



**Cle Elum Supplementation and Research Facility
Annual Report For
Worked Performed from July 1, 2014 thru June 30, 2015.**

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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 2014 brood the facility has collected and spawned 10,500 adult Spring Chinook salmon, taken 15,171,450 eggs, and released 11,465,229 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 1997-2014.

Table 1. CESRF spawning and survivor statistics (Wild/Natural brood only) for brood year's 1997-2014.

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%	712,207
2013	373	15	96.2%	136	178	0.56%	633,899	612,458	3.40%	576,968
2014	384	39	89.8%	133	188	0%	769,852	617,009	5.8%	617, 506 to be released in spring 2016
Mean	501	54	89.6%	133	216	5.14%	764,533	713,838	5.86%	671,263

Table 2. CESRF spawning and survivor statistics (Hatchery brood only) for brood year's 2002-2014

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%	90,684

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2013	194	5	97.2%	38	44	0%	127,425	80,534	3.4%	71,679
2014	86	11	87.2%	15	29	0%	81,169	74,843	1.7%	85,999 to be released in spring of 2016
Mean	150	13	91.78%	29	49	.92%	164,414	93,569	6.13%	88,947

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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, 2014 to June 30, 2015. During this time frame work was focused to maintain and care for the 2013, 2014, and the 2015 broods. Rearing and release of the 13 brood covers much of the work performed under this contract period. The remainder of the report will cover the early rearing/release of the 2013 brood and the start out of the collection of adults for the 2014 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:

2013 Brood – 651,523 smolts released at acclimation sites during the spring of 2015.

2014 Brood–704,233 fry transferred to Cle Elum rearing ponds on March 3-6, 2013. Schedule release date is in spring 2016.

2015 Brood – 513 adults transferred from Roza to Cle Elum from the May to June 30, 2015 time period.

FISH CULTURE:

Normal fish culture practices continued throughout the 2014/2015 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. Below is a list of annual monitoring and evaluation of spring chinook life history conducted at the Cle Elum Supplementation and Research Facility.

- 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.

- o Morphometric comparison between hatchery, supplementation and wild origin fish.

ADULT COLLECTION FOR THE 2014 BROOD

The bulk of the 2014 brood adult fish transfers for the five month transfer period, were trucked to Cle Elum in May and June 2014. 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 2014 Brood transferred from May 1, to September 1, 2014.				
Origin	Males	Females	Jacks	Totals
Wild/Natural	149	197	38	384
Supplementation	34	33	17	84
Hatchery Control	23	32	31	86
Grand Total	206	262	86	554

Table 1. Total adult transfers from Roza to CESRF, for 2014 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 were spawned artificially to compare against wild and hatchery egg development. Thirty females and twenty 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 #13 (BY's 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13 and 14) 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.

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 2014 spawning

season are shown in **Table 2**.

	Natural					Hatchery			
	Males	Females	Jacks	Total		Males	Females	Jacks	Total
Production spawners	116	188	17	321		15	29	6	50
Mortalities	23	7	9	39		4	3	4	11
Not Used	10	2	12	24		4	0	21	25
Total Accounted	149	197	38	384		23	32	31	86

Table 2. Schematic breakdown of natural and hatchery adult usages at CESRF fall 2014.

In addition to wild/natural and hatchery adults collected for the 2014 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 the adult 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 2014 season.

Supplemental adults usage for 2014				
	Males	Females	Jacks	Total
Production spawners	20	30	1	51
Mortalities	4	2	3	9
Not Used	10	1	13	24
Total Accounted	34	33	17	84

The 2014 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 10.7%, with 1.2% from pre-spawning mortality and 9.5% totaling mortality after sorting period began in September.

SUMMARY OF EGG TAKE FOR THE 2014 BROOD

The spawning period for the 2014 brood took place over a five week period with the first egg take occurring on 9/3/14 and the last one on 10/14/14. 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
- Simon Goudy (Yakama Nation, Cle Elum Hatchery) head of incubation
- Simon Goudy and Vernon Bogar III (Yakama Nation) factorial crosses/egg measurements
- Paul Huffman (Yakama Nation) records lengths and photographs adult salmon
- Sharon Lutz (USFW) pathology screening
- Curt Knudsen and Chad Stockton (WDFW) factorial crosses/egg measurements

A combined 247 (188 wild/natural + 29 hatchery + 30 supplemental) females were spawned for the 2014 season. No females tested high for Bacterial Kidney Disease (BKD) for the 2014 spawning population. Total egg take of 879,446 (includes WW 769,852 + 109,594 HH). 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 Jensorter (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
679,374	639,989	5.8%	3,614	81,169	74,843	1.7%	2,799

Table 4. Schematic breakdown of total eggs collected for BY 2014 by origin and % egg loss and estimated fecundity for each. In **table 4**, under the Hatchery Origin, of the total 81,169 eggs taken and 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.

