



**Cle Elum Supplementation and Research Facility
Annual Report For
Worked Performed from July 1, 2012 thru June 30, 2013.**

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CLE ELUM SUPPLEMENTATION AND RESEARCH FACILITY

Executive Summary

The Cle Elum Supplementation and Research Facility (CESRF) have been in operation since 1997. Since the collection of the first brood in 1997 up to the 2012 brood the facility has collected and spawned 10,000 adult Spring Chinook salmon, taken 14,401,598 eggs, and released 10,294,345 smolts. See the tables 1 and 2 below for a detailed description of individual brood year activity for wild and hatchery statistics for brood years 1997-2012.

Table 1. CESRF spawning and survivor statistics (Wild/Natural brood only) for brood year's 1997-2012.

Brood Year	Total Collected	Total Morts.	Pre-Spawn Survival	No. Fish Spawned		% BKD Loss	Total Egg Take	Live Eggs	% Egg Loss	Smolts Released
				Males	Females					
1997	261	23	91.2%	106	132	2.6%	482,287	451,458	6.4%	386,048
1998	408	70	82.8%	140	198	1.4%	725,682	655,229	9.7%	589,683
1999	738	24	96.7%	213	222	2.7%	832,397	762,607	8.4%	758,789
2000	567	61	89.2%	170	278	9.2%	937,516	878,534	6.3%	834,285
2001	595	171	71.3%	145	223	53.2%	408,485	380,169	6.9%	370,236
2002	629	89	85.9%	125	261	10.0%	893,186	884,381	1.0%	836,975
2003	441	54	87.8%	115	200	0.0%	820,933	761,902	7.2%	735,981
2004	597	70	88.2%	125	245	0.4%	830,108	762,349	8.2%	691,109
2005	526	57	89.1%	136	241	0.8%	870,741	802,666	7.8%	769,505
2006	519	45	91.3%	122	239	1.7%	772,357	703,657	8.9%	642,977
2007	473	49	89.5%	134	216	.6%	749,131	715,857	4.4%	676,602
2008	480	38	92.1%	151	253	5.5%	915,563	832,938	9.0%	752,109
2009	486	57	88.3%	142	219	1.4%	850,404	848,339	0.2%	744,170
2010	483	20	95.9%	97	193	2.5%	757,124	727,030	4.0%	702,874
2011	455	28	98.9%	96	197	0%	743,617	712,969	4.1%	684,711
2012	363	14	96.1%	111	209	0%	768,310	739,528	3.7%	Release in spring 2014
Mean	501	54	89.64%	133	220	5.75%	772,365	726,226	6.01%	678,404

Table 2. CESRF spawning and survivor statistics (Hatchery brood only) for brood year's 2002-2012.

Brood Year	Total Collected	Total Morts.	Pre-Spawn Survival	No. Fish Spawned		% BKD Loss	Total Egg Take	Live Eggs	% Egg Loss	Smolts Released
				Males	Females					
2002	201	22	89.1%	26	72	4.2%	232,316	93,115	9.2%	87,837
2003	143	12	91.6%	30	51	0.0%	201,690	87,966	8.2%	88,734
2004	126	19	84.9%	22	49	0.0%	166,043	100,168	6.7%	94,339
2005	109	6	94.5%	26	45	0.0%	139,194	94,250	11.7%	90,995
2006	136	21	84.6%	21	41	2.4%	112,576	102,889	8.6%	68,434
2007	61	15	91.8%	19	35	0.0%	101,275	86,318	3.7%	94,663
2008	194	10	94.8%	51	67	1.5%	247,503	106,122	5.1%	97,196
2009	164	24	85.4%	30	38	0.0%	148,593	91,994	0.8%	88,771
2010	162	9	94.4%	29	55	1.8%	191,826	94,925	9.2%	92,033
2011	166	7	98.7	28	49	1.1	159,801	89,107	4.95	84,726
2012	140	8	94.3%	29	42	0%	156,725	95,438	2.0%	Released in spring of 2014
Mean	146	14	91.3%	28	49	1.00%	168,867	94,754	6.38%	88,773

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INTRODUCTION

Historically, the return of spring Chinook salmon (*Oncorhynchus tshawytscha*) to the Yakima River numbered about 200,000 fish annually. Spring Chinook returns to the Yakima River averaged fewer than 3,500 fish per year through most of the 1980s and 1990s (less than 2% of the historical run size).

In an attempt to reverse this trend the Northwest Power Planning Council (NPPC) in 1982 first encouraged Bonneville Power Administration (BPA) to fund the design, construction, operation, and maintenance of a hatchery to enhance the fishery for the Yakama Indian Nation as well as all other harvesters. After years of planning and design, an Environmental Impact Statement (EIS) was completed in 1996 and the CESRF was authorized under the NPPC's Fish and Wildlife Program with the stated purpose being "to test the assumption that new artificial production can be used to increase harvest and natural production while maintaining the long-term genetic fitness of the fish population being supplemented and keeping adverse genetic and ecological interactions with non-target species or stocks within acceptable limits". The CESRF is co-managed by the Yakama Nation and the Washington Department of Fish and Wildlife (WDFW) with the Yakama Nation as the lead entity. The Cle Elum project became operational in 1997.

This report describes the work performed at the CESRF from July 1, 2012 to June 30, 2013. During this time frame work was focused to maintain and care for the 2011, 2012, and the 2013 broods. Rearing and release of the 11 brood covers much of the work performed under this contract period. The remainder of the report will cover the early rearing of the 2012 brood and the start out of the collection of adults for the 2013 brood.

The maintenance and upkeep of the CESRF is ongoing and specific details are covered in this report. Maintenance and upkeep of the Cle Elum Facility includes; maintaining 23 buildings (includes three acclimation sites and seven residential houses), maintaining 20 large pumps ranging from 50 to 75 hp, maintaining 6 large generators, and maintenance of roads, grounds and data support systems.

