with Rangen's soft moist starter diet in the 2007-2011 seasons the same feed was used for the 2011-2012 season. That feed seems to perform well for sockeye at the Cedar River Hatchery for a number of reasons. Most significantly, perhaps, is that it falls very slowly through the water column giving the less aggressive fry a prolonged opportunity to feed. The rate of conversion of food to growth is not as impressive as some of the other starter feeds available, but some of those other feeds sink to the bottom of the pond faster and are wasted which requires feeding more total feed.

Because the focus of the calcein mark project was to test and evaluate processes for marking, trapping, reading, and analyzing calcein marked fry, results should not be used to draw conclusions about rates of survival, rates of delayed migration, and trap efficiency. The pilot project yielded valuable information about how effective this strategy could be towards answering those types of questions in the future. Methods and strategies honed during the 2011-2012 pilot project could be successfully implemented in the future under a more robust monitoring and evaluation plan to contribute to the

clarification of in-stream survival, delayed migration, and the effectiveness of otolith sampling trapped fry. WDFW biologist, Kelly Kiyohara, who led the trapping and interrogation portion of this pilot, compiled the data and some suggestions in Appendix 5. The focus of the pilot was to develop techniques and methods for use in the future when a more robust plan guides this study. The data do not have the integrity on which to base conclusions about fry survival or delayed migration.

Appendices

Appendix 1 2011-2012 Operations Plan

General Production Schedule	May	Actual
Broodstock collection	Sep. 11 - Nov. 15	Sept. 11-Nov 8
Spawning	Sep. 20 - Nov. 30	Sept. 15-Nov. 23
Egg picking	Nov. 10 - Jan. 10	Oct. 28-Jan. 3
Ponding, rearing, release	Jan. 25 - Apr. 10	Jan. 26-Apr. 19

Adult Return	May	July	December
Preseason Forecast	34,683		
Locks Estimate		36,744 (7/19)	
Live Counts			42,641

Broodstock Collection Goal	May	July	December (actual)
Number of Adults	3,125-4,375	3,437-5000	6,737

Broodstock Collection Schedule	May	July	December (actual)
Sept. 11	184	232	520
Sept. 18	266	336	915
Sept. 25	364	459	1,647
Oct. 2	435	549	800
Oct. 9	446	563	1,252
Oct. 16	416	526	1,049
Oct. 23	379	478	194
Oct. 30	338	426	28
Nov. 6	300	379	60
Nov. 13	248	313	0
Nov. 20	206	260	0
Nov. 27	169	213	0

Egg Take Goal	May	July	December (actual)
Number of Eggs	5,000,000-7,000,000	5,500,000-8,000,000	9,015,000

Rearing Plan	May	July	December (actual)
Duration	2-weeks	2-weeks	2-weeks

Release Location	May	July	December (actual)
Hatchery	0%		29%
Trestle	50%	50%	37%
Mouth	50%	50%	34%

Appendix 2, 2010 Adult Trap and Weir Activities Log

2011 Trap Log

9/9: 03:30pm 170cfs

Installed weir today, things went smoothly, having a list and a plan I think helped things to move along. Also installed the new air bladders in place of the old kick panels those also went in smoothly much more stable and even throughout top portion of weir. We also placed sandbags on the underside of the weir about a foot from the substrate rail; I think that next time we do this we will place them as close to the rail as possible to prevent the fish from becoming stuck underneath the weir. Also observed some fish before installation about 75-100 SO holding in RR hole below weir.

07:30pm

Observed 100+ SO in RR hole

9/10: 08:00am 165cfs

Observed 100+ SO as well as 6 CK 3 in RR hole and 3 CK just behind weir, also saw a stuck CK under weir it was still alive so we moved out a sandbag and were able to direct it toward the opening and it swam out, we placed more bags to block access to that portion of the weir. We also moved one half of the debris gate back towards the trap to increase the attractant flow, then we cleaned the weir and sorted fish into the live boxes, 11 males and 1 female.

12:00pm

Fish observation counted 6 CK below weir 4 in the RR hole and 2 in the pylon hole under the walking bridge there were also around 100+ SO below weir, also lots of suckers in RR hole maybe 10-15, holding just to the edge of the hole

06:30pm

Evening fish observation counted 6 CK below weir 4 in RR hole and 1 in RRW and 1 behind pylon, there were also about 150 SO below weir.

9/11: 07:30am 173cfs

AM fish observations counted 9 CK below weir 4 were directly behind weir, 1 in RRW and 4 in RR hole, along with about 100+ SO. Opened the tip-gate for passage of CK after opening the gate I watched 1 CK swim through, after watching we emptied the trap and had 2 CK which we passed 1 female as well as a Jack CK, good #'s of SO in trap this am, sorted fish into live boxes and cleaned weir, John came down (SPU) and Hauled 51 males and 27 females to the hatchery, also showed John how the new air bladders work.

12:00pm

Mid-day fish observation counted 5 CK below weir as well as 100+ SO. Lots of people on river today swimming, floating, running dogs, at least 150 people at CC all day long.

08:00pm

Evening fish observation counted 5 CK below weir 4 in RR hole and 1 behind weir along with about 100 SO below weir. Lots of garbage on the weir tonight after hot day with lots and lots of people using parks and river, was out until dinner, came in to eat then went back out to keep people from destroying weir. Did my observation and then cleaned weir, also something to note, a number of kids moved a log down river and is now sitting in the middle of the river and will come down onto weir as soon as we get high water. Weir will be fishing tonight.

9/12: 07:30am 170cfs

Did fish observation with Joe this am to see where fish had been holding , we counted 7 CK, 2 were holding directly below weir 3 in the RR hole and 2 in the RRW slot also viewed around 100 SO from weir to RR hole.

10:30am

We tried to haul fish first thing today only to find that we had the wrong trash pump, so after some running around we hauled fish at 10:30 , 20 males and 18 females and noticed that the 2 CK that were behind the weir were back behind the walking bridge pylon.

01:00pm

Mid-day fish observation showed that the fish were getting aggressive starting to move around counted 8 CK , 2 directly behind weir 3 in RR hole and 3 in tail-out of RRW still about 100 SO from weir to RR hole 1 pair digging above RRW, installed vexar to the top of the bulkheads to create a shaded area in the run before the trap.

07:30pm

Evening fish observation counted 8 CK; 2 behind walking bridge pylon, 2 in RRW and 4 in RR hole didn't see any directly behind weir , also saw a school of SO (50) move up river and stopped at the tipgate, which was closed

9/13 06:30am

On the morning fish check saw 7 CK directly behind weir, opened the tip-gate to allow for the passage of the CK viewed from the wall until 8am while watching saw 6 CK swim through the tip-gate. There were still 4 to 6 CK behind weir and 10 more in RRW and RR hole. Also pulled a wild female CK out of the trap and moved it upriver will leave tip gate open until there are fewer than 10 CK behind weir.

10:30am

Cleaned the weir also moved the log from upstream to below the weir to avoid damage, also installed the final section of vexar to closest bulkhead, CK have moved from behind weir to the RRW slot, tip-gate is still open.

01:00pm

Sorted SO out of the trap 6 males and 4 females, also counted 11 CK, 8 in RR hole, 3 in RRW and the 2 or three under weir seemed to have moved up or are just underneath unable to be seen. Put the fingers into the trap V to prevent back outs.

04:00pm

Still viewing 11 CK; 3 in the RRW and 8 in the RR hole there are also about 75 SO in RR hole

07:00pm

Evening fish observation counted 12 CK ; 8 in RR hole and 4 in RRW 1 has a disk tag, still none directly behind weir

11:00pm

Closed the tip-gate, it was open for the previous 14.5 hours, we are now fishing.

9/14 07:00am

Opened tip-gate for 15 min and watched 10 SO and 1 CK move through, in the fish observation saw 12 CK downstream of weir 8 in RR hole and 4 in the RRW, reopened tip-gate at 0830 and sorted fish into live boxes.

01:00pm

Viewed 11 CK 7 in RR hole and 4 in RRW, Cory came down in lurch to haul 10 females and 31 males to the hatchery. We had 2 morts in live boxes 1 male and 1 female, cleaned the weir.

04:30pm

Viewed 11-13 CK below weir 6 in RR hole and 5-7 in RRW slot 2 with disk-tags also hard to count fish in the RRW slot due to currents and lighting there are also at least 150 SO from weir down to RR hole.

06:30pm

Evening fish observation counted 11-13 CK; 7 in RR hole, 5 in RRW slot tip-gate will remain open until 11 pm tonight to allow for passage of the CK.

11:00pm

Closed tip-gate, it was open for the previous 15 hours, we are fishing for the night.

9/15 06:30am

Opened tip-gate with 3 CK behind it, watched as 1 went through and the other 2 were close to the opening.

08:30am

Talked to Michele (SPU) who said that the river should be rising by approx 50 cfs today, and that the electrician will be coming in around 1pm to fix break room lights. On the morning fish observation saw 13 CK; 7 in RR hole and 6 in RRW slot, only saw 1 fish which was tagged(yellow) there are also 150 SO in RR hole, after the observation we sorted 23females and 25males.

12:30pm

Mid-day observation counted 11 CK with at least 5-6 in RR hole (wind is preventing good visibility) and about 5-6 in the RRW slot. There are at least 150-175 SO in RR hole. SPU electrician is working on lights in break room and honeybucket will be here weekly Tues or Thurs.

