

# Kilbella/Chuckwalla Chinook Salmon Stock Recovery Enhancement, 2019-2020 Final Report



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**Kilbella/Chuckwalla Chinook Salmon  
Stock Recovery Enhancement, 2019-2020  
Final Report for NF-2019-E-6**

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## INTRODUCTION

This project continues to be one of the top priorities for work on Chinook and other salmon species in Rivers Inlet as identified by a Rivers Inlet Salmon Steering Committee (RISSC) comprised of representatives from the Wuikinuxv First Nation, local lodge owners, Fisheries and Oceans Canada, Pacific Salmon Foundation and independent scientists. The committee developed an action plan that included recovery enhancement of the Kilbella and Chuckwalla chinook salmon and this work has been taken on by the Pacific Salmon Foundation and local lodges through a partnership with the Wuikinuxv First Nation at Percy Walkus Hatchery. The Kilbella and Chuckwalla chinook are significant in that they contribute to the world famous recreational fishery in Rivers Inlet and are intercepted in commercial and recreational fisheries along the migration route.

The Kilbella and Chuckwalla chinook populations had experienced significant declines in escapement since a small scale enhancement program ended in 2001. Monitoring to 2010 indicated returns were just 5-10% of target levels at 150 for the Kilbella and 75 for the Chuckwalla. Surveys in 2013 indicated that returns were equally as poor. In 2014, the first year of the current recovery enhancement project, DFO aerial survey estimates were 200-300 for the Kilbella and 100 for the Chuckwalla. Crews consisting of Snootli Hatchery staff, SEP Community Advisor, Wuikinuxv Fisheries technicians and the hatchery manager were only able to capture 29 Kilbella and 15 Chuckwalla chinook (new individuals), covering extensive portions of the rivers over a ten day period. CPUE (catch per unit effort) was 0.67 in the Kilbella and 0.38 in the Chuckwalla. In the years 2015 to 2017, catches and number of eggs taken increased even though overall escapements continued to be poor (Table 1). Crews simply became more familiar with the rivers and spent more time working the most productive sections/sites.

TABLE 1: SUMMARY OF NEW FISH CAUGHT, EFFORT AND CPUE BY BROOD YEAR AND RIVER

Return Year	KILBELLA					CHUCKWALLA				
	CATCH OF NEW FISH			EFFORT	CPUE	CATCH OF NEW FISH			EFFORT	CPUE
	Female	Male	Total	#Sets		Female	Male	Total	#Sets	
2014	17	12	29	43	0.67	5	10	15	39	0.38
2015	10	23	33	38	0.87	15	13	28	43	0.65
2016	11	21	32	76	0.42	17	14	31	68	0.46
2017	15	52	67	85	0.79	5	24	29	98	0.30
2018	35	56	91	43	2.12	19	23	42	62	0.68
2019	35	43	78	35	2.23	30	35	65	63	1.03

In 2018 a strategic change was made in the broodstock program (deploying two crews on the same river during key period) and this, as well as a slight improvement in escapement numbers, resulted in a much higher CPUE and achievement of the 50k egg target for both rivers for the first time. In 2019 egg targets were achieved once again and catches and CPUE results would indicate escapements were similar to 2018. Improvement in escapement numbers could not be quantified in either year as aerial counts were limited and did not continue past the broodstock collection (no DFO surveys or AUC estimates). Of significance in both 2018 and 2019 is the number of adipose clipped/coded wire tagged (AD/CWT) adults encountered as it provides proof that enhancement is contributing to returns even though releases in the contributing brood years were quite small. In 2018 (the first age four enhanced fish returning from the 2014 brood), the enhanced contribution to catch in the broodstock program was 5.5% in the Kilbella River and 14.3% in the Chuckwalla (this from smolt releases of only 12,122 Kilbella

and 4,297 Chuckwalla). In 2019, with predominantly age four (2015 brood smolt releases of 19,518 Kilbella and 10,793 Chuckwalla) and five (2014 brood) fish returning, enhanced contribution to river catches was 20.5% in the Kilbella and 13.8% in the Chuckwalla (Table 2 and detailed in Appendix 1). At this time data for AD/CWT incidence of marked recoveries in the 2019 sport and commercial fisheries is not complete. It will be provided when available.

TABLE 2: SUMMARY OF INCIDENCE OF AD CLIPPED ADULTS CAPTURED DURING THE 2019 KILBELLA AND CHUCKWALLA BROODSTOCK PROGRAM

River & Year	Unique fish (live+dead)			Adipose-clipped			AD clips as
	Female	Male	Total	Female	Male	Total	% of New Fish
<b>Kilbella</b>							
2017	15	52	67	0	1	1	1.5
2018	35	56	91	1	4	5	5.5
2019	35	43	78	6	10	16	20.5
<b>Chuckwalla</b>							
2017	5	24	29	0	0	0	0.0
2018	19	23	42	1	5	6	14.3
2019	30	35	65	5	4	9	13.8
<b>Notes:</b>							
The capture method was the same from 2014 to 2019 (8.25" gillnet).							
No carcasses were encountered in 2017-2019.							
None of the Ad clips encountered in 2018 and 2019 were recaptures and are included in catch							

