

# Cle Elum Supplementation and Research Facility Annual Report For Worked Performed from July 1, 2016 thru June 30, 2017.

Project 1997-013-25 Contract #56662 release # 110

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## **Executive Summary**

The Cle Elum Supplementation and Research Facility (CESRF) has been in operation since 1997. Since the collection of the first brood in 1997 up to the 2016 brood the facility has collected and spawned 11,665 adult Spring Chinook salmon, taken 17,282,354 eggs, and released 14,525,714 smolts. Totals for adult and eggs collected is for Wild and Hatchery origin only. No Supplemental lines were added as they are not released and only used for research purposes.

Table 1. CESRF spawning and survivor statistics	(Wild/Natural brood only) for brood year's 1997-
2016.	

Brood	Total	Total	Pre-Spawn	No. F	ish Spawned	% BKD	Total Egg	Live	% Egg	Smolts
Year	Collected	Morts.	Survival	Males	Females	Loss	Take	Eggs	Loss	Released
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	96.20%	136	178	0.56%	633,899	612,458	3.40%	576,266
2014	384	39	89.80	133	188	0%	769,852	617,009	5.8%	617,506
2015	436	116	73.8%	128	182	0.55%	654,361	615,189	6.0%	595,062
2016	394	57	85.9%	142	173	0.0%	601,908	577,371	4.07%	Released in spring 2018
Mean	480	55	89.00%	133	212	4.66%	750,893	726,226	5.77%	667,216

Table 2. CESRF spawning and survivor statistics (Hatchery brood only) for brood year's 2002-2016.

Brood	ood Total Total Pre-Spawn		<u>No.</u> F	ish Spawned	% BKD	Total Egg	Live	% Egg	Smolte	
Year	Collected	Morts.	Survival	Males	Females	Loss	Take	Eggs	Loss	Released
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

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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
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
2015	61	23	61.7%	15	22	9.09%	66	64,646	2.4%	60,211
2016	114	25	98.2%	33	35	0.0%	132,119	74,947	3.1%	To be released in spring 2018
Mean	137	14	89.89%	27	45	1.34%	146,555	89,151	5.38%	85,450

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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, 2016 to June 30, 2017. During this time frame work was focused to maintain and care for the 2015, 2016, and the 2017 broods. Rearing and release of the 15 brood covers much of the worked performed under this contract period. The remainder of the report will cover the early rearing of the 2016 brood and the start out of the collection of adults for the 2017 brood.

The maintenance and upkeep of the CSERF 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:

2015 Brood – 655,223 smolts released at acclimation sites during the spring of 2017.

2016 Brood – 613 adults transferred from Roza to Cle Elum from May to September 30, 2016 time period.

2017 Brood – 489 adults transferred to Cle Elum at end of June 30, 2017 period.

## FISH CULTURE:

Normal fish culture practices continued throughout the 2016/2017 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 Hatchery:

- Reproductive success comparisons between hatchery and wild spring Chinook in observations stream (spawning channel).
- o 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 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.
- o Juvenile behavior work that monitors dominance and predator avoidance activity.

• Morphometric comparison between hatchery, supplementation and wild origin fish.

## ADULT COLLECTION FOR THE 2016 BROOD

The bulk of the 2016 brood adult fish transfers for the five month transfer period, were trucked to Cle Elum in May and June 2016. 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 2016 Brood transferred from May 1, to September 1, 2016.											
Origin	Males	Females	Jacks	Totals							
Wild/Natural	151	225	18	394							
Supplementation	39	52	14	105							
Hatchery Control	41	42	31	14							
Grand Total	231	319	63	613							

 Table 1. Total adult transfers from Roza to CESRF, for 2016 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 38 were spawned artificially to compare against wild and hatchery egg development. Thirty-eight females and thirty-one 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 #16 (BY's 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15 and 16) 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 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 2016 spawning season are shown

in Table 2.

		Natura	al		Hatchery				
	Males	Females	Jacks	Total		Males	Females	Jacks	Total
Production spawners	129	173	13	315		25	35	8	68
Mortalities	9	47	1	57		12	6	7	25
Not Used	3	0	1	4		4	1	16	21
Released to River	10	5	3	18		0	0	0	1
Total Accounted	151	225	18	394		41	42	31	114

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

 2016.

In addition to wild/natural and hatchery adults collected for the 2016 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 and released at CESRF and associated acclimation sites. 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. Located in **Table 3** is a breakdown of supplemented adults used of the 2016 season.