06:00pm

Counted 14 CK; 8 in RR hole and 6 in RRW slot 1 with tag(yellow) sockeye are stacked in RR hole and appear ready to move

11:00pm

Closed Tip-Gate

9/16 06:30am

Opened tip-gate then watched as 2 CK swam through very quickly. There are only about 20 SO in the trap but there are several upstream from weir swam through while tip-gate was open.

08:30am

John and Jeff (SPU) hauled 37females and 25males to the hatchery.

10:30am

Fish observation counted 16 CK; 1 in RR hole 1 with tag (pink and yellow), also 3 CK in RRW slot, and 1 behind weir. Only about 75 – 100 SO in RR hole

03:00pm

Mid-day fish observation counted 15-16 CK; 11 in RR hole and 3-4 in RRW slot, have been working with Michele (SPU) on Trailer alarm, and the air bladders have been holding air since last time filled up 4-5 days ago.

06:00pm

Still counting 12 CK in RR hole and 4 in the RRW slot SO #'s are also growing in the RR hole

11:00pm

Closed Tip-Gate

9/17 05:00am

Opened Tip-Gate

06:30am

Watched as 2 CK and 8 SO passed through opening

08:30am

Sorted and Hauled SO 62males and 59females went into ponds 1 and 2, the morning fish observation counted 13 CK in RR hole 1 with tag(yellow and blue) several fresh fish also 2 in RRW slot for a total of 15 CK below weir, there are also at least 250 SO

12:30pm

More SO arriving from downriver maybe 300 or so stacked up in RR hole still counting 13 CK in RR hole and 2 in the RRW slot for 15 CK total, we are going to install vexar on lowest section of the topside of the weir to prevent fish from becoming stuck, head first.

04:00pm

Still counting 15 CK below weir; 13 in RR hole and 2 in RRW slot we closed the tip-gate because there were lots of sockeye moving with no CK present.

06:30pm

Opened tip-gate about 40 SO in trap already

10:00pm

Closed Tip-Gate

9/18 05:00am

Opened tip-gate

07:30am

7 **CK** behind tip-gate, SO still moving through.

09:00am

Hauled 74males and 93females with SPU, there was 1 wild female **CK** in trap which was released in the soft water near the shoreline.

10:30am

Fish observation counted 27-30 **CK** below weir most in RR hole and a couple in RRW slot as well as a couple directly behind weir.

02:00pm

Still Counting 25+ **CK** in RR hole, 5 behind weir and watched as a large female **CK** swam through tip-gate opening.

05:00pm

3 **CK** directly behind weir, fish have been moving all day most likely from more water.

07:00pm

Evening fish observation counted 30 **CK** below weir; 3 directly behind, 2 in RRW slot and 25 in RR hole, only 1 SO in the trap lots of debris showing up now, first flush of the season.

11:00pm

Closed the Tip-Gate.

9/19 05:00am 230CFS

Opened Tip-gate

07:00am

4 **CK** directly behind open tip-gate, hard to see in RR hole.

08:00am

Found 1 **CK** trapped beneath weir. We moved a sandbag to push fish out, it swam off. Less than 15 minutes later there was another **CK** trapped and we were able to assist it out alive, we also found a dead **CK** in the trap entrance. It looks like it had its mouth caught on vexar or tie-downs. It fix the problem of having **CK** stuck under the weir we placed sandbags to fill the gaps. After fixing weir, Ben and I loaded (SPU) with 77 males and 112 females.

12:45pm

Mid-day fish observation counted only 10 **CK** below weir to RR hole, water quality looked poor. It is getting cloudy, making it hard to get a good count. I will get a better count this evening.

07:00pm

Fish observation showed 19 **CK**, fish were easier to see tonight. Some fish already starting to move. Had at least 3 **CK** behind weir, 3-4 **CK** in riprap wall and at least 13-15 **CK** in RR hole. Fish looked active, moving around, changing positions and acting aggressive. Around 100-200 SO below weir, around 40-50 SO in trap. We will start fishing around 10pm and stop at 5am.

10:30pm

Closed tip-gate

9/20 05:30am

Opened tip-gate

08:00am

Fish observation counted 16 **CK** below weir as well as 200+ SO, went in trap to check for **CK** there were none so we sorted out 35 females and 35 males and put them into the live boxes, there were still 100 fish in the trap, we then cleaned the weir and will be waiting until this afternoon to haul fish due to the Grand opening celebration at the new hatchery

01:00pm

Mid-day observation now counting 10 **CK** below weir still about 200 SO, the truck arrived to haul fish so we loaded and hauled the fish we had 97 males and 103 females then sorted out 30 of each sex and left the rest in the trap until tomorrow, then we installed the vexar onto the sides of the V of the trap to prevent the fish from becoming stuck, and zip-tied the bars on the tip gate panel to prevent chattering/rattling vibrations. Aaron Bosworth also stopped by checking on things, so I informed him on how we are approaching our fishing patterns this year and how many hours we were giving the **CK** to move upstream.

07:30pm

Evening fish observation counted at least 19 **CK** all of which were in either the rip rap wall or the RR hole none were holding just behind the tip gate so I waited until dark then opened the gate it will stay open until I close it around 11pm tonight

9/21 09:00am

Loaded and hauled fish from the trap and the live boxes 91 males and 98 females, and after cleaning the weir Dan Astell came down to sample the 3 **CK** mortars that we had, and I took him to view the **CK** which had been stacking into the RR hole and RRW slot, while talking he had mentioned that we paint the mouth of the trap black to decrease the **CK**'s apprehension on entering the trap

10:30am

Did fish observation while with Dan, counted 27 **CK** all in RR hole or RR wall and fairly evenly split between the two spots. After hauling fish we pulled out every third sandbag from the underside of the weir to allow for some room for escape if trapped. We also added another picket section on the near shore portion, and attached a piece of wood to the backside of the tip-gate to prevent it from destroying itself.

05:30pm

Evening fish observation counted 27 **CK** all in RR hole or RR wall there were none behind the weir so I will be leaving the tip-gate closed until the fish begin to move, we will not be fishing tonight so we can try to pass the **CK**.

07:30pm

Opened the tip-gate

9/22 08:00 am 249cfs

Fish observation counted 21 **CK** all holding in RR hole or RR wall slot there were no **CK** present behind the weir so I closed the tip-gate to capture SO that were holding behind the weir, still counting around 150 SO below weir, SPU showed up to haul fish so we loaded and hauled 43 females and 27 males and after cleaning the weir Dave went up to the hatchery to help spawn.

12:00pm

Talked to Rand Little (SPU) who said to expect an increase in flows about 50-60 cfs starting this afternoon and evening, the mid-day observation counted 21-22 **CK** all in RRW or RR hole some SO starting to move upriver fish seem active today and the tip-gate is still closed as there are no **CK** behind it.

03:00pm

Hans floated today and counted 29 **CK** below weir he also saw a **CK** test digging, below second walking bridge, and asked to keep an eye on it. Also opened the tip-gate for a **CK** which took about 10 -15 min to swim through.

07:00pm

Opened the tip-gate when I saw the first upriver **CK** to allow passage. There are about 15-20 SO in the trap already and also went down to look for the **CK** redd/ test dig and no **CK** were present but there were some SO over a redd where the **CK** was previously.

9/23 08:00am 300cfs

Fish observation showed that the majority of the fish which had been holding have moved upriver with the increased flows from overnight so we sorted and hauled the fish we got overnight Michelle (SPU) drove lurch with Cory, a good test run with only 33 fish to haul 11 males and 22 females, we will be working on the walkway as well as a support system to be able to walk all of

the way to the concrete pad, we will also be working on the v portion of the trap , painting it black to aid in fish capture.

12:45pm

Mid-day fish observation counted 15 CK below weir 1 behind the pylon 4-6 in RR wall and 8-10 in RR hole along with about 100-200 SO water is still a little dirty making it difficult to view fish, pulled V out of the trap and will paint it when Gary returns with paint, it will be out for the night.

06:45pm

Evening fish observation counted around 12 CK 7-8 in RR hole and 4-5 in RRW there were also probably between 50 and 100 so with the CK. The SO are starting to dig lots of redds.

9/24 08:00am 300cfs

Dave and I will be reinstalling V portion of the trap now that it has been painted black, morning fish observation counted around 12 CK 7-8 in RR hole and 4-5 in RR wall, V looks good in black, like a big hole we also worked a little bit on stabilizing the walkway and sawhorses.

12:00pm

Mid-day fish observation counted about 12-15 CK 7-9 in RR hole and 5-6 in RR wall, the fish look like they are getting ready to move , we will continue working on the stability of walkway and sawhorses. Also had a post spawn hatchery male king on weir we put aside to be sampled

04:40pm

Looked for fish movement counted about 12 CK still holding but now are evenly split between the two holes SO are building in the RR hole and there are now 150-200 fish

07:00pm

Took a CK out of the trap a wild female, fish should be starting to move now anytime still counting 12 CK below weir

11:00pm

Closed tip-gate

9/25 05:00am 306cfs

Opened tip-gate

08:00am

Watched as 3 CK and a CO passed through the tip-gate, after fish passed tip-gate was shut then cleaned the weir sorted and hauled fish with Michele (SPU) 23 males and 37 females then we secured the legs to the walkway we also trimmed the branches on the trees in front of the camera. On the am fish observation there were 9 CK counted all in RR hole or the RRW tip-gate is closed after no CK were seen behind the weir.

