Kilbella/Chuckwalla Chinook Salmon
Stock Recovery Enhancement, 2016-2017
Progress Report



Prepared for:

Pacific Salmon Commission
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September 2017

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Prepared by:

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INTRODUCTION

Stock assessment and enhancement priorities for Rivers Inlet have been examined and discussed extensively over the past four years. This project was one of the top priorities for work on Chinook and other salmon species in Rivers Inlet identified by a Rivers Inlet Salmon Steering Committee (RISSC) comprised of representatives from the Wuikinuxv First Nation, local lodge owners, Fisheries and Oceans Canada (DFO), Rick Hansen Foundation (RHF), Pacific Salmon Foundation (PSF), and independent scientists. The RISSC was established in 2011 to guide the development of an immediate action plan for Wannock River Chinook salmon and long-term plans for other Rivers Inlet stocks and salmon species.

Historically, Chinook salmon from the Kilbella/Chuckwalla rivers (Figure 1) represented a significant portion of the Chinook salmon caught in the Rivers Inlet recreational fishery (Nelson et al. 2000). Annual escapement monitoring through 2010 indicated a 5-10 fold decline in spawners from the numbers observed in the 1998-2002 period when these stocks were being augmented through small-scale enhancement. In 2010, the escapement estimates for Chinook salmon were only 150 and 75 for the Kilbella and Chuckwalla rivers, respectively. Results from surveys conducted in September 2013 indicated that the number of Chinook salmon spawners in these rivers was similar to the very low numbers observed in 2010. Chinook salmon escapement estimates derived from 2014 aerial surveys were 200-300 and 100 for the Kilbella and Chuckwalla rivers, respectively. In 2014, 44 Chinook salmon (29 Kilbella, 15 Chuckwalla) were captured during broodstock collection by Snootli Hatchery personnel and Wuikinuxv Fisheries technicians (English and MacLaurin 2015). In 2015, 62 Chinook salmon (27 Kilbella, 35 Chuckwalla) were encountered during broodstock collection by staff from Snootli Hatchery, Wuikinuxv Fisheries, and LGL Limited (Smith et al. 2016).

PROJECT GOALS AND OBJECTIVES

The purpose of this project was to increase Chinook salmon returns to the Kilbella/Chuckwalla watersheds through a small-scale, targeted, enhancement program. Eggs and milt were collected from Kilbella/Chuckwalla Chinook salmon and reared at the Snootli Hatchery near Bella Coola. Fed fry were returned to net pens located near the Kilbella River estuary for further rearing prior to release. Information on the contribution of these fish to coastal fisheries will be obtained by applying coded-wire tags (CWT) to a large portion of the smolts released, and recovering marked fish from ongoing sampling programs in BC and Alaska.

The enhancement goal for 2014 and 2015 was to obtain 50,000 eggs and adequate milt from each stock in each year. This equates to 10 mature Chinook salmon of each sex from each river. The enhancement goal for 2016-2018 was to collect 75,000 eggs and adequate milt annually from each stock. The ultimate goal is to increase number of annual spawners in the Kilbella and Chuckwalla rivers to an initial target of 1,000 adult Chinook salmon.

In the first year of this program (2014-15), 4 female fish were spawned (3 Kilbella, 1 Chuckwalla), 18,857 eggs were transported to Snootli Hatchery, 16,521 fry were transferred to

net pens in Rivers Inlet (12,224 Kilbella; 4,258 Chuckwalla), and a total of 16,380 5.4-g smolts were released in the Spring of 2015 (Smith et al. 2016). Survival rates from egg take to release averaged 87% (94% for Kilbella, 71% for Chuckwalla). In the second year (2015-16), 8 females were spawned (6 Kilbella, 2 Chuckwalla), 32,853 eggs were transported to Snootli Hatchery, 30,333 fry were transferred to net pens, and 30,311 smolts were released in the Spring of 2016 (Smith et al. 2016). Survival rates from egg take to release averaged 92% (92% for Kilbella, 93% for Chuckwalla). Despite a two-fold increase in the number of females spawned in 2016 relative to 2015, the enhancement goals were not met in either year.