## PROJECT GOALS AND OBJECTIVES

The purpose of this project is to increase Chinook salmon returns to the Kilbella/Chuckwalla watersheds through a small-scale, targeted enhancement program. In the first years of the project (2014-2016) eggs and sperm collected on the rivers were taken to DFO’s Snootli Hatchery in Bella Coola where the brood were incubated, ponded, reared and AD/CWT marked before being transported to a netpen in Kilbella Bay at the mouth of the rivers for final rearing and release. From 2017 to present, the hatchery portion of the fish culture program occurs at the Percy Walkus Hatchery in Katit Village, home to the Wuikinuxv nation, and the marked pre-smolts are transported to the net-pen in Kilbella Bay as in previous years. An important part of the program is the collection of DNA samples from adults for parent-based tagging (PBT) and to confirm river of origin for marked fish that are released. In brood years 2014-2017, all smolt releases were marked and in 2018 all of the Chuckwalla (48.5k) and 58.6k of the 61.8k Kilbella were marked. CWT/AD marking was cancelled for the 2019 brood due to the COVID-19 pandemic and closure of the Wuikinuxv Nation community to marking crews, however, with DNA/PBT data the brood is still “marked”. Tracking recoveries of CWT/AD tagged adults and DNA sampling through commercial and recreational fisheries and during broodstock capture on the rivers will provide information on interception and contribution as well as relative success of the brood years in terms of survival.

The goal of the recovery enhancement program is to augment escapements until estimates are in the range of 1000 adults. This would mean an estimated 5 fold increase in the Kilbella and 10 fold increase in the Chuckwalla from when the current enhancement started in 2014. The annual enhancement goal for each river is to obtain between 50k and 75k eggs for a release of 40-60k smolts (based on 80% survival from eggs taken to smolts released). To reach the egg targets approximately 10-15 full ripe females and 10-15 ripe males are required from each river. Adult capture and number of eggs taken

have improved each year from 2014 to 2018 when sufficient ripe adults were captured to reach the 50K egg targets. Egg targets of 50K were met again in 2019. Egg to smolt release survival has met or exceeded 80% in all but the 2014 brood year Chuckwalla when egg fertilization was affected by a poor quality female. Average survival to release has been very good with 92% for the Kilbella, 89.9% for the Chuckwalla and 91% overall (Table 3).

TABLE 3: SUMMARY OF EGGS TAKEN, SMOLT RELEASES AND SURVIVAL FROM EGG TO RELEASE FOR BROOD YEARS 2014-2019

RIVER & BROOD YEAR	FEMALES SPAWNED	EGGS PLANTED	SMOLTS RELEASED	EGG TO RELEASE SURVIVAL
<b>KILBELLA</b>				
2014	3	12,859	12,122	94.3%
2015	6	21,252	19,518	91.8%
2016	4	14,082	13,096	93.0%
2017	6	19,081	17,635	92.4%
2018	16	68,580	61,788	90.1%
2019	16	57,513	53,804	93.6%
Subtotal	51	193,367	177,963	92.0%
<b>CHUCKWALLA</b>				
2014	1	5,998	4,258	71.0%
2015	2	11,601	10,793	93.0%
2016	8	33,102	28,770	86.9%
2017	5	31,962	27,559	86.2%
2018	9	54,997	48,543	88.3%
2019	12	56,969	55,007	96.6%
Subtotal	37	194,629	174,930	89.9%
<b>COMBINED TOTAL</b>				
2014	4	18,857	16,380	86.9%
2015	8	32,853	30,311	92.3%
2016	12	47,184	41,866	88.7%
2017	11	51,043	45,194	88.5%
2018	25	123,577	110,331	89.3%
2019	28	114,482	108,811	95.0%
<b>OVERALL</b>	<b>88</b>	<b>387,996</b>	<b>352,893</b>	<b>91.0%</b>

## **OPERATIONAL REPORT FOR THE 2019-2020 PROJECT YEAR**

2019 is the sixth year of the Kilbella and Chuckwalla Chinook Salmon Stock Recovery Enhancement Project. It should be noted that the rearing, marking, transport and release of the 2019 brood Kilbella and Chuckwalla was greatly affected by the onset of and consequent public and work safety measures related to the COVID-19 pandemic. It is a tribute to the hatchery manager and staff that they were able

to find ways to modify operations so successful releases of healthy large smolts could occur. The only objective that could not be met was AD/CWT marking of fry. The time period where Kilbella and Chuckwalla fry could be marked was at the start of a Wuikinuxv Nation community closure to non community members (tagging crew could not travel to site) and the marking itself was seen as too risky in terms of maintaining safe working conditions for staff.

### **2019 PROJECT LOGISTICS**

Personnel from Wuikinuxv Fisheries, PSF, DFO, Pacificus Biological Services, Duncanby Lodge and Good Hope Cannery lodge contributed to the 2019-2020 project. Crew were housed at the hatchery, local bed and breakfast accommodation and Good Hope Cannery. The aircraft used was provided by Helijet International Inc. (Bell 206L Long Ranger). There were two teams of four crew deployed on all days except August 27 when weather prevented one team from getting to the river and on August 31 & September 1 when one team was sufficient to capture the remaining females needed.

### **RESULTS OF AERIAL COUNTS IN 2019**

*Kilbella River:* Due to poor water clarity and absence of adults being observed while crew was being ferried to drop-off sites as high up as Mallon Creek and into Mallon Creek, no dedicated aerial surveys were conducted in 2019.