12:00pm

Noticed that with lots of debris coming down river we will need to keep the air bladders pumped up all of the way to keep water from running over the bags and sinking entire weir, on the fish count we counted only 8 CK there were also lots of SO maybe 200 and there are about a dozen in the trap.

03:00pm

Went out to clean the weir and had noticed that some of the zip-ties that were holding the air bladders so we re-zip-tied the spots that had come loose, then we cleaned the weir and looked into the trap to see a male hatchery CK took it out and moved it upriver

06:00pm

Fish observation this evening counted only 7 CK below the weir while watching for fish movement I checked the trap and saw a wild male CK which I took out and moved up river, I then opened the tip-gate for approx 1 hour.

9/26 08:00am

Opened tip-gate for approximately 45 min, watched 1 CK pass through. There is 1 more moving around, but it is not immediately behind the weir. There are about 50-80 SO behind the weir. Fish are still entering the trap.

10:30am

Hauled 60 males and 73 females with the SPU guys, 1 male SO up river. Cleaned weir, several female SO morts that look to be pre-spawn morts.

12:00pm
 Counted 7 **CK** in RR hole and 2 **CK** in the riprap section. Estimated 75 SO behind weir and 50 in RR hole.

04:00pm
 Counted 3 **CK** directly behind weir, so I opened it. As I was standing at the wall I watched 2 **CK** pass through tip-gate and watched 4-6 **CK** more move up behind weir.

06:00pm
 Counted 7 **CK** in RR hole, the fish directly behind weir seemed to have moved through. Closed tip-gate at 6:30pm. (2.5 hours open) Removed a hatchery female **CK** with a blue and yellow disk tag #5008, I walked it into the soft water near the shoreline 20ft. above weir. When I let it go she swam up 15-20ft then turned around and darted back down shoreline and made it over the shallow section of the weir.

9/27 06:30am 358cfs
 Opened the tip-gate for the 6-8 **CK** that were behind weir. From 6:30-7:30 am, I watched 12 **CK** pass through open tip-gate, only 4 **CK** behind weir when I left wall.

08:30am
 Counted 6 **CK** in riprap section and 8 in RR hole. There are about 150 SO from weir to RR hole. Closed tip-gate.

10:00am
 Hauled 99 males and 100 females, we also sorted 47 females into the live box. If we trap anymore fish by 1:30 we will haul again.

12:30pm
 Muckleshoot bios floated and saw 15 **CK** from weir to RR hole. We counted 6 **CK** in riprap section and 8 **CK** in RR hole.

02:30pm
 Hauled 100 females and 65 males, we also sorted 13 females. Our total haul for the day is 377 SO. Opened tip-gate for half hour, 1 **CK** passed through. Cleaned weir again.

04:00pm
 8 **CK** in RR hole and 4 **CK** in riprap section. There is 150-175 SO from weir to RR hole.

06:30
 Opened tip-gate. There is around 50 SO in trap.

11:00pm
 Closed tip-gate.

9/28 05:00am 342cfs
 Opened tip-gate.

07:00am
 Watched 1 **CK** pass through open tip-gate. There was 1 **CK** still behind weir when I walked away. Returned a half hour later and didn't see it, so I closed the tip-gate.

09:00am
 Hauled 63 males and 94 females. We had 1 wild **CK** male in trap, released it soft water with no problems. We had 1 hatchery **CK** jack wash down onto weir. Counted 8 **CK** in RR hole and 5 in riprap section. 150 SO from weir to RR hole.

12:00pm
 Mid-day fish observation showed 8 **CK** in RR hole and 6 **CK** in riprap section. There's around 150 SO in RR hole, 75 in riprap section and 50 behind weir.

04:00pm
 Opened tip-gate, 1 **CK** passed through. It was only open for half an hour. A kid was beat up in grass section near viewing wall. He did not want any help from me or Surfer Dave. Another kid untied our **CK** mortis and tried to walk off with them before I was able to stop him, I asked if he could tie them back up. After they were secure I explained to him our operations and that those fish will have samples taken.

06:00pm
 Opened tip-gate. Counted 9 **CK** in RR hole, 6 **CK** in riprap section and 1 **CK** directly behind weir. There is close to 75 SO in the trap.

11:00pm
 Closed tip-gate.

9/29 05:00am 324cfs
 Opened tip-gate
 07:00am
 Watched 3 **CK** pass through tip-gate in 45min of viewing.
 08:00am
 Hauled 105 males and 114 females, we also sorted 2 males and 8 females into live boxes. We had 1 wild Ck jack carcass on weir. Viewed 8 **CK** in RR hole and 4 **CK** in riprap section.
 10:00am
 Closed tip-gate. There is close to 100 SO behind weir.
 12:00pm
 Still counting 8 **CK** in RR hole and **CK** in riprap section.
 01:00pm
 Hans came down and said they saw 11 **CK** in RR hole and lots of fresh SO on their way up river. He suggested that we open the tip-gate. Within a half hour 2 **CK** swam up from walking bridge and passed through tip-gate. Both were tagged, 1 blue tag and 1 white tag.
 04:00pm
 Closed tip-gate, no **CK** behind weir.
 06:00pm
 Reopened tip-gate. 1 **CK** behind weir, 21 **CK** in RR hole and 3 **CK** in riprap section. Hans told me there were lots of SO downstream, but not a huge # of **CK**. Removed a hatchery female **CK** from trap, it swam up stream unharmed. 200 SO from weir to RR hole.
 11:00pm
 Closed tip-gate.

9/30 05:00am 342cfs.
 Opened tip-gate. There appeared to be a **CK** carcass on Tip-gate, but I was unable to retrieve it.
 07:00am
 1 **CK** directly behind weir, 8 **CK** in RR hole and 3 **CK** in riprap section. 100 SO behind weir.
 09:30am
 Hauled 100 males and 101 females, sorted 35 females and 15 males. Closed tip-gate.
 12:00pm
 Counted 12 **CK** in RR hole and 4 **CK** in riprap section. Close to 250 SO in RR hole, 50 in riprap and 50 behind weir.
 02:00pm
 Brought tree down river over weir before high flows bring it down and slam it into weir.
 04:00pm
 Sorted 50 males and 50 females. Replaced zip-ties on bladders with eyebolts and carabineers.
 06:00pm
 Counted 9 **CK** in RR hole and 2 **CK** in riprap section. Opened tip-gate.
 11:00pm
 Closed tip-gate.

10/1 05:00am 342cfs
 Opened tip-gate
 07:00am
 100 SO behind weir along with 2 **CK**. Roughly 130 SO in trap.
 08:30am
 Hauled 79 males and 101 females, sorted 40 of each sex into live boxes. Jon will be back at 12:00 to haul the rest. Closed tip-gate. Counted 9 **CK** in RR hole, 2 **CK** between RR and riprap, 2 **CK** in riprap and 1 **CK** behind weir. 125 SO in RR hole and 50 behind weir.
 11:00am
 Put the wing-walls in an upside V to prevent debris on trap.
 12:00pm
 Hauled 50 males and 67 females. Opened tip-gate.
 02:30pm

Counted 200 SO from weir to RR hole. 8 CK in RR hole, 4 CK in riprap section and 2 CK behind weir.

04:00pm

Closed tip-gate.

06:00pm

2 CK behind weir, 4 in riprap section and 8 CK in RR hole. 200 SO in RR hole and 50 behind weir. Hatchery male CK washed down on weir.

10:00pm

Closed tip-gate.

10/2 05:00am 346cfs

Opened tip-gate

07:00am

2 CK behind weir, 150 SO in trap.

08:00am

Closed tip-gate, hauled 73 males and 83 females. 9 CK in RR hole, 1 in riprap section and 1 behind weir. 250 SO in RR hole and 75 from riprap to weir.

10:00am

1 CK behind weir, opened tip-gate.

12:00pm

Closed tip-gate. The 1 CK that was behind weir is no longer there and it is not in the trap.

02:30pm

Counted 13 CK in RR hole, 10 in section between riprap and RR hole. 300 SO from weir to RR hole. Fish are very spooked. The last time they acted this way they made a big push.

04:00pm

Talked to Renton Police Officer who wanted to inform me that there have been a couple of suspicious fishermen at Ron Regis Park. They gave them a warning.

06:00pm

Opened tip-gate for the night. 1 CK behind weir and 22 in riprap and RR hole. 100 SO in trap.

10/3 08:00am 350cfs

Loaded and hauled 53 females and 42 males to the hatchery then we cleaned the weir, and then did the fish observation and noticed that we had a female CK digging a redd on the near shore side under the alder trees about 50 ft downstream of the weir, she looks to be alone but there are around 50 to 60 SO and no other CK so I closed the tip-gate from 9am until 10am.

09:30am

On the observation we counted 21 CK below weir 8 in RR wall and 12 in the RR hole, also about 150 SO, called Aaron Bosworth to let him know about the CK to be sampled.

02:30pm

Mid day fish observation showed that the CK activity was beginning to increase now counting 29 CK lots in the RR wall slot as well as in the RR hole looks like we will not be fishing tonight.

05:30pm

Evening fish observation counted 28 CK still holding below weir we will not be fishing tonight due to CK numbers.

10/4 08:00am 350cfs

Am fish observation counted 21 CK about ten less than last night there were also around 150 SO, we will be cleaning and sorting some fish out of the trap, about 20 each sex. some of the surveyors came by to sample the CK we had.