The following sections document results from 2016-17, the third consecutive year of this program. Plans for 2017-18 activities are also discussed.

2016 PROJECT LOGISTICS

Personnel from Wuikinuxv Fisheries, DFO, Good Hope Cannery, Duncanby Lodge, and LGL Limited contributed to the 2016-17 project. In August and September, out-of-town crew members stayed at the Percy Walkus Hatchery, Tech Lodge, and Eagle's Nest Bed and Breakfast in Wuikinuxv Village. Helicopter support (Hughes 500) to conduct broodstock collection and aerial surveys was provided by West Coast Helicopters (Port McNeill, BC). Eggs were transported from the Wuikinuxv Village airport to Bella Coola by Bella Coola Air (Hagensborg, BC).

RESULTS OF AERIAL COUNTS IN 2016

Aerial counts for Chinook salmon were conducted in the Kilbella and Chuckwalla rivers in 2016; however, unlike 2015, no swim counts were attempted in 2016 due to poor water clarity.

Kilbella River: In the Kilbella River, aerial counts of live and dead Chinook salmon were conducted via helicopter on 26 August and 6–7 September, 2016 (Table 1). Counts were stratified into three river sections: Mallon Creek (rkm 40.0) to Cascades (rkm 29.5), Cascades to 9-Mile Bridge (rkm 17.3), and 9-Mile Bridge to the mouth (rkm 0.0). No Chinook salmon were observed on 26 August, and 1 dead Chinook salmon was counted on 7 September. Water clarity was very poor on 26 August and only fair on 6–7 September which made it difficult to count fish in this system.

Chuckwalla River: In the Chuckwalla River, four helicopter counts (25 August and 3, 4, 5, and 8 September were conducted in 2016 (Table 1). Counts were stratified into five river sections: Above Johns Creek (> rkm 23.0), Johns Creek (rkm 23.0) to Cascades (rkm 20.0), Cascades to the Canyon (rkm 14.0), Canyon to Bridge Pool (rkm 6.0), and Bridge Pool to the mouth (rkm 0.0). Despite very low water levels, no Chinook salmon were observed on the 25 August survey due to poor water clarity. A peak count of six Chinook salmon (5 live, 1 dead) occurred on the 5 September survey.

RESULTS OF BROODSTOCK COLLECTION EFFORTS IN 2016

Kilbella River: In 7 days of fishing effort between 26 August and 7 September, 76 gillnet sets (100 ft long, 8.25 in. mesh) were made between rkm 12.0 and rkm 40.0 in the Kilbella River (Table 2; Figure 2). A total of 34 live Chinook salmon were captured, including 33 unmarked fish (11 female, 21 male) and 1 recapture (male; Table 2; Figure 3). In addition, 2 unmarked carcasses (1 female, 1 male) and 1 marked carcass (male) were encountered on 1 September. Three key locations for capturing pre-spawn, ripe fish included: 1) rkm 22.5 – a left-bank sidechannel where spawning occurs near the outlet; 2) rkm 18.4 – a mainstem site with a left-bank backeddy pool where fish were observed spawning in the tailout; and 3) rkm 13.1 – an area known as the "10-K Pool." Four females were spawned, of which two were full of eggs and two were partially full of eggs (Table 3). Milt was collected from 12 males. Females averaged 72.2 cm POH (range: 62.0-78.0 cm POH) and males averaged 59.9 cm POH (range: 37.0-77.0 cm POH; Figure 4). Successfully aged scale samples collected from Chinook salmon caught in the Kilbella River in 2016 consisted of fish of ages 4_1 (8), 4_2 (5), and 5_2 (1; Table 4).