*Chuckwalla River:* There were no dedicated aerial surveys in 2019 as crew did not observe any chinook in the upper or lower sections of the river when being ferried to drop-off sites or during the return flights to the hatchery. The focus was on obtaining sufficient broodstock to achieve egg targets.

### **RESULTS OF 2019 BROODSTOCK COLLECTION EFFORTS**

*Kilbella River:* Broodstock capture occurred on August 25-27 and again on September 1 for a total of about 2.5 days of fishing. On August 25 and 26 there were two crews on the river spending a half day on the 25th due to fog and a full day on the 26th. August 27 was a short day with only one crew being deployed due to weather (visibility for transporting a second crew to the river was poor and water levels rose so getting the first crew out was a priority when a break in the weather occurred). September 1 was also a short day with only one crew being needed to obtain a final female. Capture was done using tangle gillnets with 8.25" web hung at 5:1 ratio to reduce "gilling". Most nets were 80-100' in length and between 10 and 15' deep. Over the capture period a total of 35 sets were made, 29 in the mainstem Kilbella River (12 sets between river kilometer 20-25 and 17 between river kilometer 35-40) and 6 sets in Mallon Creek which enters the Kilbella at river kilometer 40 (Figure 1). A total of 78 new fish were caught, 35 females and 43 males (summary in Table 1 and details in Appendix 2). There were 6 recaptures during broodstock capture (3 females and 3 males with one female being recaptured twice) and most of these were on the same day and in the same pools or runs where they were tagged.

A total of sixteen females were spawned from the Kilbella River of which seven were full ripe females and nine were partials (females that had deposited some eggs already or with eggs that were not fully developed) (Table 4). None of the females used for broodstock were AD clipped and all females were spawned on the same day of capture so no holding was required. Milt was collected from 18 different males, two of which were AD clipped. One of the AD clipped males was used in 1:1 fertilization with a partial female on August 27 as no other ripe males were captured on that day. Milt from the other AD clip was used as a secondary donor in fertilization of one female on September 1. Use of AD clipped adults for broodstock is avoided in order to maintain as much genetic diversity as possible. Fertilization was done using 1:1 matrix (one male to one female). If additional sperm was obtained on any given day it would be used as a second or back-up after the first male was mixed with the eggs.



FIGURE 1: MAP OF KILBELLA AND CHUCKWALLA RIVER WITH SIGNIFICANT 2019 FISHING AREAS MARKED IN RED

TABLE 4: SUMMARY OF ADULTS SPAWNED IN THE 2019 KILBELLA AND CHUCKWALLA BROODSTOCK PROGRAM

River & Date Caught	Female			Male
	Full	Partial	Total	
<b>Kilbella</b>				
25/Aug	3	1	4	6
26/Aug	3	7	10	10
27/Aug	0	1	1	1
1/Sep	1	0	1	2
Subtotal	7	9	16	19
<b>Chuckwalla</b>				
28/Aug	3	0	3	5
29/Aug	1	3	4	4
30/Aug	2	0	2	4
31/Aug	3	0	3	3
Subtotal	9	3	12	16
<b>COMBINED TOTAL</b>	<b>16</b>	<b>12</b>	<b>28</b>	<b>35</b>
Note: in 2019 milt used from 18 Kilbella and 15 Chuckwalla males				

The average postorbital-hypural (POH) length of the 31 females sampled on the Kilbella River in 2019 was 73.9cm with a range of 63cm to 84cm. Male POH lengths ranged from 32cm to 86.5cm in the 39 sampled and average length was 66.5 (Figure2).