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FISH PRODUCTION:

2011 Brood–769,437 smolts released at acclimation sites during the spring of 2013.

2012 Brood –819,427 fry transferred to Cle Elum rearing ponds on March 3-6, 2013. Schedule release date is in spring 2014.

2013 Brood--711 adults transferred from Roza to Cle Elum. Remainder of adults will be transferred during next contract period (July to September 2013).

FISH CULTURE:

Normal fish culture practices continued throughout the 2012/2013 time period. Some of the fish culture duties performed during the year included, but were not limited to: feeding fish, assisting in the marking and tagging of juveniles, transfer of juveniles from CESRF to the acclimation sites, cleaning ponds, maintaining and installation of feed delivery system and supply lines, cleaning/calibrating probes, pressure washing ponds once fish were removed, setting up and shutting down acclimation sites, fertilizing and mowing yards, predator net repairs, maintaining hatchery buildings and grounds, plumbing and small electrical jobs, and fielding tours that visit the Cle Elum Project.

In addition to the supplementation of spring Chinook at the Cle Elum Facility numerous research activities are conducted annually on eggs, fry, juveniles and adults held at CESRF and acclimation sites. A list of the studies performed annually is located on the list below and accounts describing the work can be found on the WDFW annual report (Schroeder and Knudsen) or Don Larsen of NOAA.

- Reproductive success comparisons between hatchery and wild spring Chinook in observations stream (spawning channel).
- Gamete viability comparisons between hatchery and wild spring Chinook.
- Fecundity, egg size, reproductive effort, age, size, comparisons between hatchery- and wild origin females.
- Reproductive effort and testes weight by male size comparisons between wild, supplementation and hatchery and males—also size and age comparisons.
- Maturation timing comparisons by sex and origin (wild, supplementation and hatchery) adults.
- Emergence timing and Kd comparisons between progeny produced by hatchery and wild-origin adults.

- Juvenile behavior work that monitors dominance and predator avoidance activity.
- Morphometric comparison between hatchery, supplementation and wild origin fish.

ADULT COLLECTION FOR THE 2012 BROOD

The bulk of the 2012 brood adult fish transfers for the five month transfer period, were trucked to Cle Elum in May and June 2012. The transfer of adults slowed down in July and August as the peak of the run had passed. Total adult/jack transfers from Roza to the facility are shown in **Table 1**.

Adult Collection for the 2012 Brood transferred from May 1, to September 1, 2012.				
Origin	Males	Females	Jacks	Totals
Wild/Natural	118	220	25	363
Supplementation	55	108	19	182
Hatchery Control	52	70	18	140
Grand Total	225	398	62	685

Table 1. Total adult transfers from Roza to CESRF, for 2012 season.

Broodstock transferred to Cle Elum were of wild/natural, supplemented and hatchery origin. Wild/Natural brood was collected and spawned for production/research purposes only. Supplemented adults (returning adults which were reared and released at CESRF) were collected and allocated for spawning channel and 44 were spawned artificially to compare against wild and hatchery egg development. Forty-four females and twenty-five male supplemental adults were spawned artificially and were used to compare fertilization to yolk-sac absorption against wild and hatchery crosses. The progeny of supplemented adults that were spawned are being used for juvenile trait analyses as part of the long-term supplementation study. Hatchery origin adults were collected for spawning channel observations and to fill two of the eighteen raceways used for production at CESRF. This marked year #11 (BY's 02, 03, 04, 05, 06, 07, 08, 09, 10, 11 and 12) that hatchery origin adults were collected and spawned to create a hatchery by hatchery line. The hatchery control line was created to monitor the effects of domestication. This was recommended by the Independent Scientific Review Panel (ISRP) in 2001 and implemented starting with the 2002 brood.

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The hatchery control line juveniles are marked differently than their supplemented counter parts so that they can be separated once they return as adults. Hatchery and Supplemented adults are used for research purposes with approximately 100 used in spawning channel observations for reproductive success and trait analyses studies. A breakdown of adult usage for wild/natural (progeny of natural spawners = 1 generation removed from hatchery environment) and hatchery control adults for the 2012 spawning season are shown in **Table 2**.

	Natural					Hatchery			
	Males	Females	Jacks	Total		Males	Females	Jacks	Total
Production spawners	96	209	15	320		22	42	7	71
Spawning Channel	0	0	0	0		24	24	0	48
Mortalities	5	9	0	14		2	3	3	8
Not Used	14	2	10	26		4	1	8	13
Released to River	3	0	0	3		0	0	0	0
Total Accounted	118	220	25	363		52	70	18	140

Table 2. Schematic breakdown of natural and hatchery adult usages at CESRF fall 2012.

In addition to wild/natural and hatchery adults collected for the 2012 season supplemented adults were also collected at Roza and held at CESRF. Supplemented adults are fish that were raised and released at CESRF. Supplemented adults were progeny from wild/natural spawners that were captured at Roza and transferred to CESRF. These adults were then spawned, eggs incubated, reared at CESRF. Supplemental progeny will be used to monitor several different characteristics and then compared to wild and hatchery life history traits from the egg to juvenile stages. Supplemental adults were also placed in spawning observation channel located at the main facility. Located in **Table 3** is a breakdown of supplemented adults used of the 2012 season.

Supplemental adults usage for 2012				
	Males	Females	Jacks	Total
Production spawners	22	44	3	69
Spawning Channel	24	24	0	48
Mortalities	2	1	2	5
Not Used	7	2	14	23
Released to River	0	37	0	37
Total Accounted	55	108	19	182

The 2012 adult holding and rearing season pre-spawning losses were low and, as in the past, mortality increases in September as adults are handled weekly until the spawning period is complete. The total mortality for the five-month holding period was 4.2%, with 1.0% from pre-spawning mortality and 3.2% totaling mortality after sorting period began in September.