Supplemental females were spawned but fecundity estimations were not calculated as only 600 eggs from each cross of artificial spawn were used for research purposes. The bulk of the research was conducted by Curt Knudson of Onchor Consulting and Chad Stockton,

onsite Washington Department of Fish and Wildlife biologist.

In the fall of 2014, 30 supplemental females were artificial spawned and used by WDFW researchers Chad Stockton and Curt Knudson. The 30 supplemental females were artificially spawned with 20 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 2014 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 February 23 and concluding on February 25, 2015. At the time of ponding the average temperature unit (TU) at ponding was 1774 TU's with an average of 1388 fry/lb. Total pounds transferred to raceways were 502 with an overall average of 27.9 pounds per raceway. The total number of fry ponded was 697,009 with an average of 38,772 fry per raceway.

FINGERLING / JUVENILE REARING FOR BROODYEAR 2013

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 2013 Brood was ponded in CESRF raceways in February of 2014 and transferred to off-site acclimation sites January of 2015. 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).

The 2013 brood was reared under methods which were set to have fish reach the 30 fish per pound size in mid-October 2014. 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 2015 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 2013 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 1 and 2 comprised of at least 12 to 14 wild females, which were transferred to outdoor raceways 14 and 13, respectively. Each pair will then be moved to one of the three

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acclimation sites with Cle Elum ponds 14 and 13 being transferred to Jack Creek ponds 2 and 1.

Marking and tagging for the 2013 brood began October 20, 2014 and was completed by December 5, 2014. 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 13 is found in Table 5.

Brood Year 2013 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	CF 05	WW	Right	Red	Snout	36097	2000	38097	10/20/2014	10/22/2014
CLE02	CF 06	WW	Left	Red	Snout	34541	2000	36541	10/23/2014	10/27/2014
CLE03	ES 05	WW	Right	Green	Snout	33761	2000	35761	10/27/2014	10/30/2014
CLE04	ES 06	WW	Left	Green	Snout	34682	2000	36682	10/30/2014	11/07/2014
CLE05	CF 03	WW	Right	Red	Snout	34495	2000	36495	11/04/2014	11/06/2014
CLE06	CF 04	WW	Left	Red	Snout	32054	2000	34054	11/06/2014	11/12/2014
CLE07	ES 03	WW	Right	Green	Snout	32866	2000	34866	11/13/2014	11/17/2014
CLE08	ES 04	WW	Left	Green	Snout	34418	2000	36418	11/17/2014	11/19/2014
CLE09	CF 01	HH	Right	Red	Post Dorsal	32264	4000	36264	11/19/2014	11/24/2014
CLE10	CF 02	HH	Left	Red	Post Dorsal	31648	4000	35648	11/24/2014	12/01/2014
CLE11	JC 03	WW	Right	Orange	Snout	34948	2000	36948	12/01/2014	12/03/2014
CLE12	JC 04	WW	Left	Orange	Snout	35508	2000	37508	12/03/2014	12/05/2014
CLE13	ES 01	WW	Right	Green	Snout	34013	2000	36013	11/24/2014	12/02/2014
CLE14	ES 02	WW	Left	Green	Snout	34580	2000	36580	11/20/2014	11/24/2014
CLE15	JC 01	WW	Right	Orange	Snout	32151	2000	34151	11/18/2014	11/20/2014
CLE16	JC 02	WW	Left	Orange	Snout	33703	2000	35703	11/13/2014	11/18/2014
CLE17	JC 05	WW	Right	Orange	Snout	35987	2000	37987	11/07/2014	11/13/2014
CLE18	JC 06	WW	Left	Orange	Snout	33807	2000	35807	11/13/2014	11/17/2014
Totals						611523	40000	651523		

Table 5. Summary of 2013 brood year marking activities at the Cle Elum Supplementation and Research Facility.

After juveniles from BY 13 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 first part of January 2015. In January of 2015, Sharon Lutz, USFW pathologist, cleared BY 13 juveniles for fish transfer.