12:00pm

Mid day fish observation counted 21 CK 1 holding just behind weir about 10 in RR wall and 10 in RR hole also saw a CO along with about 150 SO

05:30pm

Rand Little Called and said to expect the flows to increase 50cfs tonight because they will begin to release more water out of the masonry dam on the evening fish observation I counted 20 CK below weir all in RR hole or in the RR wall

10:00pm

Closed tip-gate.

10/5 05:00am 390 cfs
Opened tip-gate

08:00am

5 **CK** immediately behind weir working to get upstream tip-gate is open. Also about 150 SO in the trap and also the 30 or so we sorted from yesterday, we will be waiting to clean the weir to give the **CK** an opportunity to pass

12:00pm

The fish observation for mid-day counted 25 **CK** about 10-12 in RR wall and about 12-13 in RR hole the **CK** numbers appear to be building again we had the tip-gate closed from 10:00 until 12:30 then open from 12:30 until 2:00

03:00pm

Cory and Michael came down to haul fish we hauled 107 males and 114 females then sorted the rest, we also had 2 wild male **CK** in the trap fish started moving about mid-day have seen around 150 SO.

06:00pm

Watched as 1 **CK** swam through the tip-gate and 2 more ready to go through counted 20 **CK** below weir on the observation so we will be fishing again tonight from 11pm until 5am

11:00pm

Closed tip-gate

10/6 05:00am 460cfs
Opened tip-gate

07:30am

Weir is sunk the problem is that there is too much surface area over the air bladders so when the water reaches them it will force them down and the water will just run over the top, only happens when there is a lot of debris/morts.

08:00am

SPU here @ 8 am we loaded then hauled 100 females and 62 males then sorted out 30 females and 15 males, which were put into lave boxes, river has increased almost 75 cfs last night with no call from Landsburg?

12:00pm

The river is dirty from the rain last night making it very hard to observe fish movement, but can still see ok behind the weir so I will be manning the tip-gate we had about 4-5 **CK** behind weir at last check but will be heading back over after lunch, to try and resume fishing I have already seen 2 **CK** pass through today

04:30pm

Flows have been decreasing since about noon but visibility is still too poor to get any observation in the holes on the observation I could only see around 10 **CK**

10:00pm

Closed tip-gate

10/7 06:00am 435cfs
Opened tip-gate

07:00am

Weir is sunk again but was still fishing for a majority of the night and have around 100 SO in the trap plus the 40 or so from sorting yesterday.

09:00am

Cleaned the weir and loaded and hauled fish 57 males and 85 females Dave and Pat came down in lurch, we will be watching tip-gate until lunch.

12:00pm

Mid day fish observation counted 15 **CK** holding below weir 1 immediately behind weir about 6-8 in RR hole and 5-6 in RR wall we will try out a new method to clean off the weir, we will deflate and inflate the air bladders to see if it will wash off the debris/morts which cause the weir to sink.

03:00pm

The deflate/inflate method works great for getting the weir back up and fishing when covered with debris but does not get the leaves off.

06:00pm

Evening fish observation counted 12-13 CK 2 behind weir 1 moving up from RR wall 5-6 in the RR wall and 4-5 in the RR hole, also saw a PK above the weir

10:00pm

Closed the tip-gate

10/8 06:00am 440cfs

Opened tip-gate

07:00am

Used the deflate/inflate method of clearing the weir and getting it back up fishing, as it was sunk again, then went over to watch below weir for fish saw 2 CK holding just behind looking to get through there are probably around 100 SO in the trap.

08:00am

SPU came down to haul fish (John and Michele) hauled out 52 females and 57 males we then cleaned the weir and will be monitoring the tip-gate watching for CK when none are present we will fish.

10:00am

Unloaded the sandbags off the truck that Dave and Gary filled yesterday then sent Dave up to help Marianne take mortars out of the holding ponds.

12:00pm

Mid day fish observation counted 14-15 CK about evenly split between the holes 6-7 in the RR wall and 7-8 in the RR hole also closed the tip-gate at 11 am to try and capture the SO which are moving now.

03:30pm

Sorted out of trap about 40 of each sex into live boxes probably still about 75 to 100 fish in trap still so we should have a good haul for tomorrow also inflated and deflated the air bladders to clean off the weir and went out to collect a CK carcass.

05:30pm

Evening fish observation counted 14-15 CK almost all of the CK were in the RRW slot and jostling for position indicating that they will be moving around tonight.

07:00pm

Tip-gate is open until 10 pm

10:00pm

Deflated and re-inflated the air bladders to keep weir fishing through the night and closed the tip-gate to fish for the night, there are also probably 150 SO in trap already.

10/9 06:00am 427cfs

Opened tip-gate

07:30am

Deflated and inflated the weir to keep fishing, using this method last night I think helped to keep fishing through the night SPU showed up early so we got geared up and started to load fish first haul was 100 females and 76 males then we sorted out about 40 of each sex into the live boxes and cleaned off leaves on weir. SPU said that they will be back out in a few hours.

09:30am

On the morning fish observation we counted 15 CK all in the RRW slot or in the RR hole most up in the slot and may move today but it's supposed to get bright so probably tonight

12:00pm

SPU returned for their second load for the day and hauled out 101 males and 100 females for a total haul of 377 fish, we then cleaned the weir and grabbed a CK carcass to be sampled. On the mid-day observation we counted 14-15 CK and about 75 SO.

04:00pm

Used the deflate/inflate method of cleaning off the weir and then checked the tip-gate, saw Aaron Bosworth and Frank (fish commission) just out to see what was going on, then went to check the trap for CK which there were none. Just around 40 SO.

05:00pm

On the evening fish observation counted 15-16 **CK** most still in the RRW slot and a few more in the RR hole there was also a smaller CO behind the weir , will also be checking on the tip-gate as it gets darker when fish start to move it will stay open until 11pm tonight

11:00pm
Closed tip-gate

10/10 06:00am
Opened tip-gate.
07:40am
SPU is here (TOO EARLY), on fish observation I counted about 17 **CK** evenly split between RR hole and riprap section. There is also 1 **CK** behind weir working for a way up.
08:00am
Hauled 63 males and 60 females with SPU workers. Closed tip-gate.
09:00am
Cleaned weir with the deflate/inflate method.
12:00pm
Counted 15 **CK** in RR hole and 1 in riprap section. 150 (SO) from weir to RR hole. I opened the tip-gate at 10am and closed it at noon.
02:00pm
Opened tip-gate, 1 **CK** behind weir. Close to 30(SO) carcasses have come down throughout the day. I have been trying to keep it clean for the public.
04:00pm
Closed tip-gate. Dave Cox and I cleaned weir and removed mortars. We also raised the North side bulkhead.
06:00pm
Opened tip-gate. There is either a **CK** or Coho behind the weir, the fish looks bright but not enough light to tell. There are 15 **CK** in RR hole and 200 (SO) from weir to RR hole. I also removed mortars and check on trap, there are 35-50 (SO) in trap. Rand (SPU) called earlier to inform us that we could expect an inch of rain in the morning. He will call if diversion to Lake Youngs is stopped.
11:00pm
Closed tip-gate.

10/11 05:00am 523CFS
Opened tip-gate. The weir is completely under water. I went to deflate/inflate bladder but no gas.
07:30am
Cory showed up with 2 cycle mix for the blower. The weir is not elevating with the blower alone.
09:00am
Dave Cox and I cleaned the upper third of the weir in hopes of relieving pressure on bladders for easier inflating. We tried several methods in hope of getting the weir back in fishing order.
10:00am
Pat and Joe showed up to haul fish. The 4 of us were still unable to get the bladder to inflate, too much water hitting the bladders.
11:00am
Rand from SPU called and said we should expect to see flows from 750-850 CFS by tonight. Pat and Joe are going to return after hauling fish to help lower and safeguard the weir.
01:00pm
Pat, Joe, Dave got the weir in safe mode; deflated bladders, lowered tie-downs, removed live boxes, pulled pickets in trap, pulled cat walk and secured hoses off air bladders. By the time we stopped the flows had already hit 750 CFS.
06:30pm 755 CFS
Everything looks secure on weir, no visible damage.

10/12 07:00am 674 CFS
Flows have decreased a fair amount since last night. SPU called and said they have started to divert 93 CFS back to Lake Youngs, we should see difference by this afternoon. Weir looks good.

02:00pm

Flows are still up. We were unable to get the weir back in fishing order.

06:00pm

Put the trap back together.

10/13 07:30am

Michele (SPU) stopped by to see if we can get the weir back in fishing order by inflating the bladders, it was close to fully elevating.

10:00am

Jon (SPU) came down to help clean weir and get back fishing, again we were close.

02:00pm

The Dave C, Dave W, and Pat came down to help get weir back together. We reattached north end bulkhead to tip-gate. We finally got the weir back to fishing order by pushing down on the resistance boards with our feet. Three of us pushed and the weir popped right up. The bladders seem to be too far from the boards, the boards are riding right under the bladders. We attached zip-ties to bladders in hope of pulling the bladders up closer to the boards to get some lift. Removed a female hatchery **CK** from trap, it went upstream unharmed.

03:00pm

Closed the tip-gate.

06:00pm

There are 100(SO) in RR hole and 100 behind weir, 1 **CK** in RR hole. I cleaned the leaves and morts off the upper third of the weir from the downstream side. The weir is fully elevated. We have 30-50 (SO) in trap.

10/14 07:30am 414 CFS

There are 200+ (SO) in trap and an additional 100 directly behind weir.