SUMMARY OF EGG TAKE FOR THE 2012 BROOD

The spawning period for the 2012 brood took place over a five week period with the first egg take occurring on 9/5/12 and the last one on 10/9/12. The CESRF standard operations during the spawning period are to sort by sexes and check for ripeness on Mondays, and spawn on Tuesdays of each week starting on the first week of September. The spawning period is usually completed by the first week of October. The Cle Elum staff sorts and identifies by sex, checks for ripeness, spawns, and fertilizes Chinook salmon. Other individuals involved with the spawning process include:

- Bill Bosch (Yakama Nation) YKFP Data Manager
- Michael Whitefoot (Yakama Nation, Cle Elum Hatchery) head of incubation
- Vernon Bogar Jr./Michael Whitefoot/Simon Goudy (Yakama Nation) factorial crosses/egg measurements
- Paul Huffman (Yakama Nation) records lengths and photographs adult salmon
- Sharon Lutz and Joy Everson (USFW) pathology screening
- Curt Knudsen and Chad Stockton (WDFW) factorial crosses/egg measurements

A combined 295 (209 wild/natural + 42 hatchery + 44 supplemental) females were spawned for the 2012 season. No females tested for high rate of Bacterial Kidney Disease (BKD) so all females were used for either production or research purposes used for production or research purposes. Total egg take of 1,111,250 (includes WW 862,572 + 156,725 HH + 91,953 SS). The total estimated egg take is the first estimation of total egg take using the volumetric method during the spawning period. The next text method of estimated egg take is by running the eggs through the egg counter once they reached the eyed stage.

The total eyed egg reported in table 4 was formulated by the use of the egg counting machine. After all eggs reach the eyed stage they were shocked and processed through the Jentsorter (egg sorting machine) which removes the dead unfertilized eggs and then they are ran through the egg counter to give the new egg inventory.

Wild				Hatchery				
Total eggs	Eyed eggs	% Egg Loss	Est. Fecundity		Total eggs	Eyed eggs	% Egg Loss	Est. Fecundity
768,310	739,528	3.7%	3,766		125,736	**95,438	2.0%	3,053

Table 4. Schematic breakdown of total eggs collected for BY 2012 by origin and % egg loss and estimated fecundity for each. ** Only 2,321 eggs from each hatchery control female were used to fill the two HxH production ponds. The remaining eggs from each hatchery female used were culled which is reflected in the total eggs of 125,736 – 95,438 eyed eggs = 30,298 eggs culled for the hatchery line.

In **table 4**, under the Hatchery Origin, of the total 125,736 eggs taken only 95,438 eggs were utilized to fill the two hatchery by hatchery raceways designated to monitor the effects of domestication. In this report reference to a hatchery female is one that was reared and released from CESRF and upon returning as an adult it was selected for brood to create a hatchery by hatchery (HxH) line. The hatchery line adults will at no time be allowed to pass the Roza collection facility and spawn naturally. All hatchery adults are trapped at Roza and are artificially spawned to create the HxH line or used for spawning channel observations. Approximately 2,321 eggs from each of the hatchery females spawned were used to make up the two HxH raceways. The allocated eggs of 2,321 were then split in half with one half represented one HxH raceway and the remaining eggs used to fill other HxH pair = two full raceways.

Supplemental Eggs			
Total eggs	Eyed eggs	% Egg Loss	Est. Fecundity
91,953	N/A	N/A	N/A

Table 5. Supplemental eggs spawned for research purposes. Curt Knudsen’s 2012 report for a detailed description of egg use.

In the fall of 2012, 44 supplemental females were artificial spawned and used by WDFW researchers Chad Stockton and Curt Knudson. The 44 supplemental females were artificially spawned with 25 supplemental males and 600 eggs from the supplemental crosses were then incubated for research purposes. Chris Johnson of WDFW used 5,000 supplemental eggs for hatch out study conducted in the Yakima River. After research eggs were allocated the remaining supplemental eggs from each female were then culled.

During the incubation period, eggs for the 2012 brood were thermally regulated by using a combination of 48° well water and 37° chilled water. By use of thermal control, it was possible to pond fry in a three day period starting on March 3, 2013 and concluding on March 6, 2013. At the time of ponding the average temperature unit (TU) at ponding was 1792 TU’s with an average of 1417 fry/lb. Total pounds transferred to raceways were 578 with an overall average of 32.1 pounds per raceway. The total number of fry ponded was 819,427 with an average of 45,523 fry per raceway.

FINGERLING / JUVENILE REARING FOR BROODYEAR 2011

Juvenile rearing at the CESRF covers a ten month span and starts when fry are transferred from incubation building to the 18 outdoor raceways (transferring fish from incubation to raceways = ponding) in early-March. Juveniles remain in the raceways until January of the following year. For example, the 2011 Brood was ponded in CESRF raceways in March of 2012 and transferred to off-site acclimation sites January of 2013. In January/February (weather permitting) of each year the juveniles are transferred from the CESRF to one of the three acclimation sites (Easton, Clark Flat and Jack Creek). Juveniles destined for Jack Creek site were transferred at the beginning of March 2013 to avoid freezing conditions that make fish rearing challenging.

The 2011 brood was reared under methods which were set to have fish reach the 30 fish per pound size in mid-October 2012. Fish were hand fed Bio-Vita Starter until they reached the 300 fish per pound size and then they were fed Bio-Vita Fry size 1.2 mm pellets by utilization of automatic underwater feeders. Fry were started on well water and sequestered to one half of the raceway to make hand feeding more effective. As fish mass increased flows were increased as well. By mid- May 2012 fish were large enough to change to utilize the automatic underwater feeder pond dividers were removed and fish were given the whole raceway. Well water was used for initial rearing and gradually as the spring freshets passed they were reared solely on Yakima River water.