Juveniles from BY 13 were transferred from CESRF to the acclimation sites starting January 12 through the 15, 2015.

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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 13 brood. Screens at all three acclimation sites were removed on March 12, 2015.

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. The 2013 brood fish were all fed Bio Vita feed from starter all the way to the 2.0 mm feed.

On February 18 and 19, 2015 samples of juvenile fish at all three sites were taken by Sharon Lutz (USFW pathologist). USFWS takes a small sample of fish from each site to make sure fish are healthy and ready to release.

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 2015 period. As more pit-tag fish were detected leaving each acclimation site feeding levels were reduced.

FRY / FINGERLING REARING FOR BROODYEAR 2014

Brood Year 2014 was transferred from indoor incubators to outdoor raceways during the week of February 23-27, 2015. Water was thermally regulated in both the iso-buckets and vertically incubators to achieve a February ponding date. Estimated fingerlings transferred to the 18 raceways totaled 697,009 and average size at transfer was 1388 fish per pound. At the end of June 2015, 704,233 fish were estimated to be on-hand with an average of 122 fish per pound. All fish were hand fed Bio-Oregon's Bio Vita dry starter feed.

ADULT HOLDING FOR BROODYEAR 2015

Brood year 2015 marked the 19th year that adults were captured at Roza and held at the Cle Elum Supplementation and Research Facility. Total adult transfer count for end of June 2015 collection for BY 2015 was 513 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, 2014 to June 30, 2015

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 2014 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 2015 to July 2015. 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. Mark Luce, of Laurmar Electric performs annual inspection of breakers, pumps, motors and drives. Mark replaced fan in variable speed #1 drive and also the pneumatic actuator in the airburst valve #1. The drive fan keeps the motor cool and the actuator valve allows the valve to open and close to keep river intake screens clear of debris. A Partlow thermograph records daily temperature for a 24 hour, 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 5,500 to 13,650 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 or two pumps to supply water to spawning channel and Oxbow.

WELL FIELD MAINTENANCE:

Six wells were operational throughout the year and maximum sustainable flows were 3,650 gallons per minute. All wells are used to supply early rearing water to the eighteen production and adult ponds and for egg incubation. Well water was used to temper down the warmer river water flows during the warmer summer months. In August 2014 to 1 and 3 were turned on to cool the adult holding pond down to 55° In addition to tempering adult pond 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 2014 brood in February 2015.

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 #1 recorded the most hours of operation as it was used for egg incubation from September 2014 through early February of 2015.

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 2013 brood. Acclimation site(s) clean up and shut down operations occurred during June 2015. 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.

In October 2014 Mark Luce of Laurmar Electric performed annual maintenance at each of the three acclimation sites. He also provided maintenance during the operation of the sites from January to May 2015 time period. Some the work performed that Laurmar performed at the three acclimation sites included; replacing septic pump and floats at Jack Creek, resetting variable speed parameters at Easton, replaced solenoids in Jack Creek airburst system, and replacing gasket seal in airburst system at Easton. All sites have compressors that operate continuously keeping incline and T-screens free of debris to allow water to flow freely into rearing ponds.

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. Daniel Brownlee, Complex Foreman, was responsible for this task and submits a quarterly report to Department of Ecology for

acclimation site and Cle Elum operations.

Prior to removing screens for volitional release of BY 2013 Sharon Lutz, USFWS pathologist sampled smolts from each raceway at the three acclimation sites. Sharon sampled fish to develop a fish health profile and to ensure juveniles were clear to release. The pre release samples were conducted February 18 and 19th, 2015.

Screens were pulled at all three sites on March 12, 2015. Fish at all three acclimation sites were given optimal allowable feed diets. As water temperature warmed in the early spring a higher percent body weight was fed to all juveniles at each of the three acclimation sites. By May 15, 2014 all fish were forced out of the acclimation sites to prepare for cleanup and shut down of the sites.

All of the 2013 brood was pushed out of the sites on May 5, 2015. They were pulse releases from nearby reservoirs to assist in downstream migration. The winter had a record low snow pack and the releases assisted in the missing natural freshets. At the time of the final push out there was 12% of the total population remaining for the 2013 brood at the time of the final force out.

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

EASTON

Smolts for the 2013 brood were pushed on at the end of May 5, 2013. Easton clean up and shut down was completed by June 30, 2015. 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 September 2014 NC Machinery performed maintenance on the facility backup generator. AMB tools serviced the facility airburst system and compressor in November of 2014.