Supplemental adults usage for 2016												
	Males	Females	Jacks	Total								
Production spawners	26	37	2	65								
Mortalities	5	14	1	20								
Not Used	8	0	11	19								
Released to River	Not closed     0     1     0     1       Released to River     0     1     0     1											
Total Accounted	39	52	14	105								

The 2016 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 16.5%, with 6.0% from pre-spawning mortality and 10.5% totaling mortality after sorting period began in September.

#### SUMMARY OF EGG TAKE FOR THE 2016 BROOD

The spawning period for the 2016 brood took place over a five week period with the first egg take occurring on 9/7/16 and the last one on 10/04/16. 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:

- o Bill Bosch (Yakama Nation) YKFP Data Manager
- o Simon Goudy (Yakama Nation, Cle Elum Hatchery) head of incubation
- Simon Goudy/ Markeyta Pinkham/Quinn James/ (Yakama Nation) factorial crosses/egg measurements
- o Paul Huffman (Yakama Nation) records lengths and photographs adult salmon
- o Sharon Lutz (USFW) pathology screening
- o Curt Knudsen (Onchor Consulting) and Chad Stockton (WDFW) factorial crosses/egg measurements

A combined 245 (173 wild/natural + 35 hatchery + 37 supplemental) females were spawned for the 2016 season. Total estimated egg take of 863,298 (includes WW 731,179 + 132,119 HH). The total estimated egg take is the first estimation of total egg take using the volumetric method during the spawning period. The next method of estimated egg take is by running the eggs through the egg counter once they entered 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.

 Table 4.
 Schematic breakdown of total eggs collected for BY 2016 by origin and % egg

 loss and estimated fecundity for each.

	Wild			Hatchery						
Total eggs	Eyed eggs	% Egg Loss	Est. Fecundity	Total eggs	Eyed eggs	% Egg Loss	Est. Fecundity			
642,882	605,984	5.7%	4,226	129,355	78,739	5.3%	3,804			

In **table 4**, under the Hatchery Origin, of the total 129,355 eggs all were used to fill the two designated hatchery by hatchery (HxH) raceways. For brood year 2016, 35 adult females were spawned of the hatchery by hatchery origin. In this report reference to

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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 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.

During the incubation period, eggs for the 2016 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 five day period starting on March 3rd and concluding on March 9, 2016. At the time of ponding the average temperature unit (TU) at ponding was 1773 TU's with an average of 1427 fry/lb. Total pounds transferred to raceways were 457 with an overall average of 25.5 pounds per raceway. The total number of fry ponded was 652,318 with an average of 36,239 fry per raceway.

## FINGERLING / JUVENILE REARING FOR BROODYEAR 2015

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 late February. Juveniles remain in the raceways until January of the following year. For example, the 2015 Brood was ponded in CESRF raceways in February 22-25, 2016 and transferred to off-site acclimation sites January of 2017. 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 2015 brood was reared under methods which were set to have fish reach the 30 fish per pound size in mid-October 2016. Fish were hand fed Bio-Vita Starter until they reached the 300 fish per pound size and then the even numbered ponds were fed Bio-Vita Fry and the odd numbered ponds were fed a Bio Pro II 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 2016 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 2015 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 18 and 17, respectively. Each pair will then be moved to one of the three acclimation sites with ponds 18 and 17 being transferred to Clark Flat ponds 6 and 5 respectively.

Marking and tagging for the 2015 brood began October 17, 2016 and was completed by December 01, 2016. 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 15 is found in Table 5.

Table 5.Summary of 2015 brood year marking activities at the Cle ElumSupplementation and Research Facility.