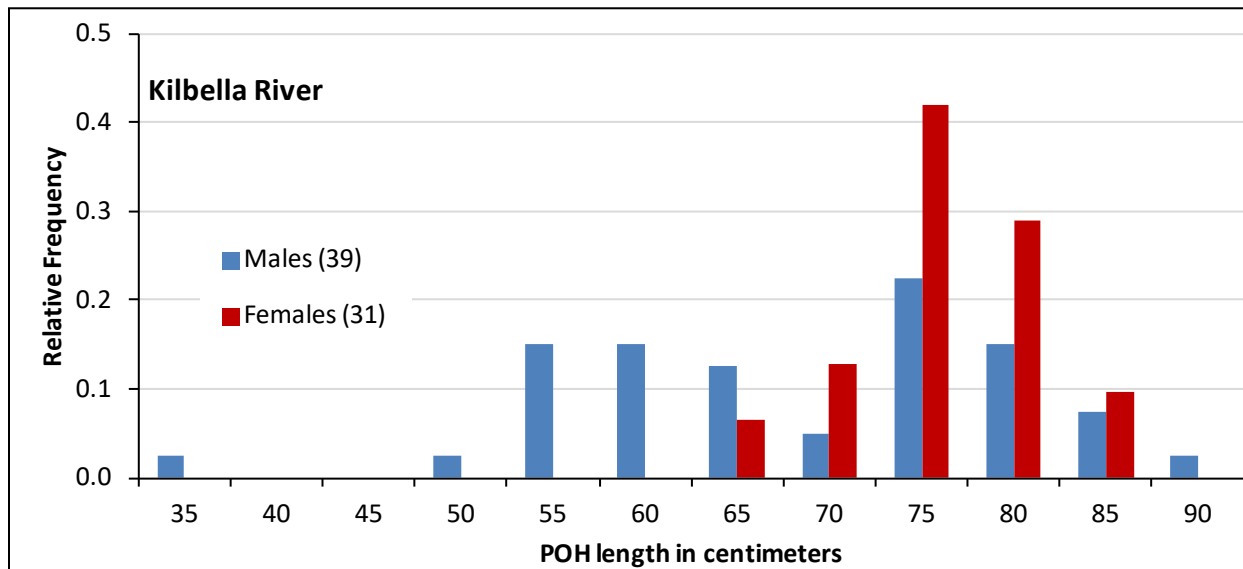


FIGURE 2: LENGTH FREQUENCY DISTRIBUTION OF UNIQUE KILBELLA CHINOOK SAMPLED IN 2019

There were 63 adults sampled for scales from Kilbella chinook in 2019 and of these there were 49 where total age could be determined (28 males and 21 females) (Table 5). The age composition in males ranged from 2 to 5 with ages 4 and 5 comprising 88% of the total (53% age 4 and 25% age 5). Ocean



type life history presented in 17 or 60.7% of males sampled and stream type numbered 11 or 39.3%. Age composition in females was 38% age 4 and 62% age five with a roughly 50:50 split between ocean and stream type (52% stream and 48% ocean).

TABLE 5: AGE COMPOSITION OF CHINOOK SALMON SAMPLED IN THE KILBELLA AND CHUCKWALLA RIVERS IN 2019

River	European Gilbert-Rich	0.1	0.2	0.3	0.4	1.2	1.3	1.4	TOTAL FULLY AGED	M2	M3	M4	FULL + MARINE ONLY
		2 <sub>1</sub>	3 <sub>1</sub>	4 <sub>1</sub>	5 <sub>1</sub>	4 <sub>2</sub>	5 <sub>2</sub>	6 <sub>2</sub>		2M	3M	4M	
Kilbella	Male	2	4	11	0	4	7	0	<b>28</b>	4	3	0	35
	% of Total	7%	14%	39%	0%	14%	25%	0%					
	Female	0	0	8	3	0	10	0	<b>21</b>	0	5	2	28
	% of Total	0%	0%	38%	14%	0%	48%	0%					
	Combined	2	4	19	3	4	17	0	<b>49</b>	4	8	2	63
	% of Total	4%	8%	39%	6%	8%	35%	0%					
Chuckwalla	Male	0	2	6	1	5	6	1	<b>21</b>	4	2	1	28
	% of Total	0%	10%	29%	5%	24%	29%	5%					
	Female	0	1	6	1	0	12	0	<b>20</b>	1	7	1	29
	% of Total	0%	5%	30%	5%	0%	60%	0%					
	Combined	0	3	12	2	5	18	1	<b>41</b>	5	9	2	57
	% of Total	0%	7%	29%	5%	12%	44%	2%					

Notes:  
M1 (1M) = 1 marine annuli; M2 (2M) = 2 marine annuli; etc.  
58 samples were submitted for the 2019 Chuckwalla but one was unreadable (regenerated)

There were sixteen adipose clipped chinook caught during the Kilbella broodstock program in 2019 (6 females and 10 males)-(Table 2). These comprised 17.1% of new females captured, 23.3% of males and 20.5% overall. Brood year representation was determined in 11 of the AD clip captures with 8 (73%) being age 4 fish from the 2015 brood year (Table 6). Results from DNA samples from the AD clipped adults confirmed all were of Kilbella origin.

TABLE 6: BROOD YEAR AND SCALE AGE COMPOSITION IN AD CLIP ADULTS SAMPLED IN 2019

RIVER	2017 (2 <sub>1</sub> )	2016 (3 <sub>1</sub> )	2015 (4 <sub>1</sub> )	2014 (5 <sub>1</sub> )
<b>Kilbella</b>				
Male	1	2	5	0
Female	0	0	3	0
Total	1	2	8	0
<b>Chuckwalla</b>				
Male	0	1	2	0
Female	0	0	3	1
Total	0	1	5	1

**Chuckwalla River:** In 2019 broodstock capture occurred between August 28 and September 1. There were three full days of effort with two crews on the river (Aug28-30), one full day with a single crew (Aug31) and September1 was a partial day with one crew. There were 63 tangle net sets made on the Chuckwalla River, 30 between river kilometer 9-13(below the canyon) and 33 between river kilometer 20-23 (above Canyon and cascades to John’s Creek)(Figure 1). The nets used were the same style and with same techniques as those used in the Kilbella River. A total of 65 new fish were captured (30 females and 35 males) (summary in Table 1 and details in Appendix 2). There were three female and five male recaptures during the 2019 broodstock program with one male being recaptured twice.

A total of twelve females were spawned from the Chuckwalla River in 2019 and of these, nine were full females and three were partials (Table 4). None of the females spawned were AD clipped and all were spawned on the same day as they were captured (no holding required). Milt was taken from fifteen different males of which two were AD clipped. Both AD clipped males were used as the primary milt in fertilization on August 29 as there were insufficient ripe unmarked males encountered. Fertilization was done using a matrix of 1:1 for ten of the females and 1:2 for two of the larger females (eggs from a female divided in two and two different males used).