Chuckwalla River: In 8 days of fishing effort between 25 August and 8 September, 68 gillnet sets were made between rkm 13.1 and rkm 26.3 in the Chuckwalla River (Table 2; Figure 5). A total of 33 live Chinook salmon were captured, including 31 unmarked fish (17 female, 14 male) and 2 recaptures (1 female, 2 male; Table 2; Figure 6). No Chinook salmon carcasses were encountered on the Chuckwalla River in 2016. Three key locations for capturing pre-spawn fish included: 1) rkm 38.1 – a right-bank sidechannel where spawning occurs at the lower end; 2) rkm 33.7 – the outlet of a left-bank braid of the mainstem where spawning occurs at the lower end; and 3) rkm 27.2 – an area along the left bank just below the mouth of House Creek. Eight females were spawned, of which five were full of eggs and three were partially full of eggs (Table 3). Milt was taken from 9 males. Females averaged 70.9 cm POH (range: 64.0-78.0 cm POH) and males averaged 70.0 cm POH (range: 39.0-86.0 cm POH; Figure 4). Successfully aged scale samples collected from Chinook salmon caught in the Chuckwalla River in 2016 consisted of fish of ages 3_1 (1) 4_1 (12), 3_2 (1), 4_2 (1), and 5_2 (4; Table 4).

In 2016, eight Chinook salmon (5 females, 3 males) were transported via helicopter from their capture locations in the Chuckwalla River to a holding site in the lower Chuckwalla River (rkm 0.6; Figure 1). Fish were transported in a dry bag partially filled with water and kept in submerged aluminum tubes (1 fish per tube) at the holding site. Transport times from the capture sites to the holding location averaged 7 minutes (range: 6–9 min, n = 5). Of the held fish, two females and one male were spawned, while the remainder were either voluntarily released (2 males) or escaped due to equipment malfunction (3 females). The two females that were successfully spawned were captured on 27 August and held for two (29 August) and four (31 August) days. No fish died while being held or showed signs of any stress (e.g., fungal growth).

Despite a 78% increase in fishing effort in 2016 (144 sets) compared to 2015 (81 sets), the number of live, unmarked Chinook salmon captured in each year was similar (61 in 2015, 63 in 2016). Relatively large daily catches occurred on the first two days of fishing in 2016 (7 fish on

25 August in the Chuckwalla, 9 fish on 26 August in the Kilbella), which included three ripe females, so it was possible that a portion of the run had spawned prior the onset of broodstock collection. Nonetheless, Chinook salmon abundance in both rivers continued to be very low in 2016, and the enhancement goal of collecting eggs from 15 Chinook salmon in each river was not met.

RESULTS OF 2016-17 EGG INCUBATION AND FRY RELEASE

In total, 47,184 eggs (14,082 Kilbella, 33,102 Chuckwalla) were planted at the Percy Walkus Hatchery for incubation in August and September 2016 (Table 5). This was a 44% increase in the number of eggs planted compared to 2015.

Fed fry were transported to net pens in Kilbella Bay on April 24, 2017, at a size of 2.2 g. On 19 May 2017, 13,096 Kilbella and 28,771 Chuckwalla smolts (5.2 g) were released from the net pens, meeting the target time and size of release goals. Egg-to-fry survival was good for both stocks and there were few mortalities through rearing. Overall egg-to-release survival was 93% for the Kilbella and 87% for the Chuckwalla (Table 5).

PLANS FOR 2017 BROODSTOCK COLLECTION EFFORTS

The experience gained from 2014-15 through 2016-17 has been used to develop plans for 2017-18 that will address the challenges encountered to date related to helicopter access, fish holding, and broodstock transport. The four project components for 2017-18 will include:

1) additional survey effort to improve the reliability of annual escapement estimates and determine the best locations and approach for obtaining broodstock;
2) broodstock collection in late August and early September;
3) egg incubation, fry ponding/rearing, and CWT application at Percy Walkus Hatchery; and
4) transport of fry to net pens in Kilbella Bay for further rearing from April until release in May of 2018.