While in the incubation building, eggs from the 2011 brood were separated in to treatment groups. Half of each female's egg was split evenly with one half placed in vertical incubator tray and the other half of the eggs were placed in the adjacent vertical tray. Each vertical tray incubates no more than three female's eggs which were split in half (not to exceed more than 5000 eggs/tray). Approximately 45,000 eggs were placed in each vertical incubator stack (with one stack equaling 10 to 12 trays). Each adjacent vertical stack was set in pairs with each pair comprised of the same female which was split in half. Again each vertical stack was then transferred in pairs randomly to the outdoor raceways. For example, vertical stacks 5 and 6 comprised of at least 12 to 14 wild females, which were transferred to outdoor raceways 7 and 8, respectively. Each pair will then be moved to one of the three acclimation sites with ponds 9 and 10 being transferred to Easton ponds 5 and 6.

Marking and tagging for the 2011 brood began October 13, 2012 and was completed by December 6, 2012. Pit tags were inserted in 40,000 fish, 2,000 tags in each of the sixteen WxW production ponds and 4,000 in each of the two HxH ponds. The marking process consisted of 100% adipose clip, coded wire tag placement in the snout for WxW production juveniles and posterior dorsal for HxH juveniles. Elastomer marks were also inserted in adipose tissue of the eye of juvenile salmon. The tagging and marking operation conducted by Mark Johnston, YN Fisheries Research Scientist IV, was completed by using the two YKFP trailers and twenty Yakama Nation Fisheries employees. A summary of marking and tagging figures for the BY 11 is found in Table 6.

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Brood Year 2011 Marking and Tagging										
CLE RW ID	ACC. Site ID	Comment	Elastomer Eye	Color	CWT Body site	CWT	PIT Tags	Total	Start Date	End Date
CLE01	JCJ05	WW	Right	Orange	Snout	42452	2000	44452	10/15/2012	10/18/2012
CLE02	JCJ06	WW	Left	Orange	Snout	42217	2000	44217	10/18/2012	10/22/2012
CLE03	CFJ05	HH	Right	Red	Post Dorsal	38432	4000	42432	10/22/2012	10/25/2012
CLE04	CFJ06	HH	Left	Red	Post Dorsal	38743	4000	42743	10/25/2012	10/29/2012
CLE05	ESJ01	WW	Right	Green	Snout	38404	2000	40404	10/29/2012	10/31/2012
CLE06	ESJ02	WW	Left	Green	Snout	37931	2000	39931	11/01/2012	11/05/2012
CLE07	CFJ01	WW	Right	Red	Snout	40449	2000	42449	11/05/2012	11/08/2012
CLE08	CFJ02	WW	Left	Red	Snout	39281	2000	41281	11/08/2012	11/13/2012
CLE09	JCJ03	WW	Right	Orange	Snout	43588	2000	45588	11/19/2012	11/26/2012
CLE10	JCJ04	WW	Left	Orange	Snout	41715	2000	43715	11/27/2012	11/30/2012
CLE11	ESJ05	WW	Right	Green	Snout	40964	2000	42964	11/30/2012	12/04/2012
CLE12	ESJ06	WW	Left	Green	Snout	40905	2000	42905	11/28/2012	12/03/2012
CLE13	CFJ03	WW	Right	Red	Snout	42298	2000	44298	11/19/2012	11/27/2012
CLE14	CFJ04	WW	Left	Red	Snout	41111	2000	43111	11/15/2012	11/19/2012
CLE15	JCJ01	WW	Right	Orange	Snout	42769	2000	44769	11/08/2012	11/14/2012
CLE16	JCJ02	WW	Left	Orange	Snout	42230	2000	44230	11/05/2012	11/08/2012
CLE17	ESJ 03	WW	Right	Green	Snout	39770	2000	41770	11/01/2012	11/05/2012
CLE18	ESJ 04	WW	Left	Green	Snout	39823	2000	41823	10/29/2012	10/31/2012
Totals						733082	40000	773082		

Table 6. Summary of 2011 brood year marking activities at the Cle Elum Supplementation and Research Facility.

After juveniles from BY 11 were marked and tagged they were allowed to recover and heal prior to transferring fish to the acclimation sites. Quality control and tag retention tests were performed by Mark Johnston and staff, in the latter part of December of 2012. In January of 2012 Joy Everd, USFW pathologist, cleared BY 11 juveniles for fish transfer.

Juveniles from BY 11 were transferred from CESRF to the acclimation sites starting January 2013 and completed during second week of February 2013. Fish were first moved to the Easton and Clark Flat site on January 8-10, 2013. Fish transfer for the 11 Brood concluded with Jack Creek site on February 14, 2013 with all six ponds transferred on this day.

With fish transfers completed to all three acclimation sites, the juveniles were allowed to imprint for a minimum of three weeks prior to pulling screens in mid-March to start the volitional release of the 11 brood. Screens at Easton and Clark Flat site were removed on March 15, 2013.

Raceways at all acclimation sites included ten 5' diameter camouflaged floating hoola hoops and ten underwater feeders dispersed evenly on pond walls. Flows for raceways were set at 840 gallons per minute at all sites. Feed was introduced at a sub-surface water level, and as rearing water temperature increased in early spring fish were fed at optimum levels.

Half of the ponds at each of acclimation sites were fed Bio-Vita Fry six weeks prior to volitional release and the other half of the fish were fed Bio-Supreme Transfer feed. Bio-Supreme Transfer is formulated to help prepare juvenile salmon for the transition from fresh to saltwater environments. Transfer feed was fed until fish were forced out in mid-May 2013. Of the six total raceways at each of the three acclimation sites all odd numbered raceways were given the Bio-Supreme feed diet and the even numbered raceways were fed Bio-Vita Fry. Both feed types were of the 2.0 mm sized pellet. Data will be monitored and evaluated to see if any differences in survival are detected in the both the juveniles and returning adults from the 2011 brood.