08:30am

The 2 Daves and I cleaned the weir and put 3 wild **CK** on rope for bios. We were able to deflate/inflate bladders with no problems. We only saw 2 **CK** from the weir to the RR hole.

09:00am-noon

The three of us worked on the weir with Cory. We used rope in place of the eye bolts. We strung the rope through the tab and synched it as tight to the black stringer as possible. We only got the south bladder section of weir changed. I counted 3-5 **CK** in RR hole. There are close to 300 (SO) from weir to RR hole. We hauled 112 males and 100 females, sorted 50-60 males into live boxes. Rand (SPU) called to inform us of a 100 CFS rise overnight.

02:30pm

We tried to install rope on the middle section of weir, but it is too heavy. We tried to install rope on the middle section but we were unable to hold the weir off the bladders, need more people.

05:30pm

There are about 200 (SO) in trap. I counted 3-5 **CK** in RR hole and 400 (SO) from weir to RR hole. Tip-gate has been shut since 3:00pm yesterday.

10/15 07:00am

Checked for **CK** behind the weir and only saw 100 (SO). There are about 200(SO) in trap.

08:00am

Hauled 112 males and 39 females. SPU will be back to haul the rest of the fish this afternoon. We cleaned the weir, tried to deflate/inflate but the middle section would not pop back up. I pushed down on a resistance board and it popped up. I saw about 150 (SO) in RR hole, zero **CK**.

12:00pm

We hauled another 100 males and 66 females. Dave and I put another 3 or 4 sections of rope on the north side of the weir. Dave and I were unable to put rope on the middle section; it is too heavy with the bladder down. He were propping it up with the rake, but it was starting to bend them. Dave is going to the hatchery in the morning after hauling to pick up lumber to make some braces. Still seeing 150 (SO) in RR hole.

02:00pm

Opened the tip-gate for a **CK** that was hanging out behind it.

04:00pm

Closed the tip-gate. The CK is no longer present. We cleaned the weir off leaves and morts.

06:00pm

I pulled the morts off the weir. There are about 50 (SO) in the trap. Fish observation shows 200 (SO) from weir to RR hole, zero CK.

10/16 07:00am 414 CFS

Went over to the rec. center side to see if any CK were present behind the weir, didn't see any. There are about 100 (SO) in trap.

08:00am

SPU hauled 50 males and 54 females, we released 56 males upstream and a nice cutthroat. We don't have room for any more males at the hatchery. We pulled 1 wild female CK off the weir along with a hatchery coho jack.

09:00am

Dave went to the hatchery to gather some lumber so we can make braces for working on the weir. There are 150 (SO) from weir to RR hole.

12:30pm

Dave and I made braces (T shaped) to prop up the weir while it is deflated. We were able to attach 4 more sections of rope on the middle section. Pulled another wild female CK off weir, looks like the female that was on the redd at the top of the wall on the rec. center side. Dave and I told 3 kids that fishing is closed, informed them of the regulations.

04:00pm

Opened tip-gate for 1 CK with red and yellow tags. The fish must have been resting under the walking bridge for a while because I haven't seen any CK. While watching the fish go back and forth behind the weir I noticed it was being followed by another CK. I watched the tagged fish pass through the tip-gate but was unable to see the other make it through.

06:30pm

Closed the tip-gate, the CK was no longer present. I saw about 150 (SO) in RR hole and another 50 behind weir. There are about 60 (SO) in trap.

10/17 08:00am 440cfs

SPU came down to haul fish we had 43males and 32 females and put 2 SO upstream then we cleaned the weir, had lots of leaves and morts, also did the fish observation only saw 1 CK in the RRW slot along with about 150-200 SO all over in holes and in between

11:30am

Rand little (SPU) called to let us know that the flow will be increasing overnight about 80cfs should put the river up to about 515-520 by the am, then went out and cleaned the weir lots of leaves and morts again also cleaned off the debris gate to increase the flow through the trap.

02:00pm

There are quite a few fish behind the weir and some have started to move into the trap. Mid-day observation counted 2 CK below weir 1 in the RR hole and 1 in the RRW slot there are still lots of SO maybe 200+

04:00pm

Cleaned off the weir lots of leaves sunk the deep end of the weir also retrieved a CK carcass and it looks like there will be another in a little while a beat up old CK just upstream of the weir

07:00pm

Cleaned off the weir using the deflate and inflate method weir is ready to fish for the night, also on the fish observation counted 2 CK in the RR hole also lots of SO still 200+.

10/18 07:00am 504cfs

Weir is sunk, with lots of leaves up on the top portion of panels forcing the weir down under water so I deflated the bladders to clean off leaves and morts.

08:00am

Probably only 40-50 fish in the trap so we will probably just sort out the fish and not haul anything.

09:00am

AM fish observation counted 2 **CK** both tagged and both in the RR hole weir is still sunk and could not get it to resurface we tried propping it up and inflating it at the same time. Also saw 2 CO behind the weir.

12:00pm 510cfs

Tried to pump up air bladders with an air compressor they remained under water but all of the air bladders are now fully inflated we also removed and installed new bulkhead supports we are now using metal pipes to elevate the weir even further on the edges.

04:00pm

Tried to get one of the kick panels set down, to get any tension you need to go to the second stringer up and drop the rope back towards the panel then tie off then tension, looks like it will be doable but difficult. We also sorted fish into live boxes about 40 of each sex.

05:00pm

Michelle came down to try to get the power restored to the electric box on the light pole down below, she got it turned on through the green box up top next to the kiosk.

06:30pm

Evening fish observation counted 2 **CK** down below weir both in the RR hole still lots of SO 150+ we are fishing tonight with the weir partially submerged.

10/19 07:30am 504cfs

Morning fish observation counted 1 **CK** in RR hole also some SO maybe 70 or so weir was fully submerged because of the leaves this am, so we deflated and just left it down because we were going to work on getting the kick boards into place.

08:00am

SPU came down to haul fish this am and took with them 87 males and 100 females, after loading we started to work on the weir, shortly after starting we realized that we were going to need a longer drill bit in order to reach the kick board without submerging the drill.

09:45am

Cleaned off the weir tip gate debris gate and trap there are a few fish moving around and going into the trap morning fish observation counted only 1 **CK** in the RR hole along with some SO maybe 50 or so.

12:00pm

After lunch we started to work on the kick boards using the new drill bit we got, we started on the near shore side of the river and worked our way across one panel at a time bracing each panel on each side of the one we were working on to gain elevation to keep drill above water, we also needed at least 5 guys to get the job done but we worked our way across, we finished when we ran out of rope we still needed to secure two kick boards on the far side of the river but could get the weir up and fishing again so we decided to do those another day.

04:00pm

Evening fish observation counted 1 **CK** below weir and probably around 100 SO weir already had enough leaves on it to sink the part that we didn't get to water is flowing over but not submerging the weir itself.

Rand Little also called to tell us that we will have decreased flows and should start seeing those tonight a 70cfs drop.

10/20 07:30am 476cfs

As soon as I could see well I went down to check on the weir and trap the top of the weir was sunk down to about the water level full of leaves. So I deflated it to try and clean off the panels from the buildup of morts and leaves, SPU should be here early because it is a spawn day at the hatchery, there is probably 150 fish in the trap.

08:00am

SPU arrived just before 8 and we loaded and hauled 100 females and 95 males then we cleaned the weir, trap and debris gate and blew up the air bladders with the blower, still need to fix the kick boards on the last two panels of the weir.

12:00pm

1 **CK** swimming back behind the tip-gate will open to let pass also SO are moving good right now and have probably another 150 in the trap. Mid-day fish observation counted 3-4 **CK** in the RR

hole and RRW slot. Also looks like the majority of the SO which were in the RR hole have moved up and are either behind the weir or in the trap. Looks like we may have to do a run this afternoon.

02:00pm

Finally got a call back from the hatchery and told them that we definitely needed to make a run, I had also got a hold of SPU as well and they said that they would make the run. So I should see someone in about an hour or so. I'm estimating that there are around 200 fish in the trap.

03:30pm

SPU arrived to haul fish as well as the Dave's from the hatchery. We had time to clean the weir before SPU arrived so we did that, then loaded and hauled 101 females and 100 males. We also sorted out about 60 fish into the live boxes. We also had 2 female wild CO that we put upstream.

04:30pm

Rand Little called and said that we should expect a 100cfs increase tonight which should put us up to around 540cfs by tomorrow. Evening fish observation counted 1 CK in RRW slot and quite a few CO maybe 4-5 in the slot and RR hole.

07:00pm

The weir has now been fishing for 4+ hours since we re-secured and re-tensioned the kickboards weir is the furthest out of the water since we started the season. There are also about 50 fish in the trap.

10/21 07:00am 510cfs

Weir is sunk with debris; we will begin to clean it when workday begins. Morning observation counted 2 CK below the weir and 3-4 CO with about 40 SO.

08:00am

We suited up and cleaned the weir to get it back up as high up as we could, got it up almost all of the way with just a little water spilling over the top.

10:30am 520cfs

Water is coming over top of the weir all of the way across the weir and tried to re-tension kickboards.

12:30pm

Pat arrived to haul fish for us today so we loaded and hauled we loaded and hauled 52males and 82females there were also some fish moving into the trap after we finished.

01:00pm

Opened the tip-gate for 2hrs total for today there were 2 CK seen back behind the weir but backed down the river after the tip-gate was opened, so we shut it down after an hour to continue to fish for SO. We have probably 50 or so in the trap already. Still not seeing many fish down below on the mid-day observation I counted 2 CK and 3-4 CO, and watched 1 CO move through the tip gate while open (12-1).