	Brood Year 2015 Marking and Tagging											
					CWT							
CLE	ACC.		Elastomer		Body		PIT					
RW ID	Site ID	Comment	Eye	Color	site	СМТ	Tags	Total	Start Date	End Date		
CLE01	ESJ01	WW	Right	Green	Snout	32798	2000	34798	10/17/2016	10/20/2016		
CLE02	ESJ02	WW	Left	Green	Snout	32700	2000	34700	10/20/2016	10/25/2016		
CLE03	JCJ03	ww	Right	Orange	Snout	38469	2000	40469	10/25/2016	10/27/2016		
CLE04	JCJ04	WW	Left	Orange	Snout	34615	2000	36615	10/27/2016	10/31/2016		
CLE05	CFJ05	WW	Right	Red	Snout	33149	2000	35149	10/31/2016	11/02/2016		
CLE06	CFJ06	WW	Left	Red	Snout	32516	2000	34516	11/02/2016	11/04/2016		
					Post							
CLE07	CFJ01	HH	Right	Red	Dorsal	28055	4000	32055	11/07/2016	11/08/2016		
					Post							
CLE08	CFJ02	HH	Left	Red	Dorsal	24464	4000	28464	11/09/2016	11/14/2016		
CLE09	JCJ01	WW	Right	Orange	Snout	38098	2000	40098	11/14/2016	11/16/2016		
CLE10	JCJ02	ww	Left	Orange	Snout	35807	2000	37807	11/16/2016	11/20/2016		
CLE11	ESJ03	WW	Right	Green	Snout	33136	2000	35136	11/20/2016	11/28/2016		
CLE12	ESJ04	WW	Left	Green	Snout	34248	2000	36248	11/28/2016	11/30/2016		
CLE13	ESJ05	WW	Right	Green	Snout	37837	2000	39837	11/30/2016	12/01/2016		
CLE14	ESJ06	WW	Left	Green	Snout	36564	2000	38564	11/21/2016	11/29/2016		
CLE15	JCJ05	WW	Right	Orange	Snout	34354	2000	36354	11/15/2016	11/21/2016		
CLE16	JCJ06	WW	Left	Orange	Snout	36156	2000	38156	11/08/2016	11/14/2016		
CLE17	CFJ03	WW	Right	Red	Snout	36915	2000	38915	11/02/2016	11/08/2016		
CLE18	CFJ04	WW	Left	Red	Snout	38105	2000	40105	10/27/2016	11/02/2016		
					Totals	617986	40000	657986				

After juveniles from BY 15 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 18 and 19<sup>th</sup> of 2016. They sampled 200 fish from each raceway at Cle Elum to make sure tags were

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visible and detectable. In January of 2017 Sharon Lutz, USFW pathologist, cleared BY 15 juveniles for fish transfer.

Juveniles from BY 15 were transferred from CESRF to Easton and Clark Flat acclimation site on January 17-24 2017. The Jack Creek fish were transferred on February 8 and 13, 2017. With fish transfers completed to all three acclimation sites, the juveniles were allowed to imprint for a minimum of three months prior to pulling screens in mid-March to start the volitional release of the 15 brood. Screens at three acclimation sites were removed on March 14, 2017.

Raceways at all acclimation sites included five 8' 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 BioVita Fry and the other half of the fish were fed BioPro II feed. BioPro II is specialty feed, health promoting diet formulated for salmon and trout. The diet is designed to be fed during stressful events, adverse environmental conditions, or periods of known disease risk. The BioVita feed is the top product in fry feed. BioVita Fry is a premium fish feed with high levels of fish meal and fish oil. It contains an enhanced vitamin pack and pigment to promote healthy fish and natural coloration. Both the BioPro and BioVita are a Bio-Oregon product.

Of the six total raceways at each of the three acclimation sites all odd numbered raceways were given the BioPro II feed diet and the even numbered raceways were fed BioVita. 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 2015 brood.

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 2017 period. As more pit-tag fish were detected leaving each acclimation site feeding levels were reduced.

#### FRY / FINGERLING REARING FOR BROODYEAR 2016

Brood Year 2016 was transferred from indoor incubators to outdoor raceways during the week of March 3-9 25-27, 2017. Water was thermally regulated in both the iso-buckets and vertically incubators to achieve a March ponding date. Estimated fry transferred to the 18 raceways totaled 652,318 and average size at transfer was 1427 fish per pound. At the end of June 30, 2017 there were 661,447 fish on hand an average of 101 fish per pound.

#### ADULT HOLDING FOR BROODYEAR 2017

Brood year 2017 marked the 21<sup>th</sup> year that adults were captured at Roza and held at the Cle Elum Supplementation and Research Facility. Total adult transfer count up to June 30, 2017 collection for BY 2017 was 548 adults that were transferred to the facility. The

remainder of the adult holding period will 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, 2016 to June 30, 2017.

#### 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. Four wells were used for early rearing of the 2016 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.

#### **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 all four pneumatic actuator valves that control river pump airburst backwash system in February 2017.