On March 12, 2013 samples of juvenile fish at all three sites were taken by Joy Evered (USFWS pathologist) and NOAA Fisheries staff. USFWS sampled 40 smolts from each raceway for a total of 720 smolts from all acclimation sites (six raceways at each acclimation site x 3 sites = 720 smolts sampled). After USFWS finished their sampling protocol for each smolt, NOAA used the same juvenile carcass to extract gonads for physiological samples for his research. NOAA used an additional 20 smolts per raceway on top of the 40 that USFWS used for his sampling. When sampling the two H x H raceways at Clark Flat NOAA staff sampled 120 fish per H x H raceway. Total fish sampled at all three sites was 1200 smolts (480 @ Clark Flat + 360 @ Easton and Jack Creek). Sampling conducted by USFWS and NOAA was started on March 12 and completed by March 14, 2013. Once samples were complete screens were removed at the sites to allow fish to be released volitionally.

In March and April juveniles were fed at optimum levels, and adjustments to feed levels were made by watching the YKFP website migration patterns and expansion for releases for the 2013 period. As more pit-tag fish were detected leaving each acclimation site feeding levels were reduced.

FRY / FINGERLING REARING FOR BROODYEAR 2012

Brood Year 2012 was transferred from indoor incubators to outdoor raceways during the week of March 3-6, 2013. Water was thermally regulated in both the iso-buckets and vertically incubators to achieve a March ponding date. Estimated fingerlings transferred to the 18 raceways totaled 819,427 and average size at transfer was 1417 fish per pound. At the end of June 2013, 802,928 fish were estimated to be on-hand with an average of 123.6 fish per pound. All fish were hand fed Bio-Oregon's Bio Vita dry starter feed.

ADULT HOLDING FOR BROODYEAR 2013

Brood year 2013 marked the 17th year that adults were captured at Roza and held at the Cle Elum Supplementation and Research Facility. Total adult transfer count for June 2013 collection for BY 2013 was 711 adults that were transferred to the facility. The remainder of the adult holding period will be summarized on next year's annual report as Yakima River spring Chinook are collected up until mid-August of each year.

The rest of the report will cover the operation and maintenance of the Cle Elum Supplementation and Research Facility for the 12 month contract period for the periods of July 1, 2012 to June 30, 2013.

WATER PRODUCTION:

During the peak water usage period as much as 14,400 gpm's (combination of river and well water) was pumped through the facility. Peak river water usage occurred during August-January time period when four river pumps supplied water to the outdoor rearing ponds. Only one pump was in operation in February and March when twelve of the eighteen juvenile rearing ponds were transferred to off-site acclimation sites. Four intake pumps supplied Yakima River water to production raceways, and adult holding pond.

Well water is used for tempering river water down during warmer months, for egg incubation and tempering adult holding flows. Five wells were used for early rearing of the 2012 brood in March. Peak well usage occurred in March, April, May and July: During these months, wells were used for fingerling rearing and cooling river water down during the warmer months of the summer. Well water was also used to supplement lost river water flow due to plugged intake screens from either frazzle ice in winter months or spring runoff which caused water to be murky and plug intake screens.

In addition to providing water to incubation building, adult and juvenile holding ponds river water was also used to supply water to the spawning channel which was operated from September 2012 to May 2013. During this operational period one to two drain water pumps located in the River Water Cooling Facility building picked up effluent water from raceways and then pumped water to the spawning channel.

RIVER PUMP STATION MAINTENANCE:

Normal maintenance involved checking the operation of working pumps, checking oil levels daily, changing fluids once pumps were shut down, checking river levels and cleaning the building. AMB Tools technician performs annual service on backwash compressor to ensure that it is working effectively to keep intake screens clean. A Partlow thermograph records daily temperature for a 24 hour period, and the thermograph paper is replaced every seven days with a new record sheet. This gives the Cle Elum staff a hands-on river temperature profile throughout the whole year.

River pump flow ranged from 3,600 to 14,400 gallons per minute, depending on the time of year. Peak pumping flows occur from the May to December of each year. Once fish are

transferred off site to acclimation facilities flows and pumping rates were reduced to one pump to supply water to spawning channel and Oxbow. In May 2013 all river pumps had oil drained and changed.

WELL FIELD MAINTENANCE:

Five out of the six wells were operational throughout the year and maximum sustainable flows were 3,650 gallons per minute. Well #3 was not operated because of limited flows and pumping capacity. The remaining five wells were used to supply early rearing water to the eighteen production ponds and for egg incubation. The fingerlings were introduced to river water after a month of rearing on well water. Well water was infused with the river water delivery to the adult holding pond, during the summer months when river temperatures exceeded bio-specifications rearing temperatures for the holding period. Weekly well depths and flows are recorded and forwarded to CH2MHill for review. Well #2 recorded the most hours of operation as it was used for egg incubation from September 2012 through early March of 2013.

Well water was used to temper down the warmer river water flows during the warmer summer months. In addition to tempering river water down in the summer months wells are used for early rearing when juveniles are transferred from incubation to outdoor raceways. Wells 1, 2, 4, 5, and 6 were used to start the 2012 brood in the spring of 2013. Total flow with the five wells was 2,560 gallons per minute.

ACCLIMATION SITES:

Each acclimation site includes a river intake, six raceways, a cleaning waste basin, service building with office and storage, generators for primary or backup power, and a Supervisory Control System (SCS). The application and software on the SCS computer at each acclimation site includes a process control unit and alarm display screens. The display screens allow operators to monitor and interface with process controls at the SCS computer. The operator can change set points, acknowledge alarms, and review trend data.