03:00pm

Cleaned weir to get back fishing after cleaning it, it popped right back up out of the water and fully fishing at 520cfs.

06:00pm

Weir is sunk and with leaves, but going out to clean it would be futile as there are so many leaves it fills as fast as you can clean it. There are probably 100 fish in the trap. Tip-gate is open until 10 pm tonight.

10:00pm

Tip-gate closed

10/22 07:30am

SPU arrived to haul fish this AM, so we loaded and hauled 25 females and 28 males we then cleaned off the weir to see if it would pop up but just stayed down so we will try to continue to fish this way until Monday when the water starts to recede.

08:00am

Rand called and said to expect the flows to increase to about 800cfs tonight so we will be getting the weir ready for the high water.

10:30am 570cfs

Walked over to the other side to check on the weir and trap, we watched as 1 CO moved up and over the weir there were also a few SO behind the weir.

02:00pm 580cfs
Went over to the other side and saw another 2 CO move over the top of the weir seemed to have no problem getting up over the top. Weir is still under the surface by 6" to 1'

04:00pm
Went back over to take a look at things and saw another CO pass over the weir and there was another just behind the weir. So 5 CO seen today and 4 that were seen passing over the weir. Weir is also collecting a lot of debris (leaves)so we decided to deflate the bags since the weir was already sunk. We will leave the bladders deflated for the night and hopefully the flows will stay under 700cfs.

10/23 08:00am 690cfs
Talked to John told him that there were no fish to haul, there are very few fish in the trap probably not worth fishing when the weir is down and tip-gate is open, the debris wall also got lifted up about a foot due to leaves and pressure. I also sent Dave up to the hatchery for water and to help John sort and transfer fish to our facility. We will fix the debris wall when he returns.

12:00pm 665cfs
Went out to fix the debris wall and decided to fix the near shore weir kicking the kickboards down to elevate the panels and by forcing the debris wall forward and down we reset it and re-pounded the fence posts in, river is still too high and fast to try to set the main part of the weir.

04:00pm
We will try to fish again tonight with the weir down because we cannot elevate it in these flows, Rand little called to let us know that they will start to fully divert and flows should drop back to between 450 and 520 by tomorrow hopefully.

10/24 07:00am 550CFS
Talked to John and told him that we had no fish to haul due to the weir being down, very few fish in trap.

08:00am 562CFS
We will talk to Cory to see if he wants us to get the weir back this morning before I head up to help spawn.

08:30am
Joe and I cleaned the weir, only able to get it elevated 6" above water level. If spawning goes well we will have a few more bodies down here to work on weir.

11:00am
I cleaned the downstream section of weir the best I could, again only 6" above water level. It is very hard to count fish in the RR hole, visibility is slowly returning. There are 5 (SO) in trap.

02:00pm
Cleaned the downstream section of weir, we are no longer cleaning top of weir with no one around.

05:30pm
Cleaned weir and checked trap, only 5-10(SO) in trap.

10/25 07:00am 499C FS
There is 10-15(SO) in trap.

08:00am
Dave Cox, Jess and I were able to clean the entire after yesterdays limited cleaning. We got the weir to full elevation after cleaning by lifting each section of weir, allowing water to flow behind bladder. There is roughly 75(SO) in RR hole and another 30-45 directly behind weir.

11:00am
The weir was completely under water before we started cleaning again. After cleaning it was back under water 15 minutes later.

12:00pm

Rand (SPU) called to notify us that they will be raising the flow by 10 CFS an hour and there was a natural drop of 3 CFS an hour, so we could see flows around 550 by 4:00am tomorrow.

01:00pm

Cleaned weir and tried to attach rope to final two kickboards that aren't tied back (north end). We need more muscle.

03:00pm

Pat hauled 12 males and 1 female. We cleaned the weir again and placed one of our braces (T) under the section of weir that we need to work on. It seems to be working.

05:30pm

I cleaned the downstream section of weir so we can get a little more fishing in tonight. I am not seeing very many fish holding downstream. My earlier counts today may be too high, seeing 75 max. Tip-gate is still open.

10/26 07:00am 528CFS

Weir is under water, the brace is no longer helping. There are very few (SO) in trap, about 10. Pat, Dave Cox, Jess, Gary and I will be cleaning and fixing the weir's north-end sections first thing this morning.

08:00am

Cory also came down to help. The 6 of us cleaned the weir and were able to get the kick boards set on the north end of weir. Water is moving extremely fast, it feels higher than 530CFS.

10:00am

Weir is barely above water but seems to be holding. Jess, Dave and I walked down to the stadium to see what kind of numbers were down there. There are hundreds of (SO) but they seem to be spawning, not holding.

12:30pm

The 3 of us cleaned weir, getting those 2 kick boards down seem to be helping.

02:30pm

We sorted 12 males and 9 females into live boxes, we will be hauling tomorrow am.

03:30pm

We did the final cleaning of the day since we decided I will not be entering the river by myself anymore, unless the flows get lower.

05:30pm

I check the trap, only to count 10. I also cleaned the front of trap to reduce the amount of fish exiting.

10/27 07:00am

I cleaned the front of the trap and check trap numbers, 15 (SO). SPU will be hauling at first thing this morning.

08:00am

We had 19 males and 16 females to haul. Dave Cox and I cleaned the weir before he left for spawning. He drove the fry tanker to the hatchery so he can return for another cleaning.

10:00am

Rand (SPU) called to say he will be here this afternoon to look at what is going on.

01:00pm

Rand and another SPU employee came down to take a look, we deflated the bladders to see what impact it had on the leaves that were piled up. The deflating removed a huge portion of the leaves, we will be using that approach a little more frequently. They said they will use what they saw to help the design in the future.

03:45pm

Dave Cox and I cleaned the weir and sorted 5 (SO) of each sex into the live boxes.

06:00pm

I removed leaves and debris from the front of the trap, there are 5 (SO).

10/28 07:15am

I cleaned the front of the trap, we have 5-10 in trap.

08:00am

We cleaned the weir and sorted 6-8(SO).

11:00am
Cleaned debris panels and trap. The weir is still above water so we cleaned the downstream section. We sorted another 4(SO) and 1 male CT.

03:00pm
Dave W and I started lowering weir and getting everything into safe mode for the high flows. Cory and Gary came down to haul 19 males and 15 females, when finished we removed doors from trap.

06:00pm
Everything looks good on weir, trap and debris panels.

10/29 12:30am
SPU Cedar Falls called to say they have cut their excess flows.

07:00am
Nothing bad happened to weir overnight, flows hit 700CFS.

10:00am
Blew off road and loading area.

12:30pm
Rand called and said we could expect flows 700-900 tomorrow.

03:30pm
Dave W will be heading up to the hatchery tomorrow for a garbage run and carcass run.

06:30pm
Everything looks secure, flows are dropping.

10/30 07:00am
Flows are still too high to begin fishing, everything looks secure.

10:00am
Dave left to help Michael at the hatchery.

04:00pm
The day went by with no problems.

10:30pm
SPU called to say they are releasing an additional 50CFS.

10/31 04:00am 770cfs
SPU called to say the increase has hit Landsburg.

07:00am
John (SPU) called to ask about fish hauling, told him that we are not fishing.

08:00am
I arrived today to find a blown out river and the weir in non fishing mode, the debris wall was up on end and water was flowing under it, and the tip gate has water starting to come up over the top of it. There was also some dark blue fluid coming out in the bottom of the holding tank.

09:30am
Honeybucket guy came by and I let him know about the leak, so he called into his office and they had him go out to Seattle to pick up another holding tank.

10:00am
Went out to clean off the debris wall as it has lots of debris from the high water, it had a lot of big sticks and a root ball stuck underneath it so it took a little while to clean.

04:00pm
Went out to check on the weir and trap for buildup of debris and leaves it looked ok and should be good through the night.

11/1 07:00am 670cfs
Woke up this AM checked on the trap and made some coffee, while making coffee I had the GFCI breaker flip so that turned off the power for everything that was plugged into any outlet in the trailer, so I found the gfc and reset it then flipped the breaker back and got the power back on, while restarting the computer there was a prompt for the user and password which I don't have.