These activities will be coordinated with the enhancement efforts for Wannock River Chinook salmon to ensure there is capacity to accommodate both groups of fish at the Percy Walkus Hatchery and in the net pens. Wuikinuxv Fisheries personnel will assist with escapement monitoring and broodstock collections, and will be responsible for all tasks associated with rearing Chinook salmon fry in the net pens prior to release.

In 2017, escapement numbers and broodstock collection locations will be determined using a combination of aerial, snorkel, and ground-based survey techniques. Broodstock collection will be conducted using gill nets (100 ft long, 8.25 in. mesh), similar to the methods used from 2014 to 2016, which have also been used successfully for Wannock River Chinook salmon. Fishing effort in 2017 will be focused in the upper reaches of both rivers (i.e., from the canyon to John's Creek on the Chuckwalla River [rkm 14–23], and from the cascades to Mallon Creek on the Kilbella River [rkm 30–40]). Relatively few Chinook salmon were observed in the lower reaches

of either river in 2015 and 2016. Any Chinook salmon present in these lower reaches tend to be co-mingled with hundreds of pink and chum salmon which makes it difficult to target Chinook salmon with a gillnet.

As in 2016, a holding site in the lower Chuckwalla River (rkm 0.6) will be used to retain pre-spawn Chinook salmon in submerged aluminum tubes for short periods of time until they are ripe and ready for egg collection. The holding site used in 2016 was accessible by both helicopter and small boat, which makes it easy for the crew to regularly monitor the health of fish being held and readily transport eggs to the airstrip in Wuikinuxv Village. Also, there was no bear predation at the holding site in 2016.

The proposed 2017 escapement monitoring and broodstock collection program will include a full-time field program supervisor (Jason Smith or Brydon Peace) who will be on-site for the entire broodstock collection period. Similar to 2014–2016, one 3-4 person field crew will be used initially in 2017. If necessary however, a second crew may be deployed to increase fishing effort.

PLANS FOR 2016-17 EGG INCUBATION AND 2017 FRY RELEASE

Eggs and sperm will be collected on the rivers and the gametes taken to the Percy Walkus Hatchery (as opposed to Snootli Hatchery). Eggs will be fertilized, rinsed, and placed in Heath-type, vertical incubators with a 100 ppm iodine solution. The antiseptic bath will be timed for 10 minutes, and then the trays will be placed into flowing water. At the eyed stage of development, eggs will be shocked, picked, enumerated, and placed back in Heath trays. Ponding will be done to two Capilano Type troughs arranged in lines of two. Fish will be split equally between the two troughs with 50,000 fry held in the upper section of each trough. Once densities reach 32 kg/m^3, half of the fish will be transferred to the lower section of each trough. When fry are over 1.5 g, all fish will be CWT marked, which will also verify fish numbers. Rearing will continue until fry reach ~3 g, at which point they will be transported to net pens in Rivers Inlet for final rearing and release. One float with two nets (15’ long x 15’ wide x 15’ deep per net) will be used. This will ensure density at maximum size will not exceed the recommended 5 kg/m^3. Fish will be feed a daily ration until they reach an average weight of 5 g (target date to reach this size is 15 May). Records of mortality will be kept throughout rearing so an accurate number of fish released can be reported.

PROJECT FUNDING AND COST FOR 2016-17

The PSC funding available for activities associated with the second year (2016-17) of Kilbella-Chuckwalla Chinook recovery enhancement efforts was $98,800. The current contract is slated to end on 30 September 2017. The final project and financial report to be submitted within 45 days of the end of the project to ensure that costs associated with the preparation of the project reports, preparations for the 2017 field program and complete project accounting and deliverables are covered by the 2016-17 project.