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 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. The main wells throughout the year were wells 1 and 2. All wells were fired up when the ponding the fry in outdoor raceways. Wells 1 through 6 turned on in early March 2017 and operated until May 16, 2017. Earlier in January 3 through 18, 2017 all wells were fired up to replace river water that was turned off as the result of frozen intake

screens.

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. Bi-monthly well depths and flows are recorded and forwarded to DOE for review.

Maintenance on the wells consisted of replacing a contactor on well #4 and digging up and replacing drain valve for well #5. Well #5 also had wiring looked at by Laurmar Electric as it was responsible for sounding several erroneous low level alarms.

## **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 2015 brood. Acclimation site(s) clean up and shut down operations occurred during June 2017. 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.

In October 2016 Day Wireless Systems began work on upgrade of communication and video surveillance for the Cle Elum project. The upgrade was necessary to speed data transmission from acclimation sites back to the main facility and to provide security. The major upgrade was completed in January 2017. 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 the off season all acclimation sites had the feeder lines replaced as the sun and 10 years worth of use warranted replacement. In the fall of 2016 Central Seal Coat applied seal coat to asphalt at all three acclimation sites. The interiors to the living quarters at the sites were painted and the crew replaced wooden stair case with aluminum stair fabricated ones. Contech Services, Inc repaired raceways at all three acclimation sites. The major repairs



were at the Jack Creek Acclimation site.

Andrew Lewis, Fish Culturist III, replaced stairs with the aluminum ones that he fabricated. A safer and stronger stair case is appreciated by on site personnel.



Contech Services, Inc was contracted to repair raceways at the acclimation sites. The above three photos are from Jack Creek.



Contech performed repairs on corners and pond bottoms. They also sealed stainless steel guides for walkways. The above photos were taken from the Clark Flat acclimation site.

In July 2016 Mark Luce of Laurmar Electric performed annual maintenance at each of the three acclimation sites. He also provided maintenance during the operation of the site from January to June 30, 2017 time period. Mark Luce is well versed in commercial/industrial electrical needs, motor pumps and has the ability to respond during critical periods. He is located in Ellensburg and is in close proximity when a quick response is needed. AMB tools also inspect facility compressors annually at each site. All sites have compressors that operate continuously keeping incline and T-screens free of debris when and water flowing 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 2015 Sharon Lutz, USFW 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.

Screens were pulled at all three sites on March 15, 2017. 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, 2017 all fish were forced out of the acclimation sites to prepare for cleanup and shut down of the sites. Only 8% of the total population was remaining for the 2015 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**

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 2015 brood were pushed on at the

end of May 15, 2017. Easton clean up and shut down was completed by June 21, 2017.

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 2016 NC Machinery performed maintenance on the facility backup generator. AMB tools serviced the facility airburst system and compressor in October of 2016.

Fish transfer for Brood Year 2015 took place on January 17, 2017 with 218,451 juveniles transferred to Easton. Odd number ponds at the Easton site were fed Bio-Pro II 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 2015 was on May 15, 2017 and 85% of the juveniles had migrated from the site via volitional mode.

#### CLARK FLAT

The Clark Flat site had the compressors serviced by AMB Tools October 2016. NC Machinery performed annual maintenance of facility generator in September 2016 as well.

Once the site was cleared for fish and all maintenance items were performed fish were transferred to the site on January 24, 2017. A total of 208,500 juveniles were transferred to the Clark Flat site. After pre-release samples were conducted in early March by, screens were removed on March 14, 2017 to allow fish to leave volitionally.

Odd numbered ponds were fed Bio-Pro II diet 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 15, 2017 there were only 2% of original 208,500 juveniles remaining at Clark Flat. The site was cleaned and shut down on June 26, 2017.

#### JACK CREEK

Like the other two acclimation sites Laurmar Electric performs preventative maintenance checks and is called in during the season as needed. AMB Tools inspects and performs maintenance on compressor and is also called in the event of an emergency. DayWireless made several trips to check data and phone line communication for the Jack Creek site. TSI was also needed to check data transfer on their equipment as well. Ford Excavation cleared the intake road and the main compound of snow. This season the Jack Creek site experienced challenges with heavy snow but also generator issues that made it very difficult to operate site. The generators failed to transfer or start as designed several times during the 2017 season. NC Machinery services the generators and changed carburetors, solenoids, and vapor chambers but the hard start continued. It was thought to be a fuel delivery problem so two separate tanks was brought in February 2017 and individually connected to each generator and this still did not correct the problem. We were able to make it to the end of the season and shut generator #1 off as the result of rough starts. NC Power was contacted and was scheduled to evaluate generators after June 30, 2017. Not only were generators a concern but in April 2017 only two of the four airburst screens were functioning. We expect we have broken airburst lines and will have to look at end of the rearing season.