10:00am

- Went out to observe walked up and down the river and all I could see were just a handful of SO and only two of those were below the weir. The RR hole and the RR wall appear to be vacant.
- 12:00pm 620cfs
Just talked to Cory and he should be sending someone down to help calk the window, however it is still unclear where the leak is coming from.
- 01:30pm
Ben is on his way down to help caulk and also to clean off debris wall and put trap back together.
- 03:30pm 580cfs
Cleaned off the top end of the trap and the inside of the trap and the debris wall and picket section we did not try to float the weir as the flows were still too heavy, we then did a fish observation and we are still only seeing two fish below the weir there are also a few fish above the weir.
- 11/2 07:30am 520cfs
Flows are dropping to fishable levels so we will be working on getting the weir back up and fishing this am then we should be able to tell if there is anything around.
- 11:00am
After cleaning weir and getting it 99% out of the water rand little called to see if we could get up and fishing , then Michael called they were wondering if fishing would be better if the water level was down a little more , I told them yes it would.
- 02:00pm
Did a mid-day fish observation and counted about 50 SO in the RR hole I think they will probably move tonight also aquarium Larry said that he had seen a **CK** back behind the tip gate but when we went over to look there was nothing to be seen . We will try to look for it again in a little while
- 05:00pm
Did my fish observation this evening and saw about 10 SO back behind the weir there was also 1 male **CK**, there were still also probably 20-40 SO in the RR hole, weir is also probably halfway down already takes only about 2 hours at the most to start going down.
- 11/3 07:30am 475cfs
Weir is totally sunk so I will deflate the bags to try and wash the leaves off before we go out to clean it off and refloat it looks like there were a few fish that moved last night as there are a few stuck in the weir.
- 08:00am
There are only 2 fish in the trap, it took Dave and I 1 hour of working hard to clean off the entire weir and get it up and fishing Ulysses came down today and watched us work on the weir to get some thoughts on the efficiency and effectiveness of the weir during the latter part of the season.
- 11:45am
Went over to check on weir and see if we needed to go out and clean it
- 12:00pm
The weir is still up and fishing has now been up for about 2 ½ hours I will go out to clean it after lunch.
- 01:30pm
Just got back from cleaning the weir which is working well now, probably due to lower flows and the lack of leaves, we only have 6 fish in the trap.
- 04:00pm
Just went out and cleaned off the weir for the night, weir is fishing better than it has for weeks as it has been up since this am without having to clean it too much just keep up with the leaves took 3 cleanings today.
- 05:00pm
Evening fish observation counted about 30 SO below the weir as well as 1 CO about 20 or so SO are in the RR hole and about 10 back behind the tip-gate.
- 11/4 08:30am
Went out and cleaned the weir, it took about an hour to get it cleaned and back up put of the water, we left the fish in the trap after removing a good sized RB trout.
- 01:00pm

Went back out to clean off the weir after cleaning the weir we sorted the fish in the trap into the live boxes there were 4 females and 2 males also there are around 20 SO back behind the weir and on the observation we counted around 100 SO down in the RR hole and some in the RR wall as well

03:30pm
Going out to clean off the weir again this time for the afternoon and evening Dave and I had the weir cleaned in about 25 min and there were a few more fish in the trap so we sorted those too , we now have about 10 fish in each box.

06:00pm
Went back out just before dark to clean off the weir for the night only took about 15 min there were very few leaves.

11/5 07:30am 430cfs
Water level is much more manageable now and it looks like we fish all night without going under.

08:00am
Dave and I cleaned off the weir it took about a half hour just a little debris from last night, but the fish didn't move, only 6 fish in the trap, we will wait a little while before we sort in case we get some more. On the fish observation we counted 100 SO 2 CO and 1CK all below the weir in the RR hole or in the RR wall slot, most of the fish have moved up in the holes indicating that they are willing to move

12:00pm
Went out and cleaned off the weir before SPU showed up to haul the fish we had we had 18 males and 10 females.

03:30pm
Cleaned off the weir for the afternoon evening

04:00pm
Fish observation showed that the fish are still holding down below in the holes.

06:00pm
Went out to see if I needed to clean tonight and it looked good so we will see if we can fish until tomorrow am.

11/6 07:00am 410cfs
SPU called to see how many fish we have, I told them I will find out and give them a call back, so I went down to see what was going on, weir was sunk and there were very few fish in the trap.

10:00am
Cleaned off the weir, on the AM observation we saw that the fish are still holding below although I have not seen the CK last night or today, so since the fish weren't moving we let the weir try and wash itself, didn't work so we were waiting until the wind from the fog dies down before we go out to clean otherwise it would be useless due to the amount of leaves coming down river.

12:45pm
Went out to do the fish observation and saw that the fish have not moved yet but with the little bit of rain forecast for tomorrow they may move tonight.

03:30pm
Cleaned off the weir for the afternoon and also sorted out 4 males from the trap, it took about an hour to clean and sort due to amount of leaves on weir, may or may not go out to clean tonight.

11/7 07:00am 398CFS
SPU called to let us know they will be busy this morning in Seattle. If we have any fish they will be ready to haul around 10am, they will call before they arrive.

07:30am
Air bladders are deflated in hopes of removing some of the built up leaves.

08:00am
Joe and I cleaned the weir and debris walls after inflating the bladders, there are zero fish in the trap. There are at least 75(SO) in the RR hole and another 25 in the riprap section, along with 2 CO in the RR hole.

09:30am

As soon as we were finished cleaning the weir I looked up river and saw a cloud of leaves entering the river from the Carco Theater area. The parks guy was blowing all the leaves from the grass into the river. After we realized what was happening we walked up the river on the south side to view. Joe recorded the guys actions, the guy looked around to make sure no one was watching and proceeded to put more leaves in the river. Dave got his attention and he immediately stopped and left. There are 10-15 (SO) directly behind weir.

10:45am

The weir was completely covered and submerged from the guy up river. The three of us cleaned the weir and debris walls again.

11:30am

Joe, Dave and I walked the river down to the stadium in hopes of seeing more (SO) holding, all we saw were (SO) spawning on the flats.

01:00pm

Mid-day fish observation revealed 100 (SO) in RR hole and another 25 from weir to riprap section, still 2 CO.

02:00pm

The three of us replaced the remaining hardware on the bladder tabs with zip-ties for easy removal on tear down day.

03:00pm

We sorted 7 males and 1 female into live boxes. We also hung the cable across the river for weir removal, we are missing a bolt need to hang the cable to the post. The three of us cleaned the weir and trap. Cory called to notify us of a 50-60cfs increase overnight.

05:30pm

I cleaned the downstream section of weir and the front of the trap, there are at least 15 (SO) in trap.

11/8 07:00am 423CFS

I cleaned the front of the trap, 15-20 (SO) in trap.

08:00am

There are 75 (SO) in RR hole and 25 from riprap to weir. There are also 3 or 4 CO in RR hole. We cleaned the weir, debris walls and tip-gate.

11:00am

We cleaned the weir again and sorted 10 males and 5 females into the live boxes. Joe is running to DO IT for the parts need to hang the cable effectively. Still seeing 100 (SO) and 4 CO.

02:00pm

Pat came down and hauled 40 males and 20 females.

03:30pm

The three of us cleaned the weir and hung the guide wire to the appropriate tightness. The city blew off the old boat launch located at Carco Theater filling the weir during our cleaning, so we cleaned it again. There are 5 or 6(SO) in the trap already.

04:00pm

There are 6-10(SO) directly behind tip-gate, another 15 in flat between walking bridge and weir and 60-75 in RR and riprap section.

05:30pm

I cleaned the front of the trap and the downstream section of weir. There are 10-15(SO) in trap.

11/9 07:00am 414CFS

I counted 10-15 in trap while I was cleaning off the front.

08:00am

The morning fish observation showed 75(SO) from weir to RR hole, along with 2 CO. Dave Cox and I cleaned the weir and reattached the north end bladder, the zip-ties failed. We also sorted 10-15(SO) into live boxes.

11:00pm

We cleaned the weir and worked on the air bladders.

01:00pm

Ulysses came down with Dave to measure the velocity over the bladders. We are still counting 75(SO) from weir to RR hole.

03:00pm

We sorted fish out of the trap into the live boxes, we also cleaned the weir.
05:30pm
I cleaned the front of the trap and downstream section of weir. There are 10-15(SO) in trap.
11/10 07:00am 381CFS
I cleaned the front of the trap, there are still only 10-15(SO) in trap.
08:00am
We had a safety meeting for weir removal.
08:30am
We started removing the trap, weir, tip-gate and debris walls. Everything was taken out and put on trailers in 3 hours with no problems.
12:00pm
After SPU bought us pizza we loaded Fuzz and the carcass truck with loose lumber and pickets that were in the fenced area.
02:00pm
Dave W. and I will spend the rest of the day going through and cleaning the cargo trailer.

Appendix 3, Trap and Weir Protocols

Operational Guidelines for the Cedar River Weir and Fish Trap at I-405 2011 Field Season

These guidelines are based on the framework that was established for the 1999 field season in response to concerns regarding weir impacts to Chinook salmon. The guidelines are based on 11 years of successful implementation during the 1999-2009 brood collection years. It is recognized that the Cedar River Anadromous Fish Committee and the Sockeye Hatchery Adaptive Management Work Group will have the opportunity to recommend changes to these guidelines if conditions change during the season. Such adaptive management will be documented and communicated through the committee chair. Since the implementation of this protocol and the adaptive management approach, the operation of the weir has been successful in avoiding impacts to Chinook salmon. Careful monitoring of fish behavior at the new weir will be necessary to be responsive to changing conditions and fish behavior. The number of Chinook salmon passing the weir and entering the trap in relation to the number of sockeye salmon entering the trap will dictate how the trap and weir will be operated.

GOALS

The weir and fish trap in the Cedar River are maintained and operated to collect sockeye broodstock. However, an additional goal of equal importance is to minimize the risks of adverse effects to upstream migrating adult Chinook salmon. These protocols are intended to satisfy both goals.

Due to ESA issues involving Chinook salmon in the Cedar River, the weir will be operated to avoid adverse impacts to adult Chinook salmon. There are two major impacts that we will seek to avoid: 1) having Chinook spawn within 25 meters above or below the weir such that the eventual removal of the weir could impact those redds, and 2) significantly delaying (defined as more than 24 hours) the upstream migration of Chinook. It is recognized that operating the weir to avoid impacts to Chinook compromises our ability to meet the objective of collecting sockeye broodstock.

Hatchery personnel and biological staff will communicate and work together to monitor Chinook activity in the area adjacent to the weir.