ACKNOWLEDGEMENTS

This project would not have been possible without the support from the Pacific Salmon Commission, Wuikinuxv First Nation, and Fisheries and Oceans Canada. We are grateful for their leadership and guidance throughout this project. This project was a key component of a 5-year business plan prepared for Rivers Inlet salmon by the Rivers Inlet Salmon Steering Committee. This committee included: Rick Hansen (Chair), Sid Keay, Ted Walkus, George Cuthbert, John McCulloch, Fred Helmer, Dave Rolston, and Sandie MacLaurin. We thank each of these individuals for the continued support, guidance, and fundraising efforts for the Rivers Inlet Salmon Initiative. We are especially grateful to Sid Keay for the additional funding provided for helicopter time to access the remote portions of the Kilbella and Chuckwalla Rivers for broodstock collections. We thank Dave Rolston, Wuikinuxv Fisheries Manager, Billie Johnson, Chris McConechy, and K'odi Lewis-Willie, Wuikinuxv Fisheries Technicians, for their assistance with field logistics, broodstock collection and fry rearing in the net pens. We thank Marshall Hans (DFO), Kyle Morton, Mack Keay (Duncanby Lodge), Gage Allard, and Luke Allard (Good Hope Cannery) for their assistance with broodstock capture. Brydon Peace, Percy Walkus Hatchery, and Sandie MacLaurin for their assistance with broodstock collection and project logistics, and management of hatchery related activities. Logistical support in Wuikinuxv Village was provided by Frank Johnson, and air support was provided by West Coast Helicopters (Port McNeill). We also thank Phil Burgess, skipper of the vessel Summers Retreat, for donating krill that was used to augment the food given to fish.

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Table 1. Aerial counts of Chinook salmon in the Kilbella and Chuckwalla rivers, 2016.

	River km		Chinook Salmon		
River/Date/Section	**From:**	**To:**	**Live**	**Dead**	**Total**
Kilbella River					
26-Aug-16					
Mallon Cr to Cascades	40.0	29.5	0	0	0
Cascades to 9-Mile Br	29.5	17.3	0	0	0
9-Mile Br to Mouth	17.3	0.0	0	0	0
Total			0	0	0
6-7 September					
Mallon Cr to Cascades	40.0	29.5	0	0	0
Cascades to 9-Mile Br	29.5	17.3	0	1	1
9-Mile Br to Mouth	17.3	0.0	0	0	0
Total			0	1	1
Chuckwalla River					
25 August					
Johns Cr to Cascades	23.0	20.0	0	0	0
Cascades to Canyon	20.0	14.0	0	0	0
Canyon to Bridge Pool	14.0	6.0	0	0	0
Bridge Pool to Mouth	6.0	0.0	0	0	0
Total			0	0	0
4 September					
Above Johns Cr	> 23.0		0	0	0
Johns Cr to Cascades	23.0	20.0	0	0	0
Cascades to Canyon	20.0	14.0	4	1	5
Canyon to Bridge Pool	14.0	6.0	1	0	0
Total			5	1	5
5 September					
Above Johns Cr	> 23.0		0	0	0
Johns Cr to Cascades	23.0	20.0	2	0	2
Cascades to Canyon	20.0	14.0	2	1	3
Canyon to Bridge Pool	14.0	6.0	1	0	1
Total			5	1	6
8 September					
Above Johns Cr	> 23.0		0	0	0
Johns Cr to Cascades	23.0	20.0	2	0	2
Cascades to Canyon	20.0	14.0	0	1	1
Total			2	1	3

Table 2. Number of Chinook salmon encountered during broodstock collection on the Kilbella and Chuckwalla rivers, 2016.