POH lengths in the 29 Chuckwalla females sampled ranged from 64cm to 82cm with an average of 73.3cm (Figure 3). The range of POH lengths in the 26 males sampled was 55cm to 85 cm and the average length was 66.4cm.

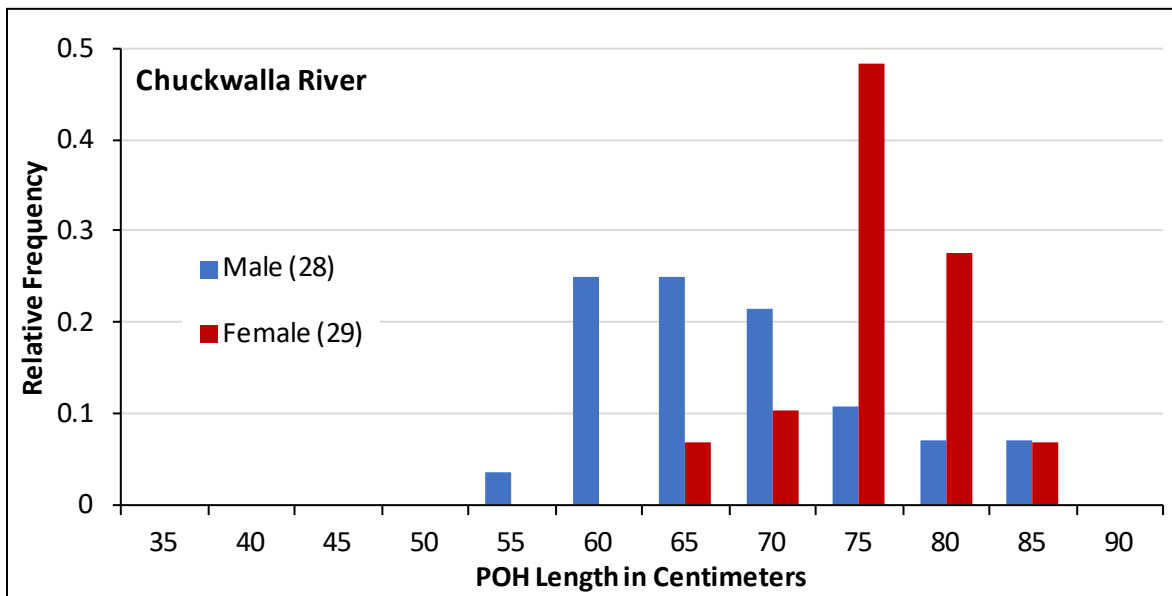


FIGURE 3: LENGTH FREQUENCY DISTRIBUTION OF UNIQUE CHUCKWALLA CHINOOK SAMPLED IN 2019

There were scale samples submitted from 58 Chuckwalla adults during the 2019 broodstock collection and total age could be determined in 41 of these (21 males and 20 females)(Table 5). The age composition in males ranged from 3 to 6 with ages 4 and 5 comprising 86% of the total (53% age 4 and 34% age 5). Ocean type life history presented in 9 or 43% of males sampled and stream type numbered 12 or 57%. Age composition of females was 5% age 3, 30% age 4 and 65% age 5. Ocean type life history presented in 12 (60%) of females sampled and stream type numbered 8 (40%).

There were nine AD clipped adults captured in the Chuckwalla River in 2019, four of which were males and five females (Table 2). The marked males comprised 11.4% of new fish caught and marked females

16.7%. Brood year representation could be determined for 11 of the AD clip captures with a majority (8 or 72.7%) being age 4 fish from the 2015 brood year (Table 6). The number of AD recoveries in the Chuckwalla is roughly 50% of that in the Kilbella River. This is expected because smolt releases from the Chuckwalla chinook in the contributing brood years was roughly half that of the Kilbella (Table 3). The AD clipped adults were all of Chuckwalla origin (confirmed through DNA sampling).

Fishing effort in 2019 was similar to 2018 and egg targets were met by end of day September 1. 2019 was the first year when broodstock was taken from Mallon Creek, a tributary of the Kilbella and the normal start point for broodstock capture work (mouth at river kilometer 40 of the Kilbella). Crews had seen fish in Mallon Creek on the final day of the broodstock program in 2018 and decided to explore this more fully in 2019. This paid off in that 5 of the 16 females were captured there. The catches and CPUE in 2019 were very similar for the Kilbella and improved for the Chuckwalla (Table 1), however, observations from field personnel that have worked in both systems since the start of the program indicate that overall abundance remains very low.

### **RESULTS OF 2019 BROOD YEAR EGG INCUBATION, REARING, MARKING AND RELEASE**

There were a total of 57,513 eggs obtained from the Kilbella River and 56,969 from the Chuckwalla in 2019 for a total of 114,482 (Table 3). Eggs were incubated in vertical drip incubators (Heath Stacks) at the Percy Walkus Hatchery. Survival during incubation was excellent with 94% for Kilbella and 96.8% in the Chuckwalla.