Juveniles from the 2015 brood in the odd numbered ponds were fed Bio-Pro II and the even numbered ponds were fed the Bio-Vita Fry diet while at the Jack Creek Acclimation site. Fish for the 2015 brood were transferred to the site on February 8 through the 13, 2017. Estimated release numbers for the 2015 brood were a total of 228,604 juveniles were transferred from Cle Elum to Jack Creek. Juveniles from the BY 15 were forced out of the raceways on May 15, 2017. At the time of the force out of juveniles there was an estimated 7% fish remaining in the rearing ponds. The site was cleaned and shut down on May 26, 2017.

## **VEHICLE MAINTENANCE:**

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.

Other motor and non-gasoline motor vehicles maintained throughout the year include; two club-carts, four snow mobiles, two riding lawn mowers, one 5500 John Deere tractor, 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 2007 Chevrolet was traded in for a Dodge 2500 4x4. The 5500 John Deere tractor had the clutch replaced and the two rams replaced on the bucket portion of the lift system.

## **RESIDENTIAL MAINTENANCE:**

There are a total of seven resident houses located 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. In October 2016 resident 411 was vacated and carpets and linoleum were replaced prior to new occupant Jim Ike moving in. Also in resident 411 the indoor heating unit was removed and replaced with and outdoor heating unit which is much quieter and more efficient. The original units were installed in 2002 when four modular homes were installed on facility grounds. Originally the units were sold as super good cents but over time replacement parts for units are difficult to locate. Duct worked for 411 were professionally cleaned prior to startup of new furnace and heat pump. Resident #391 also had the indoor hvac unit removed and an outdoor unit installed. Work was completed in May 2017 to this resident.

## 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 mid- 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 outdoor rearing ponds. Troughs, isobuckets and incubators are cleaned after eggs and fry are removed. The chiller was shut down at the end of March 2017 after seven months of use. An estimated total of 675,919 fry from Brood Year 2016 were transferred from incubation to outdoor rearing ponds on March 6-9, 2017.

The old Royce dissolved oxygen and temperature meters were removed and replaced with Hach meters and probes. Mark Luce of Laurmar Electric coordinated with Hach representative Alvin Smith to complete the upgrade of meters. The new Hach meters replaced the Royce ones on all troughs and vertical incubators located in the hatch house.



Original Royce meters on left were replaced with new Hach meters (photo on right) and probes in August of 2016.

On January 8, 2107 a domestic water line break in the ceiling of the hatchery building caused considerable damage to ceiling. The break was discovered early in the morning and water was isolated from the hatchery building. Clean Image of Ellensburg with assistance from hatchery staff removed installation from attic and fans and heaters were placed to dry attic out. Laurmar Electric repaired broken line and placed thermally controlled heat tape along with isolation valves were installed on line. This is the third break in hatchery water line and measures to repair and relocate water line are in the works. Repairs to the damage ceiling will take place in summer of 2017.

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 and Brian Saluskin, Yakama Nation Biologist, uses this as their main office. The Monitoring and Evaluation Building is used to lodge field crews from Yakama Nation, WDFW, NOAA, and Bonneville Power summer interns.

## 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 an 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 2016.

Simon Goudy and Andrew Lewis spent time in the shop preparing our two snowplows for winter use. The newer Blizzard plow had all hydraulic hoses replaced and fluid drained and replaced. Three cutting edge blades and deflector were also order for the Blizzard snowplow. On the older Fisher snow plow two cylinders were removed and sent in of repairs.



## SAFETY AND TRAINING:

Each crew member at the Cle Elum facility received at least one training opportunity in the past year. Training opportunities ranged from participating in Genetics Workshop, to attending conferences or seminars in; Hands on courses in Electrical and Plumbing repairs, Gas and Electrical powered small engines servicing and repairs, and Beginners Excel computer courses. Personnel also attended conferences such as: Future of Our Salmon, Northwest Fish Culture Conference, Science Review at Central Washington University, and Internal Project Review. Cle Elum Staff had the opportunity to cross train at various hatcheries such as Prosser, Leavenworth, and Wells Hatcheries. The entire staff also attended one day feeding nutrition course sponsored by USFWS and held in Leavenworth.