		Live					Dead						
	No.	Unmarked		Recaps			Unmarked		Recaps		Live + Dead		
River/Date	Sets	Female	Male	Female	Male	CPUE	Female	Male	Female	Male	Female	Male	Total
Kilbella R													
26-Aug	14	7	2	0	0	0.64	0	0	0	0	7	2	9
29-Aug	11	0	3	0	0	0.27	0	0	0	0	0	3	3
1-Sep	15	0	6	0	0	0.40	1	1	0	1	1	8	9
2-Sep	8	2	7	0	0	1.13	0	0	0	0	2	7	9
3-Sep	11	1	0	0	0	0.09	0	0	0	0	1	0	1
6-Sep	10	0	1	0	0	0.10	0	0	0	0	0	1	1
7-Sep	7	1	2	0	1	0.57	0	0	0	0	1	3	4
Total	76	11	21	0	1	0.43	1	1	0	1	12	24	36
Chuckwalla R													
25-Aug	12	4	3	0	0	0.58	0	0	0	0	4	3	7
27-Aug	15	4	1	0	0	0.33	0	0	0	0	4	1	5
28-Aug	8	1	1	0	0	0.25	0	0	0	0	1	1	2
31-Aug	4	0	1	0	0	0.25	0	0	0	0	0	1	1
4-Sep	10	3	2	0	0	0.50	0	0	0	0	3	2	5
5-Sep	9	4	4	1	0	1.00	0	0	0	0	5	4	9
7-Sep	1	0	0	0	0	0.00	0	0	0	0	0	0	0
8-Sep	9	1	2	0	1	0.44	0	0	0	0	1	3	4
Total	68	17	14	1	1	0.49	0	0	0	0	18	15	33
Grand Total	**144**	**28**	**35**	**1**	**2**	**0.46**	**1**	**1**	**0**	**1**	**30**	**39**	**69**

Table 3. Fate of live, unmarked Chinook salmon captured during broodstock collection in 2016.

River	Female					Male				
	Spawned		Unspawned				Unspawned			
Capture Date	Full	Partial	Green	Spent	Other	Spawned	Ripe	Spent	Other	Total
Kilbella R										
26-Aug	1	0	4	2	0	2	0	0	0	9
29-Aug	0	0	0	0	0	3	0	0	0	3
1-Sep	0	0	0	0	0	4	0	2	0	6
2-Sep	1	1	0	0	0	2	1	4	0	9
3-Sep	0	0	0	1	0	0	0	0	0	1
6-Sep	0	0	0	0	0	0	0	1	0	1
7-Sep	0	1	0	0	0	1	1	0	0	3
Total	2	2	4	3	0	12	2	7	0	32
Chuckwalla R										
25-Aug	2	0	1	0	1	2	1	0	0	7
27-Aug	1	1	1	1	0	1	0	0	0	5
28-Aug	0	0	0	1	0	1	0	0	0	2
31-Aug	0	0	0	0	0	1	0	0	0	1
4-Sep	1	0	0	1	1	1	0	0	1	5
5-Sep	1	1	0	1	1	2	1	1	0	8
7-Sep	0	0	0	0	0	0	0	0	0	0
8-Sep	0	1	0	0	0	1	0	0	1	3
Total	5	3	2	4	3	9	2	1	2	31
Grand Total	**7**	**5**	**6**	**7**	**3**	**21**	**4**	**8**	**2**	**63**

Table 4. Age composition of Chinook salmon sampled in the Kilbella/Chuckwalla rivers in 2016.

River	European Gilbert-Rich	0.2 3_1	0.3 4_1	0.4 5_1	1.2 4_2	1.3 5_2	M1 1M	M2 2M	M3 3M	M4 4M	Total
Kilbella	Male	0	3	0	5	0	1	1	4	1	15
	Female	0	5	0	0	1	1	0	2	0	9
	Total	0	8	0	5	1	2	1	6	1	24
Chuckwalla	Male	1	5	1	0	1	0	0	2	0	10
	Female	0	7	0	1	3	0	0	1	1	13
	Total	1	12	1	1	4	0	0	3	1	23

Notes:

M1 (1M) = 1 marine annuli; M2 (2M) = 2 marine annuli; etc.