Normal operation of acclimation sites during the contract period entailed the rearing and release of the 2011 brood. Acclimation site(s) clean up and shut down operations occurred during June 2013. Each acclimation site was operated and maintained by one seasonal fish culturist stationed at the site for a six-month period (January to end of June). Seasonal personnel were relieved by Cle Elum staff on Tuesday and Wednesday of each week. The use of the two-way radios and the Cle Elum computers allowed close contact and monitoring the operation of each site. Normal maintenance and emergency repairs occurred during the year as needed. Prior to transferring fish to the acclimation sites Technical Systems Incorporated (TSI) inspected computer software and data collection at sites to make sure data transfer was operating efficiently.

Technical Systems Incorporated (TSI) software engineer had to trouble shoot computers at each site so data transmissions (CESRF real-time system downloads) and alarm systems functioned properly. TSI is contracted to inspect software and provide technical assistance on data collection equipment. In addition to having site computers and data

transmission systems checked, Darren Chase, Pacific State Marine Fisheries Tech, started up and shut down the pit-tag detectors/interrogation systems at all three acclimation sites.

Water samples are collected at acclimation sites throughout the operational period. Samples are collected and sent to laboratory for determination of total suspended solids (TSS), as per temporary use permit requirements. Vernon Bogar, Assistant Hatchery Manager, was responsible for this task and submits a quarterly report to Department of Ecology for acclimation site and Cle Elum operations.

Starting February 2013 fish at the acclimation sites were issued two diets. Those in the odd numbered ponds at each site received Bio Supreme Transfer diet and those in the even numbered ponds received the Bio Vita diet. Both diets were in the 2.0 mm size pellet and the Bio Vita was the same diet that all fish were issued up to the February 2013 time period. The Bio Supreme Transfer diet is formulated to prepare fish for the transition from fresh to salt water environment and was fed 4-6 weeks prior to release of salmon. Further monitor and evaluation of the diets will be used on juvenile migration and returning adults from the 2011 brood.

Prior to removing screens for volitional release of BY 2011 Joy Everd, USFW pathologist, and NOAA Fisheries physiologist, sampled smolts from each raceway at the three acclimation sites. Joy sampled fish to develop a fish health profile and to ensure juveniles were clear to release. NOAA collected gonads to evaluate precocious maturation rates in juvenile salmon. Screens were pulled at all three sites on March 15, 2013.

A summary of the operation and maintenance of Easton, Clark Flat and Jack Creek acclimation site describes work performed at each site.

EASTON

All six ponds received fish, and during volitional release smolts left the sites at a faster pace when spring freshets hit the sites. Smolts for the 2011 brood were pushed on at the end of May 11, 2013. Easton clean up and shut down was completed by June 30, 2013.

Maintenance issues and/or repairs for the site included annual inspection and maintenance on backup generator, yearly inspection of electrical equipment by Laurmar Electric. In August 2012 NC Machinery performed maintenance on the facility backup generator. AMB tools serviced the facility airburst system and compressor in October of 2012.

Fish transfer for Brood Year 2011 took place on January 08 through the 10th with 248,944 juveniles transferred to Easton. Odd number ponds at the Easton site were fed Bio-Supreme Transfer diet and the even numbered ponds were fed Bio-Vita and both feed was of the 2.0 mm sized pellet. Final force out of the brood year 2012 was on May 14, 2013 and 88% of the juveniles had migrated from the site.

CLARK FLAT

The Clark Flat site had the compressors serviced by AMB Tools October 2012. NC Machinery performed annual maintenance of facility generator in September 2012 as well. Four Seasons's Heating and Air Conditioning serviced HVAC system in October 2012 and Zee Medical Supplies replenished first aid supplies for onsite first aid unit.

Once the site was cleared for fish and all maintenance items were performed fish were transferred to the site on January 9 and 10, 2013. A total of 255,493 juveniles were transferred to the Clark Flat site. After pre-release samples were conducted in early March by USFWS and NOAA, screens were removed on March 15, 2013 to allow fish to leave volitionally.

Odd numbered ponds were fed Bio-Supreme Transfer and the even numbered ponds were fed the Bio-Vita Fry diet while fish were at the Clark Flat Acclimation site. At the time of the final force out on May 13, 2013 there were 23% of original 255,714 juveniles remaining at Clark Flat. The site was cleaned and shut down on June 30, 2013.

JACK CREEK

The major purchase/improvement for the Jack Creek site was to remove old generators and replace with new ones. This site is 100% powered by generators that work in tandem to power the site. Each generator is set on a 3 or 4 day cycle and will operate for that period and switch weekly to the lag generator. Since this site was brought on line in 1999 these generators have accumulated over 25,000 hours of operation. The two new generators were purchased and installed from NC Machinery. Laurmar Electric provided electrical hookup to the facility transfer switches. See pictures for new generators and installation of equipment.



Olympian Generators installed in October 2012. NC Machinery provided generators and Laurmar Electric assisted in electrical hook up of generators.

Laurmar Electric repaired compressor that controls air bladder and air burst system. A new compressor was ordered and installed in February 2013. Juveniles from the BY 11 were forced out of the raceways on May 13, 2013. At the time of the force out of juveniles there was an estimated 9% fish remaining in the rearing ponds. The site was cleaned and shut down on June 2013.

Juveniles from the 2011 brood in the odd numbered ponds were fed Bio-Supreme Transfer and the even numbered ponds were fed the Bio-Vita Fry diet while at the Jack Creek Acclimation site. Fish for the 2011 brood were transferred to the site on February 14, 2013. Estimated release numbers for the 2011 brood were a total of 266,059 juveniles were transferred from Cle Elum to Jack Creek.