Fry were ponded January 4-19 into circular tubs where they were reared to approximately 3gms then transported to netpens located in Kilbella Bay April 8-9. Rearing in the netpens continued to April 30 (Kilbella) and May 2 (Chuckwalla) when fish had reached a 5gram average size and were released. The number released was 53,804 for Kilbella and 55,007 for Chuckwalla with excellent survivals to release of 93.6% 96.6% respectively (Appendix 3). No AD/CWT marking was possible in 2019 due to closure of the Wuikinuxv Nation community related to the COVID-19 pandemic. Since DNA sampling was done on all adults used for broodstock (PBT program) there will be opportunity in the return years to track contribution where DNA sampling is conducted in the various fisheries and on the rivers during the broodstock capture.

### **PLANS FOR THE 2020 BROOD YEAR OPERATIONS**

Plans for the Kilbella and Chuckwalla 2020 brood year program will be greatly affected by ongoing concerns and issues related to the COVID 19 pandemic. The five main components will remain the same but operations will likely be more complex and costly to meet safety guidelines recommended by the Wuikinuxv Emergency Operations Council (EOC), DFO, PSF and Worker's Compensation. We are optimistic that the goals for all the components are achievable and have planned accordingly (at this writing #1 and the field component of #2 and #3 have been completed).

The five components are:

1. Conduct broodstock collection and eggtakes in August and early September
2. Focus more attention on conducting 2 aerial surveys during broodstock capture and explore other means of obtaining reliable escapement estimates or levels of abundance (working with DFO and others) August 2019-August 2020
3. Reporting and recovery/sampling of AD clipped adults
4. Egg incubation, ponding, rearing and AD/CWT marking of fry at Percy Walkus Hatchery prior to transport to netpens
5. Final rearing and release of smolts from netpens

Key personnel for conducting the adult program will consist of two field teams that will be housed in separate locations and work on different parts of the river (Attachment I). Only the manager from the Percy Walkus Hatchery (Heather Hewitt) will be able to participate in the adult program and will have to self isolate for a period post eggtake before other hatchery staff members are allowed on site.

Members of the field teams will be Heather Hewitt working with DFO staff of Marshall Hans, Chris Willis and Ian Douglas – all housed at the hatchery) and Brydon with contributing crew from Good Hope Cannery (Dwayne Walkus, Luke Allard and Gage Allard) and Duncanby (Kyle Morton) all staging from Good Hope Cannery. The Good Hope Cannery crew will go directly from the accommodations to the river and back, sending the eggtake cooler to the hatchery with the helicopter at the end of each day.

Incubation, ponding and rearing will occur at Percy Walkus Hatchery with the regular hatchery staff consisting of manager Heather Hewitt, Lead Hand Chris McConechy and seasonal staff as necessary. The biological strategy used in 2019 will be generally followed but with enhanced protocols for staff to meet safety guidelines associated with COVID 19. The team is hoping that by the time AD/CWT marking would occur (late March/early April 2021), there will be reduced levels and concerns over COVID 19 in British Columbia and an acceptable marking plan will be possible.

Funding for operations in 2020 has been received from PSC (\$83,000) and will be augmented with private donations and in-kind resources from Duncanby Lodge, Good Hope Cannery, Helijet and PSF, as well as a significant in-kind donation by the Wuikinuxv Nation in terms of supplying the electrical power.

The Percy Walkus Hatchery is undergoing a significant upgrade in 2020 that includes addition of two new wells, a new larger netpen for chinook rearing and the ability to operate with 3-phase power. The upgrade will mean enhanced water security, reduced water usage during incubation and off-season, reduced and more efficient use of power and more flexibility and capacity for final rearing programs. Funding for the upgrade was provided through BCSRIF (\$336k) and PSF (est. \$40k). At the time of this writing the project is nearly complete with the new netpen being utilized for the Kilbella/Chuckwalla 2019 brood rearing and the new small well supplying water for incubation of the 2020 brood eggs. Another upgrade to the hatchery has been in an increase in accommodation capacity at the hatchery with the donation of a 30' travel trailer worth ~\$43,000. This additional accommodation has been essential for conducting work on site by outside crews (the upgrade project) and for allowing distancing for visiting field crews.

## **ACKNOWLEDGEMENTS**

This project would not have been possible without the support from the Pacific Salmon Commission, Wuikinuxv First Nation, Fisheries and Oceans Canada, private companies and individuals. We are grateful for their interest, commitment to collaborate and participate in the program which has certainly contributed to the successes over the past six years. In 2019 we are especially appreciative of the willingness of the Wuikinuxv EOC led by Jennifer Walkus and Pamela Johnson to work with us in finding ways to safely conduct work at the hatchery and on the rivers. The Wuikinuxv Stewardship office (Danielle Shaw and now Andra Forney) have supported the project with policy and personnel advice and Paul Willie (Wuikinuxv Band Manager) and his staff have been very helpful with accommodation and other logistics. Our key DFO partners/collaborators have been Ian Douglas (Central Coast Community Advisor for SEP) and Snootli Creek Hatchery staff including Haakon Hammer (Watershed Enhancement Officer), Chris Willis (Operations Manager), and Marshall Hans (Hatchery Technician and Field program lead). There has also been input from DFO Stock Assessment/Fisheries Management biologists Kate McGivney and Ivan Winther. We are thankful that Brydon Peace (previous PWH manager) of Pacificus Biological was able to provide advice and assistance to site and field programs.

We thank Danny Sitman and Helijet International for a generous donation of helicopter time and Chris Waymouth who was our pilot again in 2019. Sid Keay (Duncanby Lodge) and Tony Allard/Ted Walkus (Good Hope Cannery) continue to be key supporters, not only with funds but with personnel that contribute to our hatchery field work.