Table 5. Number of female Chinook salmon spawned, eggs planted at the Snootli Hatchery, and fry reared in net pens and released in Rivers Inlet for broods 2014 to 2016.

River/Year	Females Spawned	Eggs Planted (Est.)	Number of Fry Transferred to Sea Pens	Number of Fry Released in Rivers Inlet	Egg-to-Release Survival
Kilbella River					
2014-15	3	12,859	12,224	12,122	94.3%
2015-16	6	21,252	19,523	19,518	91.8%
2016-17	4	14,082	-	13,096	93.0%
Total	13	48,193	31,747	44,736	92.8%
Chuckwalla River					
2014-15	1	5,998	4,297	4,258	71.0%
2015-16	2	11,601	10,810	10,793	93.0%
2016-17	8	33,102	-	28,770	86.9%
Total	11	50,701	15,107	43,821	86.4%
Both Rivers					
2014-15	4	18,857	16,521	16,380	86.9%
2015-16	8	32,853	30,333	30,311	92.3%
2016-17	12	47,184	-	41,866	88.7%
Total	24	98,894	46,854	88,557	89.5%

Notes:

2014-15: 1 female from the Kilbella was partially spent.

2015-16: 3 females from the Kilbella and 1 from the Chuckwalla were partially spent.

2016-17: 2 females from the Kilbella and 3 from the Chuckwalla were partially spent.

Figure 1. Map of the Kilbella and Chuckwalla rivers showing the location of the holding site in the lower Chuckwalla River (rkm 0.6).

Figure 2. Location of gillnet sets made in the Kilbella River, 2016. Labels indicate the month/day and set number (e.g., "9/6-1" is the first set made on 6 September). Note that some set sites may not be shown if their location overlaps with other sets.

Figure 3. Location of Chinook salmon captured in the Kilbella River, 2016. Data labels indicate the ID#, month/day and fish sex (e.g., "29-9/6-M" is ID#29, a male caught on 6 September). Note that some fish captured may not be shown if their capture location overlaps with other fish.