VEHICLE MAINTENANCE:

All vehicles were taken in for service, washed, and cleaned on a regular basis. The CESRF has six passenger vehicles and two large trucks; one for adult fish transfer and one for juvenile fish transfer. Each vehicle is maintained (oil checks, washed, etc.), regularly and mileage reports are sent to Linda Lamebull, YN GSA fleet representative, monthly. GSA allowed each vehicle to be professionally detailed and this was completed by People's Auto Detailing in July 2012. In August 2012 the Ford 250 was traded in for a Dodge Ram 2500.

Day Wireless of Yakima inspected and tested all two-way radios (vehicle and hand-held) during October of each year. The F-350, plate #G63 1966D, had several mechanical issues this year. Both batteries had to be replaced and the fuel injectors were replaced, and front brake drum on driver side was replaced. Four batteries were needed in the juvenile transfer truck prior to moving fish in January 2013.

Other motor and non-gasoline motor vehicles maintained throughout the year include; two club-carts, four snow mobiles, two tractors (one riding lawn mower and one 5500 John Deere), one electric forklift, and numerous small engines and trash pumps that are used for maintaining hatchery grounds and cleaning acclimation site raceways. Snow mobiles were taken in for yearly maintenance in October and both John Deere machines were serviced on site during the year

RESIDENTIAL MAINTENANCE:

There are a total of seven resident houses located on at the Cle Elum facility. Yearly maintenance includes starting up irrigation systems in May, and shutting down and winterizing these systems in early November. Other maintenance performed each year includes annual service of heating and air conditioning units of each residence in May and November each year. Resident #391 had compressor replaced in HVAC unit.

HATCHERY BUILDING MAINTENANCE:

The hatchery, fertilization room, lab and feed rooms are all located in the same building. The incubation building is in operation from mid-August to the end of March each year. Annual maintenance and operation entails setting up incubation systems (troughs and vertical incubators), adjusting water to troughs and incubation islands, and controlling egg and fry development by infusing cooler chilled water to temper well water down. The chiller is turned on in mid-August of each year and cools well water down from 48° to 37° when in operation.

By the use of the chilled water incubation temperatures can range from 48° to 37°. The

warmer the temperature the faster the eggs develop and the cooler the water temperature the slower the eggs develop. So eggs to that are taken in the early part of the spawning period (early September) are chilled down so eggs that are taken in later September can catch up by incubating in warmer well water temperature of 48°. The chiller is shut down after fry are removed from vertical incubators and transferred to rearing ponds. Troughs, iso-buckets and incubators are cleaned after eggs and fry are removed. The chiller was shut down at the end of March 2013 after seven months of use. 819,427 fry from Brood Year 2012 were transferred from incubation to outdoor rearing ponds on March 4-6, 2013.

Yearly maintenance for hatchery/incubation building items include flushing formalin delivery system lines in January, repairing leaky faucets, setting up troughs and repairing Heath tray lids. HVAC units are inspected bi-annually in the fall and spring of each year by Four Season Heating and Air Conditioning.

MAIN OFFICE MAINTENANCE:

Much of the yearly maintenance and upkeep of the main office building is accomplished by the Ros-Elum Cleaning Service. Ros-Elum is responsible for cleaning offices and restrooms, including shop restroom and M&E Office building, twice a week. Windows and carpets are professionally cleaned once a year by Ros-Elum and Roy's Carpet Cleaning. The HVAC system for the office building was also serviced by Four Seasons Heating and Air Conditioning. Four Seasons services included changing filters and pressure testing the system for leaks and repairing motor in the office HVAC unit. In September Simplex Fire Systems inspected the entire facilities fire protection system. Simplex is contracted on an annual basis to inspect and test fire alarms and interface control panels located throughout facility. Inspection includes testing batteries and smoke alarms in all buildings.

In addition to upkeep of the main office building Ros-Elum cleaning services cleans the Monitor and Evaluation Office building #551 which is located on facility grounds. Chad Stockton of WDFW uses this as his main office and throughout the year numerous meetings are held at this office. The Monitoring and Evaluation Building was also use to lodge field crews from Yakama Nation, WDFW, NOAA, and University of Washington graduate students when they were conducting extended surveys or research projects on the Yakima, Cle Elum and Teanaway rivers.

MAINTENANCE BUILDING:

The maintenance building is a high traffic area and cleaning is done on a weekly basis. Any fabrication, project-specific construction item or equipment repair is accomplished by use of shop equipment in the maintenance building. The chiller, which is used for cooling well water down for egg incubation, is located in a separate but attached room of the maintenance building.

The chiller is operational from late August to March of each year. Raincountry Refrigeration, the original installer of the unit, services the chiller on annual basis to ensure it is operating at top efficiency. In addition to inspection of the chiller, Raincountry also provides maintenance for the walk-in freezer and cooler, and ice machine. Four Seasons

Heating and Air Conditioning serviced ceiling mounted heaters and replaced elements on broken ones.

In May 2013 a leak was detected in lawn adjacent to the maintenance building. After using Laurmar Electric's leak detector the origin of the leak was located. The facility's 4" domestic line had separated. Cle Elum staff, with the assistance of Laurmar Electric staff and equipment (leak detector and mini excavator) repaired the line. This domestic water line brings domestic water to the main facility and seven on site residential houses.



Photo on left is of Laurmar Electric probing water line break. Photo on right is Cle Elum's DJ Brownlee and Mark Luce of Laurmar Electric repairing 4" domestic water line.

SAFETY AND TRAINING:

Each crew member at the Cle Elum facility received at least one training opportunity in the past year. Opportunities ranged from Fish Health and Fish Culture Conference training, to attending conferences or seminars in; Human Side of Management, Effective Writing Seminars, Supervisory training and recognizing alcohol and drug abuse in the work place and OSHA compliance training, cross training at various hatcheries in Prosser, collecting sockeye for spawning in Canada, attending Yakama Nation employee training sessions, and on-the-job training such as feed ordering, calculating therapeutic treatments for juvenile and adult salmon and all that comes with maintaining and operation of the hatchery.