Finally, we want to thank the Percy Walkus Hatchery and PSF staff that has worked so hard to make the project a success. The 2019 Percy Walkus Hatchery personnel consisted of Heather Hewitt (PSF – hatchery manager), Chris McConechy (Wuikinuxv Nation -lead hand/technician) and Alex Albert and Willy Passmore (Wuikinuxv Nation – hatchery technicians). Science advice and overview was provided by Dr. Brian Riddell and Jason Hwang. Accounting and fiscal support came from Tim Sucic and Fei Zhong. Technical and operational support was provided by Sandie MacLaurin and John Willis (previously with DFO-SEP).



New Netpen float being used for final rearing of chinook in 2019



New travel trailer for additional accommodation

APPENDIX 1 – DETAILED TABLE OF ADIPOSE CLIP INCIDENCE IN KILBELLA AND CHUCKWALLA CHINOOK BROODSTOCK PROGRAM BY RETURN YEAR AND RIVER

Return Year	Kilbella									Chuckwalla								
	Female			Male			Combined Male & Female			Female			Male			Combined Male & Female		
	#New Fish	#Mrkd	Mark%	#New Fish	#Mrkd	Mark%	#New Fish	#Mrkd	Mark%	#New Fish	#Mrkd	Mark%	#New Fish	#Mrkd	Mark%	#New Fish	#Mrkd	Mark%
2014	17	n/a	n/a	12	n/a	n/a	29	n/a	n/a	5	n/a	n/a	10	n/a	n/a	15	n/a	n/a
2015	10	n/a	n/a	23	n/a	n/a	33	n/a	n/a	15	n/a	n/a	13	n/a	n/a	28	n/a	n/a
2016	11	n/a	n/a	21	n/a	n/a	32	n/a	n/a	17	n/a	n/a	14	n/a	n/a	31	n/a	n/a
2017	15	0	0	52	1	1.9%	67	1	1.5%	5	0	0.0%	24	0	0.0%	29	0	0.0%
2018	35	0	0	56	5	8.9%	91	5	5.5%	19	1	5.3%	23	5	21.7%	42	6	14.3%
2019	35	6	17.1%	43	10	23.3%	78	16	20.5%	30	5	16.7%	35	4	11.4%	65	9	13.8%
COMBINED BOTH RIVERS																		
Return Year	Female			Male			Female+Male											
	#New Fish	#Mrkd	Mark%	#New Fish	#Mrkd	Mark%	#New Fish	#Mrkd	Mark%									
2014	22	n/a	n/a	22	n/a	n/a	44	n/a	n/a									
2015	25	n/a	n/a	36	n/a	n/a	61	n/a	n/a									
2016	28	n/a	n/a	35	n/a	n/a	63	n/a	n/a									
2017	20	0	0	76	1	1.3%	96	1	1.0%									
2018	54	1	1.9%	79	10	12.7%	133	11	8.3%									
2019	65	11	16.9%	78	14	17.9%	143	25	17.5%									

APPENDIX 2: DETAILED DAILY CATCH SUMMARY FOR 2019 KILBELLA AND CHUCKWALLA BROODSTOCK PROGRAM

River & Date	No. Sets	Total New Fish		AD Clips(all part of new)		Recaps (no mrkd recaps)		Total New Fish + Recaps			CPUE
		Female	Male	Female	Male	Female	Male	Female	Male	Total	
<b>Kilbella</b>											
25/Aug	10	11	9	5	1	0	0	11	9	20	2.00
26/Aug	20	19	30	0	6	0	3	19	33	52	2.60
27/Aug	4	3	1	0	1	3	0	6	1	7	1.75
1/Sep	1	2	3	1	2	0	0	2	3	5	8.00
Subtotal	35	35	43	6	10	3	3	38	46	84	2.40
<b>Chuckwalla</b>											
28/Aug	22	12	15	2	0	0	0	12	15	27	1.23
29/Aug	16	11	6	3	2	2	2	13	8	21	1.63
30/Aug	15	3	10	0	0	1	1	4	11	15	1.00
31/Aug	8	3	2	0	1	0	2	3	4	7	1.00
1/Sep	2	1	2	0	1	0	0	1	2	3	2.00
Subtotal	63	30	35	5	4	3	5	33	40	73	1.16
<b>Total</b>	<b>98</b>	<b>65</b>	<b>78</b>	<b>11</b>	<b>14</b>	<b>6</b>	<b>8</b>	<b>71</b>	<b>86</b>	<b>157</b>	<b>1.86</b>