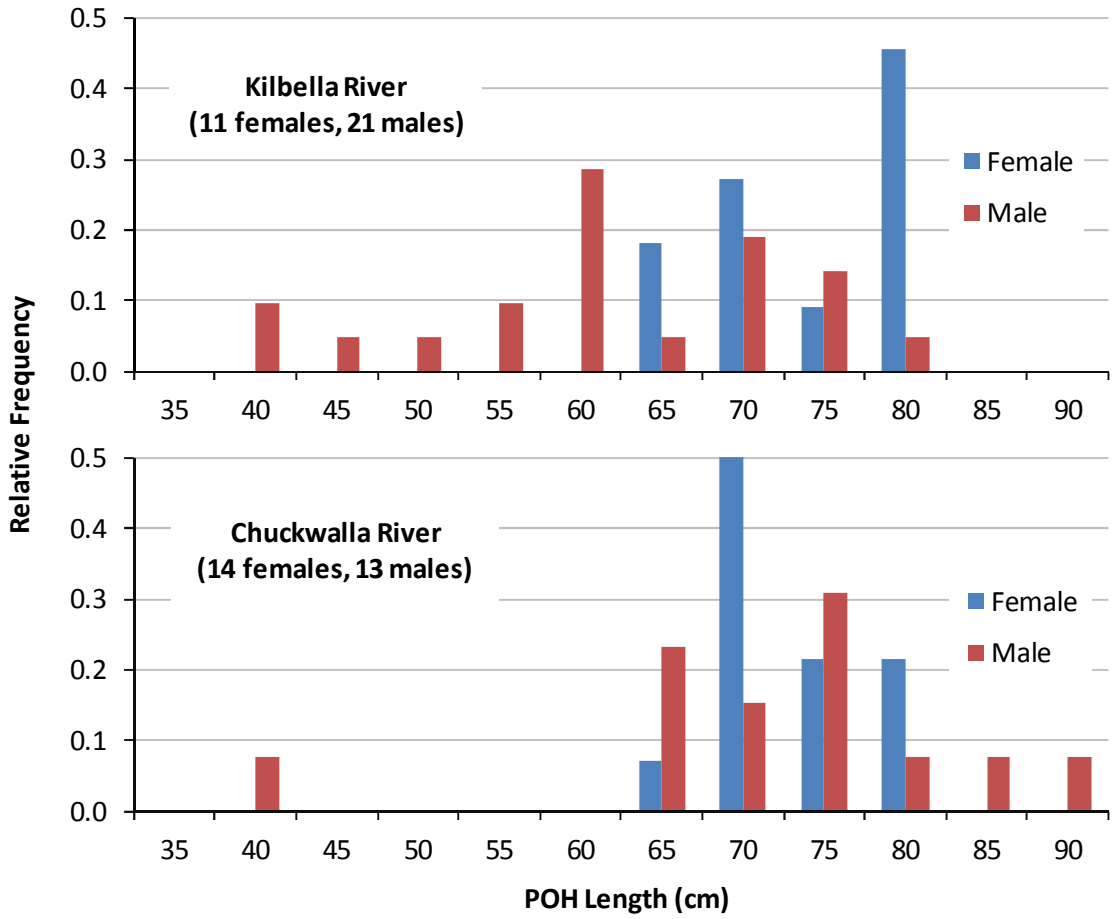

Figure 4. Length-frequency distribution of Chinook salmon sampled in 2016, by river and sex. Post-orbital hypural (POH) length was used, and both live and dead fish were included.

Figure 5. Location of gillnet sets made in the Chuckwalla River, 2016. Labels indicate the month/day and set number (e.g., "8/25-1" is the first set made on 25 August). Note that some set sites may not be shown if their location overlaps with other sets.

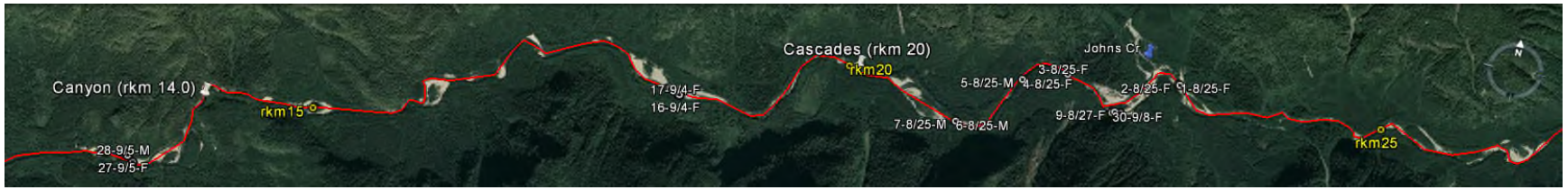

Figure 6. Location of Chinook salmon captured in the Chuckwalla River, 2016. Data labels indicate the ID#, month/day and fish sex (e.g., "5-8/25-M" represents ID#5, a male caught on 25 August). Note that some fish captured may not be shown if their capture location overlaps with other fish.

Photo 1. Gillnet deployed in the Chuckwalla River on 25 August 2016.

Photo 2. Inflatable raft used to transport gear during broodstock collection on the Kilbella River, 26 August 2016.

Photo 3. Two male Chinook salmon captured in the Chuckwalla River, 4 September 2016.

Photo 4. Eggs being collected from a ripe female Chinook salmon on the upper Kilbella River, 26 August 2016.

Photo 5. Eggs being collected from a ripe female Chinook salmon on the upper Kilbella River, 26 August 2016.

Photo 6. Net pens in Kilbella Bay where juvenile Chinook salmon from the 2016 brood year were reared prior to release (19 May 2017).