Safety inspections were performed on an annual basis. All facility fire extinguishers were tested by a qualified technician from ABC Fire Control Inc. Simplex Inc. tested all smoke and fire alarms for the CESRF. In May 2013 Quinn James replaced DJ Brownlee as CESRF safety officer. Four safety meetings were held during the contract period. Safety meetings consisted of recognizing unsafe conditions in the work place, getting staff properly fitted with safety masks used when treating with formalin, and watching safety videos pertaining the work environment.

GROUNDS:

The maintenance of the hatchery grounds starts at the entryway of Charter Road and continues onto hatchery grounds. The traffic signal lights were inspected and maintained monthly by John Rostad of Green Light Solutions throughout the 2012 and 2013 year.

Charter Road (the road coming off of South Cle Elum road) is heavily traveled by many different users, and maintaining road is a twelve-month job. During the winter months the hatchery crew plowed snow to keep the road open. Debris was collected by the crew from the road and transported to the local refuse center twice a year. The road is in dire need of repairs to asphalt by outgoing signal light. Ellensburg Cement Product trucks use Charter Road as they enter and exit the gravel pit located at the end of Charter Road. They have patched pot holes but a more intensive repair is needed on outgoing asphalt as it is buckling from heavy use.

In May 2013 a concentrated effort by Cle Elum staff, Washington Conservation Corp (WCC), and Fire District #7 of South Cle Elum, to fire “safe” the Cle Elum Facility. Cle Elum and WCC provided the labor in clearing a 10’ path around the seven residential houses. Once brush and trees were cleared and staged brush pile they were ran through a chipper which was provided and operated by Fire District #7.



Above photo. WCC and Fire District #7 prepare transfer of wood debris to the wood chipper located behind fire truck.

Kathy Sample of VMACS LLC applied spring and fall weed applications to the main facility and the Easton and Clark Flat acclimation sites. Kathy took over for former owner and operator Rex Schenk who retired from VMACS.

MISCELLANEOUS:

On September 12, 2012 a total of 96 adult Chinook were transferred to the spawning channel by hatchery personnel and WDFW. (Supplemental line: 24 females, 24 males. The hatchery control line has: 24 females, 24 males.) WDFW researchers monitored reproductive behavior of spawning adults and pedigreed offspring. The channel was in operation from

September 2012 to May 2013.

Laurmar Electric inspected all breaker panels located throughout the main facility and acclimation facilities in January 2013. NC Machinery performed annual maintenance on Cle Elum's generators in October 2012. Generators are cycled once a month by Cle Elum staff to ensure they are operating efficiently.

MEETINGS AND TOURS:

Weekly meetings were conducted at the hatchery for personnel and strategic work planning. Cle Elum staffers Vernon Bogar III, Michael Whitefoot and Ted Martin attended the Northwest Fish Culture held in Portland, Oregon. DJ Brownlee and Charles Strom attended the Project Annual Review held at Central Washington University in June 2013.

Numerous tours and visitations were fielded during the year. Schools who toured the facility included: Cle Elum third grade classes, Lincoln Elementary, students from the Mount Hood Community College Fisheries Program in Gresham Oregon toured the facility in April 2013. Other tours included 30 members from Bureau of Reclamation, American Fisheries Society members, and Columbia Inter Tribal Fish Commission. Bonneville Power Administration and USFWS staffers also toured the hatchery in April 2013.

The Cle Elum Project held its annual open house on July 20, 2012 and the turnout was great. The open house is an annual event with potluck format. A self-guided tour is set up and the public has an opportunity to get a closer look at the operation of the Cle Elum Project. Over 380 people attended the annual event.

The pre and post spawning meetings were held at the Cle Elum facility in August and October of 2012. Bill Bosch met monthly to update data and transfer project information to YKFP website. In January 2013 a one day internal Project Annual Review meeting was held at the M&E office building.

PERSONNEL:

The Cle Elum Facility employs eight full time and three seasonal employees. Permanent staff include Hatchery Manager Charles Strom, Assistant Hatchery Manager Vernon Bogar (left position in May 2013 and no longer works at CESRF), Complex Foreman DJ Brownlee, Fish Culturists; Simon Goudy, Quinn James, Michael Whitefoot, and Vernon Bogar III; Office Coordinator Patricia Bogar and Seasonal Fish Culturists Ted Martin, David Washington, and Jackson James. The seasonal employees were employed for a seven-month period and stationed at the acclimation sites. Seasonal and full time employees were administered quarterly evaluations throughout the year. Quarterly evaluations for Fish Culturists were issued by DJ Brownlee.

Thomas TallBull worked for a five week period from late June 2012 to July 2012. He was a summer intern from the Bonneville Power Administration. Kaleb Wersland, a local home school student, volunteered from September 2012 to March 2013. His volunteer

hours accumulated over 40 hours of service.

During the July 2012 to June 30, 2013 contract period we had two hatchery hosts from the May to the end of September time period. Hatchery hosts provide tours and greet guests who visit the Cle Elum facility from May to the September time period. In addition to working with the public the hosts perform landscaping, basic carpentry, and assist in fish culture duties.

Stuart and Nancy Walls were hosts for the month of July 2012 through September 2012. Jon and Juli Gill were the second hosts for the 2013 during this contract period. The Gill's started in May 1, 2013 and their host tenure lasted through June 2013.

The host program has proven to be beneficial for the Cle Elum Supplementation and Research Facility and each set of hosts. Both the Wall's and Gill's provided the Cle Elum project with plenty of smiles to meet and greet visitors. Plenty of hard work went into beautifying hatchery grounds with freshly planted flowers and or plants. The work and dedication to the Cle Elum project is not only noticed by hatchery staff but is very much appreciated by all who tour/visit the Cle Elum Supplementation and Research Facility.