- Because this weir design and location are new, monitoring and documenting Chinook responses to this new situation is very important.

- An open weir is defined as the condition that exists when fish have unrestricted access through one or more openings in the weir or trap.
- There will be no restrictions on fishing (closed weir) if there are no Chinook observed downstream of the weir for a 24-hour period, outside of the peak Chinook spawning period, however during the typical peak Chinook spawning period (typically September 25 through October 10) as determined by redd surveys and live counts, the weir will be opened for a 12-hour period following three consecutive days of fishing regardless of Chinook being observed.
- If Chinook are observed holding in the area immediately downstream of the weir, and there is a need to collect sockeye adults, then the weir will be opened to allow Chinook to move upstream. The duration of the opening will be in response to the observed behavior of the Chinook, with the goal of keeping any potential delay of Chinook to less than 24 hours. This may be accomplished by opening the weir at night.
- If field biologists or field technicians see more than 10 Chinook holding between the weir and the Renton Library below the weir, they will discuss the situation with the hatchery staff and jointly determine a course of action (i.e., opening the weir).
- The weir is to be fished only when sockeye adults need to be collected.
- If there are more Chinook in the trap than sockeye trap pickets will be pulled.
- Chinook that enter the trap will be passed upstream as quickly as possible.
- If the number of Chinook in the trap exceeds what can be removed in 30 minutes, trap pickets will be pulled to pass Chinook.

If a Chinook female unavoidably constructs a redd in close proximity to the weir, then the redd is to be immediately marked and a discussion will take place. This discussion will include, but is not limited to, the following types of actions: early weir removal, staged weir removal, and modification of weir operations. Discussion will include at least these people or their designee: Paul Faulds and Rand Little (SPU), Cory Cuthbertson, Larry Fisher, and Doug Hatfield or Annette Hoffmann (WDFW), Eric Warner (MIT), and Tom Sibley (NMFS).

PROPOSED SCHEDULE FOR BROODSTOCK COLLECTION

The following target numbers to be collected are based upon a large run size, assuming an average fecundity of 3,200, and a 1:1 male to female spawning ratio. The 2011 preseason forecast for sockeye returns entering Lake Washington is ~48,000. Weekly targets for gamete collection are based upon the average run timing curve. It is agreed that between- week adjustments to accommodate actual returns will be appropriate.

Weekly Targets for Gamete Collection

Week Beginning	Percentage of Eggs	Cumulative Number of Eggs	Cumulative No. Adults (Target)	Weekly Adult Goal
09/11/10	4.90%	343,000	214	214
09/18/10	12.00%	840,000	525	311
09/25/10	21.70%	1,519,000	949	424
10/02/10	33.30%	2,331,000	1457	508
10/09/10	45.20%	3,164,000	1978	521
10/16/10	56.30%	3,941,000	2463	486
10/23/10	66.40%	4,648,000	2905	442
10/30/10	75.40%	5,278,000	3299	394

11/06/10	83.40%	5,838,000	3649	350
11/13/10	90.00%	6,300,000	3938	289
11/20/10	95.50%	6,685,000	4178	241
11/27/10	100.00%	7,000,000	4375	197

Targets are based on are based upon the average run timing curve.

MONITORING

The following monitoring activities associated with the weir are to be conducted by hatchery personnel:

- Observe and enumerate Chinook and sockeye 25 m up and downstream of the weir (when possible) three times daily; it is recognized that at times of high flow or turbidity, accurate observation and enumeration may be compromised. The observation times are as follows: once between 7 AM and 9 AM, once between 11 AM and 1 PM, and once between 3 PM and 5 PM. For sockeye, total estimated numbers are to be recorded.
- Record the number and sex of Chinook that are collected in the fish trap and passed upstream; notice and record any tags or marks observed on the fish. Provide data to the co managers.
- Record the number and sex (where possible) of all other species passed upstream. All Atlantic salmon will be killed and sampled by WDFW staff.
- Count and flag any Chinook redd within 25 m of the weir.
- Chinook carcasses that float onto the weir will be retrieved (placed on the bank) as workload allows. Carcass sampling will be coordinated with WDFW float crews.

Field biologists and hatchery staff will communicate and discuss activities that are observed at the weir as they occur. All biologists and technicians will identify themselves and their respective agencies while making weir observations. Field biologists and hatchery staff will communicate and share information and observations via email. Responsible persons for coordinating this are Cory Cuthbertson and Aaron Bosworth. The email group this information includes Rand Little, Paul Faulds, Eric Warner, Annette Hoffmann and the Cedar River Anadromous Fish Committee.

Appendix 4, Summary of Thermal Mark Patterns

Brood Year 2011 Cedar River Sockeye Fry Released in 2012
100% Fed for Two Weeks Prior to Release

Take Date	Incubator Vessel #	Timing E, M, L	Eyed Eggs Number	Release Group	Thermal Mark Schematic
9/15/11	2	EARLY	200,000	Park	
9/19/11	4		146,000	Park	
9/22/11	8		200,000	Park	
9/26/11	10		230,000	Landsburg	
	14		211,000	Landsburg	
9/29/11	16		224,000	trestle	
	20		136,000	trestle	
10/3/11	22		229,000	Landsburg	
	26		242,000	Landsburg	
	28		241,000	Park	
	32		198,000	Park	
10/6/11	34		232,000	trestle	
	38		228,000	trestle	
	40		162,000	trestle	
	44	172,000	trestle		
10/10/11	46	MID	211,000	Landsburg	
	50		153,000	Landsburg	
	52		185,000	Landsburg	
10/12/11	56		250,000	trestle	
	58		250,000	trestle	
	62		250,000	trestle	
	64		57,000	trestle	
10/17/11	68		258,000	Park	
	72		215,000	Park	
	74		212,000	Park	
10/20/11	78		180,000	Landsburg	
	82		180,000	Landsburg	
	84		243,000	Park	
10/24/11	86		LATE	250,000	trestle
	90	250,000		trestle	
	92	244,000		Park	
	96	206,000		Park	
10/27/11	98	240,000		Landsburg	
	102	260,000		Landsburg	
	104	218,000		Landsburg	
10/31/11	108	173,000		trestle	
	110	174,000		trestle	
	114	207,000		trestle	
11/3/11	116	176,000		Park	
11/7/11	118	232,000		Park	
11/9/11	122	50,000		Park	
11/17/11	126	66,000		Landsburg	
11/23/11	128	27,000	Landsburg		

Appendix 5 Preliminary Results from the Evaluation of Calcein Marked Cedar River Hatchery Sockeye

March 18 Landsburg Hatchery Release

Release 360,00
 Total 0
 Average Flow 1,507 cfs

			Otolith Sample			Calcein Sample			
Date	Total Catch	Efficiency	Marked	Estimated Hatchery Migration	Estimated Survival	Marked	Estimated Hatchery Migration	Cumulative Estimated Survival	% of total Est. Hatch. Mrg
18-Mar	11,604	1.88%	285	352,502	97.92%	5,351	285,177	79.22%	94.37%
3/19 AM	709					174	7,094	81.19%	2.35%
3/19PM	6,988					233	9,500	83.83%	3.14%
20-Mar	5,797	3.03%				13	429	83.94%	0.14%
Total						302,200			

March 25 Landsburg Hatchery Release

Release 500,00
 Total 0
 Average Flow 1,148 cfs

			Otolith Sample			Calcein Sample			
Date	Total Catch	Efficiency	Marked	Estimated Hatchery Migration	Estimated Survival	Marked	Estimated Hatchery Migration	Cumulative Estimated Survival	% of total Est. Hatch. Mrg
25-Mar	20,640	4.58%	240	216,151	43.23%	7,094	154,774	30.95%	91.52%
3/26AM	1,091					363	7,862	32.53%	4.65%
3/26 PM	14,942	4.65%				283	6,085	33.74%	3.60%
27-Mar	15,444	4.38%				17	388	33.82%	0.23%
Total						169,108			

Notes

Otoliths were only collected on the initial night of release and only represents initial survival, not delayed movement

Fish taken for otolith samples (500) were interrogated for a calcein mark before being euthanized. Otoliths have not been read yet.

Otolith survival is based on initial detection of calcein marked fish in the otolith sample with the assumption that all hatchery fish were calcein marked and therefore represented total hatchery fish in the sample

To compare survival, apples to apples, the otolith based survival should be compared to the initial interrogation of calcein fish (first date listed), not the cumulative survival.

Recommendations

Otolith sampling may need improved methods for adequately mixing a full nights' catch for our sample

Adequate mark detection may need improvement. Both detection efficiencies of different observers should be tested and an improvement in consistency of reader light intensity should be developed if possible. If we are unable to improve light consistency, a rough time limit on battery life should be recommended.

Interrogation of initial release night should be staffed by 3 people, preferably, for efficiency sake. Interrogation of following nights catch could be staffed by only one person for a few hours.

Comparison of marked and unmarked hatchery fish should be evaluated in following years to evaluate mark affects on survival to the trap. This can simply be done by only marking half of the release group and taking an otolith sample. Calcein marked fish and unmarked fish should be present in the otolith sample at similar rates if there is no mark affect.

If there are additional years to this study, considering only marking a portion of the fish for groups larger than 500k should be discussed

During lower flows, delayed migration should continue to be reassessed. In higher flows, between 5% to 8% of the total migration moved past the trap on days following release. Lower flows may encourage hatchery fish to remain in the river.