APPENDIX 2: DETAILED BROOD SUMMARY DATA FOR 2019 BROOD KILBELLA AND CHUCKWALLA CHINOOK

PWH OPERATIONAL UPDATE JUNE 6, 2020 - FOR 2019 BROOD CHINOOK															
NUMBER SUMMARY															
STOCK	NUMBER SPAWNED		EGGS TAKEN - INV.@EYED	LIVE EGGS @EYED	%SURV. TO EYED	NUMBER AFTER PONDING	% SURV. TO POND	CURRENT REARING INV.	NUMBERS AT RELEASE			SURVIVAL DURING REARING	SIZE @ RELEASE	DATE OF RELEASE	OVERALL SURVIVAL TO DATE/REL.
	FEM.	MALE							MARKED	NO MARK	TOTAL				
KILBELLA	16	18	57,513	54,318	94.4%	54,145	99.7%	-	N/A		<b>53,804</b>	99.4%	5.06	30-Apr-20	93.6%
CHUCKWALLA	12	16	56,969	55,473	97.4%	55,118	99.4%	-			<b>55,007</b>	99.8%	5.02	02-May-20	96.6%
WANNOCK	43	47	331,622	311,520	93.9%	308,180	98.9%	-		COPEN	<b>240,263</b>	99.2%	5.20	May 30 & 31	92.2%
									River	<b>65,521</b>	5.35		June 1-3		
SIGNIFICANT DATES										Total	305,784				
STOCK	BROODSTOCK CAPTURE & EGGTAKE DATES		EYED STAGE/EGG PICK		PONDING			MARKING		TRANSFER TO SEAPENS		Release			
KILBELLA	Aug 25-27 & Sept 1, 2019		03-Oct-19		Jan 4th - 13th, 2020			Cancelled		08-Apr-20		30/Apr/20			
CHUCKWALLA	Aug 28-31, 2019		06-Oct-19		Jan 7th - 19th, 2020			Cancelled		09-Apr-20		2/May/20			
WANNOCK	Oct 17-23, 2019		26-Nov-19		Feb. 17th - Mar. 2nd, 2020			Cancelled		May 4-5, 2020		May 29 - June 3, 2020			
			ATU'S 312-322		ATU's +1000										
COMMENTS:															
<b>KILBELLA/CHUCKWALLA</b>															
Percent survival for both Kilbella and Chuckwalla was excellent at all stages of development. No marking or fin clipping was conducted this year due to COVID-19 restrictions.															



**Project Budget Form**  
**Name of Project: Recovery Enhancement of Kilbella-Chuckwalla Chinook 2019-2020**  
**Financial Report**  
**September 28, 2020**

<b>Labour</b>						
<b>Wages &amp; Salaries</b>						
Position	Budget		Actual		Variance	
	Cash	In-kind & PSC Amount	In-kind	Actual	In-kind	Actual
PSF Project Manager	4,250	-	4,250	-	-	-
PSF Field Supervisor	-	5,500	-	5,500	-	-
PWEF Crew Leader	-	6,300	-	6,300	-	-
Wuikinuxv Fisheries Manager	-	996	-	850	-	146
Egg take/Escapement crew	-	7,801	-	10,011	-	2,210
CWT marking	-	6,863	-	-	-	6,863
Net Pen Crew	-	5,610	-	5,610	-	-
DFO In-kind Labour	7,140	-	7,140	-	-	-
	<b>11,390</b>	<b>33,071</b>	<b>11,390</b>	<b>28,271</b>	<b>-</b>	<b>4,800</b>
<b>Labour - Emp[loyers Cost (percent of wages subtotal amount)</b>						
	<b>1,139</b>	<b>3,307</b>	<b>1,139</b>	<b>2,177</b>	<b>-</b>	<b>1,130</b>
<b>Volunteer Labour</b>						
Skilled	7,650	-	7,650	-	-	-
	<b>7,650</b>	<b>-</b>	<b>7,650</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Total Labour Costs</b>						
	<b>20,179</b>	<b>36,378</b>	<b>20,179</b>	<b>30,447</b>	<b>-</b>	<b>5,930</b>
<b>Site/Project Costs</b>						
Tangle nets - cost of rehangng	-	450	-	450	-	-
Egg take and sampling gear	-	400	-	275	-	125
Accomodation & food	-	2,380	-	2,161	-	219
BKD Sample Processing	-	280	-	-	-	280
Fish food	2,760	-	2,760	-	-	-
Coded Wire Tags (CWT's)	2,670	6,300	4,115	9,709	1,445	3,409
Net pen rental and/or repair	-	2,000	-	-	-	2,000
Truck/jet boat and fuel costs for netpens	-	2,550	-	2,847	-	297
First aid equipment	-	450	-	-	-	450
Communications	-	260	-	-	-	260
<b>Transport</b>						
Helicopter for river work	32,000	22,000	33,863	23,281	1,863	1,281
Aircraft charter for crew	2,986	1,814	-	1,915	-	101
Towing net pens	-	2,000	-	2,847	-	847
<b>Facilities costs</b>						
PWEF	30,000	-	30,000	-	-	-
	<b>70,416</b>	<b>40,884</b>	<b>70,738</b>	<b>43,485</b>	<b>322</b>	<b>2,601</b>
<b>Training</b>						
Bear safety	-	600	-	488	-	112
First Aid (level 1 and transport)	-	300	-	101	-	199
	<b>-</b>	<b>900</b>	<b>-</b>	<b>589</b>	<b>-</b>	<b>311</b>
<b>Overhead / Indirect Costs</b>						
Other overhead costs	-	5,000	-	4,767	-	233
	<b>-</b>	<b>5,000</b>	<b>-</b>	<b>4,767</b>	<b>-</b>	<b>233</b>
<b>Total Costs</b>						
	<b>90,595</b>	<b>83,162</b>	<b>90,917</b>	<b>79,289</b>	<b>322</b>	<b>3,873</b>