The Cle Elum Supplementation and Research Facility have three staff members who possess a license with CDL endorsements. Staff members Quinn James, Daniel Brownlee and Simon Goudy were responsible for safely transporting fish to acclimation sites. They also were able to assist in transporting sockeye adult salmon from Priest Rapids facility 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. Three 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. In November 2016 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 2016 and 2017 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.

In December 2016 Day Wireless Systems finished the upgrade of radio communications and video surveillance of the main facility and acclimation sites. The upgrade was necessary as the original communication was installed in 1999 and bandwidth was not capable of transmitting data back and forth from acclimation site to main facility fast enough. The new system will allow monitoring of acclimation sites via camera throughout the season and even during the offseason. It adds security and safety to all who work at the main site and acclimation sites.

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 2016 and her second application was administered in October 2016.

#### **MEETINGS AND TOURS:**

Weekly meetings were conducted at the hatchery for personnel and strategic work planning. Cle Elum staff member Quinn James attended the Northwest Fish Culture held in Olympia, Washington. DJ Brownlee and Charles Strom attended the Project Annual Review held at Central Washington University in June 2017. Five members of the Cle Elum staff participated in the Lower O&M free fish derby held at Marion Drain. Staff members assisted young fishers with catch, cleaned fish, and cooked lunch for derby participants.

Doug McMains, media producer for Smithsonian Institute National Museum of American Indian, filmed the Cle Elum Facility in August 2016. Wahoo films traveled to the facility in November 2016 to cover the marking and tagging procedure and interviewed YKFP staffers Mel Sampson and Dr. Dave Fast. This story was geared around a salmon recovery project and they heard of the Cle Elum Facility and wanted to feature it in their story. The local Roslyn television station also came to the site in September 2016 and filmed our spawning procedure and shared with the local viewers.

Numerous tours and visitations were fielded during the year. Schools who toured the the facility included: Roslyn pre-schoolers (30 students) Cle Elum third grade classes (50 students), Roslyn Christian School; and the Ellensburg High School Environmental class (30 students).

The largest tour for the year was two buses filled with members from the Yakima Integrated workshop. The Cle Elum staff treated them well with a salmon luncheon. In

March 2017 the CRITFC regional meeting attendees took a break from their meeting and toured the main facility and Clark Flat acclimation site.

The Cle Elum Project held its annual open house on July 15, 2016 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 350 people attended the annual event.

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 and October of 2016. Bill Bosch met monthly to update data and transfer project information to YKFP website. In January 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 includes Hatchery Manager Charles Strom, Complex Foreman DJ Brownlee, Fish Culturists; Simon Goudy, Quinn James, Markeyta Pinkham, Vernon Bogar III, Andrew Lewis and Jim Ike who joined the Cle Elum team in April 2017. Vernon Bogar III resigned from his position in January 2017 and Jim Ike took his place. Ted Martin left his acclimation site to accept another position. So we had two vacant acclimation site positions to fill with Jim Ike moving into a full time slot and Ted Martin leaving we had to fill their vacant slots. Truman Becenti and Ilene Goudy were selected as our two acclimation seasonal fish culturists. Truman started March 30, 2017 and Ilene started April 27, 2017. 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.

Kimberly Stewart worked for an eight week period from late June 2016 to July 29, 2016. She was a summer intern from the Bonneville Power Administration. During her internship she worked with Paul James of CWU, Ralph Lampman YN lamprey biologist, and assisted in the transfer of adult sockeye from Priest Rapids Hatchery to Lake Cle Elum. Kimberly also was introduced to the Cle Elum Supplementation and Research facility operations. Our second intern for the twelve month contract period started June 12, 2017 and was with the Cle Elum project for an eight week period. Her work summary will be included in next year's annual report. Summer Youth worker Kenny Brownlee was hired on for a four week period from August 1 through August 29, 2016. Unfortunately no hosts were available for the May through June 2017 time period.

Hatchery host Stuart Wall filled his duty and spent the months of June, July and August 2016 at the Cle Elum Facility. Stuart was a three time host and was a welcomed addition to our project. We had penciled in the former host's Bruce and Pam Griffon but plans changed and they were not able to host for our project.



Another year for the Cle Elum Supplementation and Research Facility and thanks to those that have been part of our project for many years. From left to right are YKFP Manager Melvin Sampson; Dr. Dave Fast Senior Research Scientist YKFP and John Easterbrook, WDFW.