Fish transfer for Brood Year 2013 took place on January 12 and 13 with 215,264 juveniles transferred to Easton. All ponds were fed Bio Vita Fry during the acclimation period. Final force out of the brood year 2013 was on May 5, 2015 and 93% of the juveniles had migrated from the site.

CLARK FLAT

The Clark Flat site had the compressors serviced by AMB Tools Septembwer2013. NC Machinery performed annual maintenance of facility generator in November 2014 as well.

All fish were fed Bio Vita Fry during acclimation period. At the time of the final force out on May 5, 2015 there were 23% of original 216,300 juveniles remaining at Clark Flat. The site was cleaned and shut down on June 30, 2015.

JACK CREEK

Like the other two acclimation sites Laurmar Electric performs preventative maintenance checks and is called in during the season as needed. During this 2014/15 acclimation site period Laurmar Electric replaced the facility septic pump and floats, worked on exhaust system in generator room, worked with Obermeyer Tech on the facility's weir system, and assisted with Day Wireless and TSI to make sure communication system was working correctly. The Obermeyer system was installed in 1999 and this was the first year that we had the original installer perform maintenance on the system. With the support of onsite operator and Cle Elum staff, Laurmar Electric the system was deemed in great shape.

Juveniles from the 2013 brood were fed Bio Vita Fry during the entire acclimation period. Fish for the 2013 brood were transferred to the site on January 15, 2015. Estimated release numbers for the 2013 brood were a total of 217,083 juveniles were transferred from Cle Elum to Jack Creek. Juveniles from the BY 13 were forced out of the raceways on May 5, 2015. At the time of the force out of juveniles there was an estimated 5% fish remaining in the rearing ponds. The site was cleaned and shut down on June 2015.

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.

Day Wireless of Yakima inspected and tested all two-way radios (vehicle and hand-held) during October of each year. The Ford Ranger had the rear brakes worked on, the Chevrolet 3500 had a 5th wheel and snow harness installed and the F-350 was taken into dealership to have the EGR valve replaced.

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.



The Yakima Klickitat Fisheries Project received the new adult transfer truck and put it to use transferring adults from the 2015 brood. The truck has two tanks and a hydraulic bed that make fish release easy.

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.

September 2014 resident 391 had carpets, linoleum, blinds, and interior painted prior to new occupant Markeyta Pinkham moving in. Resident 901 had mold professionally removed and in the attic space. The vents were also opened to allow more air flow to prevent future mold issues. Other maintenance items were replacing the water heater in 1001, garage doors adjusted and or repaired in 1131, 411, and 391.

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 2015 after seven months of use. 697,009 fry from Brood Year 2014 were transferred from incubation to outdoor rearing ponds on February 23-25, 2015.

The final repairs to incubation ceiling were completed at the end of August 2014. Repairs were necessary as a domestic water line break in ceiling in the winter of 2013. Repairs were completed and domestic water lines were heat traced for freeze protection.

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.

Once the site was cleared for fish and all maintenance items were performed fish were transferred to the site on January 13, 2015. A total of 216,300 juveniles were transferred to the Clark Flat site. After pre-release samples were conducted in February and fish were cleared for release the screens were pulled on March 12, 2015 to allow for volitional release of juveniles.

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. AMB Tools provided service to shop compressors in October 2014.

The maintenance building has three large roll up doors that are inspected annually. Roll up door #1 had the motor replaced by Laurmar Electric in October 2014. Two major repairs were started and will be completed by the next year's budget period. The first was planned and necessary. The two condensers to the chiller unit were replaced. The two older ones were part of the original install in 1999 and began to fail. The sump that recycles cooled chilled water through the chiller process was pulled and rebuilt. Luckily the system has two and we operated on one until the other was repaired. Standard operations for the sumps are to operate one for a week's time and then change to the other for a week. This is carried on from August to March of each year.



Two photos above, one showing removal of old condenser and the other on the right show the two replacment condensers that will be plumbed and ready for the 2015 egg incubation period.



Raincountry Refrigeration removing one of the two recycling sump pumps. The pump was removed in January 2015 and a rebuilt one will be installed after the June 30, 2015 time period. Future work will include the replacement of both pumps as they have accumulated over 95,000 hours of operation.

SAFETY AND TRAINING:

Each crew member at the Cle Elum facility received at least one training opportunity in the past year. Opportunities ranged participating in Cold Water Disease training, to attending conferences or seminars in; Construction Contracting, Future of Our Salmon, Supervisory training and recognizing alcohol and drug abuse in the work place and OSHA compliance training, cross training at various Prosser, Klickitat, and Wells Hatcheries, 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. In August 2014 Vernon Bogar III and DJ Brownlee received cross training at the Klickitat Hatchery working with their sorting and spawning process.

In June 2015 Simon Goudy and DJ Brownlee received adult truck driving opportunities with assisting the Lower O&M in removal of fall chinook from Chandler Canal and transferring Sockeye from Priest Rapids to Lake Cle Elum

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. Two safety meetings were held and topics covered being prepared for summer conditions and wearing proper safety attire when operation power equipment. In November 2014 Indian Health Service from the Toppenish office traveled to Cle Elum to administer flu shots for Cle Elum and marking/tagging staff.

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 2014 and 2015 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 J-box, that supplies electrical feed to signal lights, was replaced. Heavy use by gravel trucks finally took its toll and the box was removed and replaced by Knobel Electric.

Kathy Sample of VMACS LLC applied spring and fall weed applications to the main facility and the Easton and Clark Flat acclimation sites. First application was applied in July 2014 and her second application was administered in October 2014.

MISCELLANEOUS:

On February 2015 the spawning channel was set up and filled with Yakima and Naches Steelhead. The study was sponsored by CRITFIC, WDFW, and YKFP. The study was designed to test the reproductive success of Steelhead kelts and compare them to Naches Steelhead. The results of the study are ongoing and this was the first time the spawning channel was used for Steelhead.

MEETINGS AND TOURS:

Weekly meetings were conducted at the hatchery for personnel and strategic work planning. Cle Elum staffers Simon Goudy and Vernon Bogar III attended the Northwest Fish Culture held in Pendleton, Oregon. DJ Brownlee and Charles Strom attended the Project Annual Review held at Central Washington University in June 2015. In January 2015 DJ Brownlee and Charles Strom attended the Hatchery vs. Wild Symposium held in Portland, Oregon. The meeting was held in January 2015.

Numerous tours and visitations were fielded during the year. Schools who toured the facility included: Roslyn preschoolers (30 students) Cle Elum third grade classes (50 students), Ellensburg High School Environmental class (30 students), and one university tour with 50 ESL (English as a second language) students toured the main facility and Clark Flat acclimation site.

Cle Elum is a central location to host meetings for west side folks or those in the Yakima and surrounding area. Numerous meetings with the Yakama Nation reps and Washington State agencies were held in the conference room of the Monitoring and Evaluation building. The pre and post spawning meetings were held at the Cle Elum facility in August 2014 and Bill Bosch met monthly to update data and transfer project information to YKFP website. In January 2015 a one day internal Project Annual Review meeting was held at the M&E

office building.

Other tours that visited the project were the Bob Ferguson Attorney General of Washington Fish & Wildlife Parks Division. They toured the facility in August 20, 2014 and were impressed of the operation of the facility. Senior Assistant Attorney General Joseph Shorin followed up with a thank you letter and were thoroughly impressed by complexity of operation and professionalism of the hatchery staff. In August Heritage University made several visits to the facility and brought candidates vying to head the new Science Department for the University. Again all candidates were impressed with the facility and were eager to join in on the research efforts of the Cle Elum Facility.

PERSONNEL:

The Cle Elum Facility employs eight full time and three seasonal employees. Permanent staff include Hatchery Manager Charles Strom, Complex Foreman DJ Brownlee, Fish Culturists; Simon Goudy, Quinn James, Michael Whitefoot (left Cle Elum in August 28, 2014). Markeyta Pinkham replaced Michael Whitefoot in November 2014 and was hired on as Fish Culturist II. Office Coordinator Patricia Bogar left the Cle Elum project in January 2015. In Patricia's absence YKFP bookkeeper Ida Ike was assigned to the Cle Elum budget.

The seasonal employees were employed for a seven-month period and stationed at the acclimation sites. Season Fish Culturist Jackson James left the program in March 2015. Seasonal and full time employees were administered quarterly evaluations throughout the year. Quarterly evaluations for Fish Culturists were issued by DJ Brownlee.

Stuart Walls was the Hatchery Host from May 2014 to September 30, 2014. This was Stuart's fourth tour as the host of the Cle Elum Supplementation and Research Facility. 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.