



South Coast Salmon Bulletin

September 17, 2022 Escapement Update #1

Chinook, Coho and Chum – Area 18 Cowichan River

Summary

This bulletin summarizes salmon stock assessment and research activities conducted in the Cowichan River watershed by a variety of organizations including Cowichan Tribes, DFO, contractors and academic institutions. Estimates reported here are preliminary and should be interpreted with caution. Finalized estimates will be made available following the escapement season.

Final 2021 Escapement Summary

Chinook

The fence in the 2021 season ran from 16:00 on September 8th to 12:00 on September 30th, one of the shortest operational periods since the PST indicator program began in 1988. A total of **10,197 Chinook (6,249 adults and 3,948 jacks)** were recorded through the fence during operations. **30 adult PIT tags** and **18 jack PIT tags** were detected while the fence was operational, resulting in a mark rate of 1 in 208 adults and 1 in 219 jacks. Using PIT tag detections following fence removal (33 adults and 22 jacks) we estimated that **47.6%** of adults and **45.0%** of jacks passed through the fence between September 8th and 30th. Post-season expansions produced a total escapement estimate of **23,745 Chinook (14,770 adults and 8,975 jacks) including 21,863 natural spawners (13,336 adults and 8,527 jacks)**. Hatchery contribution to the natural spawning population was estimated at 6.1% for jacks and 12.1% for adults based on adipose clips.

Coho, Chum & Pink

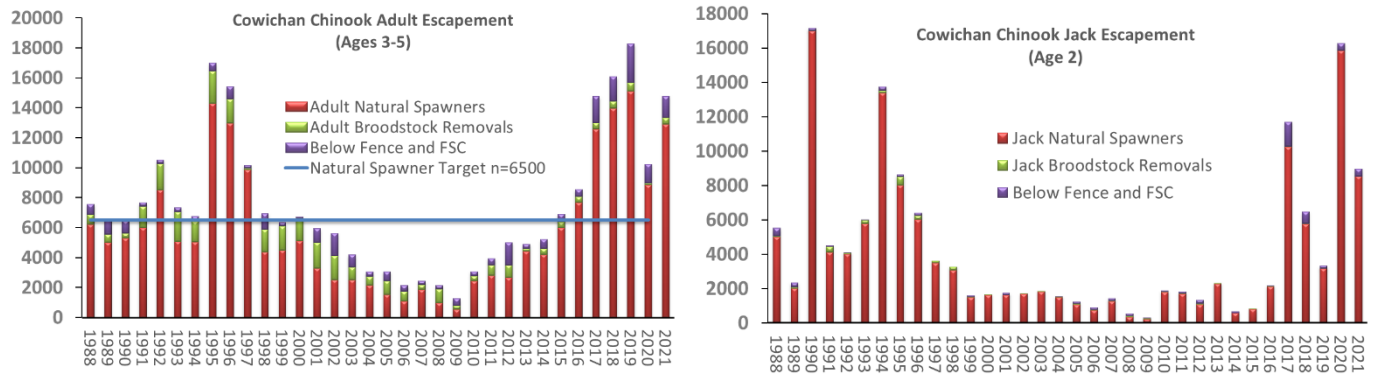
In addition to Chinook, a total of **148 Coho (92 adults, 56 Jacks)** were recorded through the fence in 2021 along with **20 Chum and 120 Pink**. Counts from the third full season operation of the Skutz Falls fishway camera were **3,547 Chinook (3,087 adults, 460 jacks), 5,169 Coho (4,832 adults and 307 jacks) and 312 Chum**. The camera was operational from August 18th to October 25th. Expanded estimates for **Coho Adults** were **31,716 ± 7,070 (SD) (CV: 22.3%)** using an expansion of Skutz Falls camera counts based on PIT tags detected at the fence site (104 Adults) and re-detections at Skutz Falls (15 Adults). Please note that the Coefficient of Variation (CV) for this estimate is higher than the benchmark of 15% due to fewer juvenile tags in 2020 (1,500 instead of 5,000) and a shorter operating season (high flows). Too few tagged jacks were detected at Skutz Falls to produce a reliable estimate.

The lower-river DIDSON was installed on October 12th and removed on November 18th. As with many other East Coast Vancouver Island systems, **Chum** were well below target (160,000) in 2021 with a total estimate of **23,531**.

2022 Pre-Season Expectations

Chinook: There are no formal forecasts for Chinook returns to the Cowichan River. Returns in 2021 surpassed 10,000 adult fish for the fifth year in a row. Expectations are for continued rebuilding with a moderate to strong possibility of reaching the target escapement for the system (6,500 naturally

spawning adults). Informal forecasts through *Forecast-R* modelling and brood-year projections suggest a total return of ~25,000 including age-2 jacks, which is similar to recent years. Age 4 Chinook are also expected to be dominant in the adult return due to strong age-2 and age-3 returns from the 2019 smolt/ocean entry cohort. See below for summary graphs with Chinook returns since the beginning of the indicator program in 1988 and the brood-year projection forecast table.



Brood Year	Natural Adults	Smolt Year	Age 2	Age 3	Age 4	Age 5	Total	Adults
2011	2786	2012	2313	4014	4797	473	11597	9284
2012	2668	2013	668	1853	3739	92	6352	5684
2013	4406	2014	887	4335	4623	141	9986	9099
2014	4185	2015	2179	8439	5420	115	16153	13974
2015	5984	2016	13282	10476	11415	173	35346	22064
2016	7671	2017	6445	6569	6051	136	19201	12756
2017	12572	2018	3335	3905	3437	125	10802	7467
2018	13975	2019	14597	11196	12200		37993	23396
2019	15103	2020	8975	7500				
2020	8849	2021	6500					
		2022 Forecast						
		Jacks	6500					
		Adults	19825					
		Total	26325					

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Coho: Coho are expected to remain in a low productivity period throughout Southern BC. Marine survivals are forecast remain similar to 2021 levels for both wild and hatchery indicators. A new project to estimate Coho escapement and run timing for the Cowichan River was initiated in 2018 with the goal of building an annual data set. Preliminary data suggest Coho survival is higher than other Strait of Georgia systems and recent escapements (2019-2021) are in excess of 10,000 adults. Skutz Falls is the primary enumeration site for this species as the fence is typically removed before the peak of migration.

Pink: A small number of pinks (~100) are typically observed at the fence every fall.

Chum: Chum returns in 2022 are forecast to be higher than the escapement target of 160,000 for Cowichan at 188,000 based on contributing brood year escapement and normal survival values (“normal forecast”). However, if recent low survivals persist through 2022 (“like last year model”) then we expect to see around 18,000 chum return. Forecasts for chum are highly uncertain and will be revised in-season as returns are enumerated using a DIDSON. The peak of the run is expected to occur near November 1.

Sockeye: Although the Cowichan is not considered a Sockeye system a handful of fish are observed in most years but migration likely occurs before the fence is installed.

2022 Operations

General operations at the counting fence in 2022 remain unchanged from 2021. Improvements were made to passageway infrastructure this year to improve durability and allow for a deflecting device to be inserted during turbid conditions. This insert encourages fish to swim closer to the camera to improve enumeration during lower visibility periods. Recent upgrades at the enumeration fence include: new fence rail (2017), building with internet (2018), concrete bulkhead (2019) utilization of two passageways and wider openings (2019), new Passive Integrated Transponder (PIT) in-river arrays (2020).

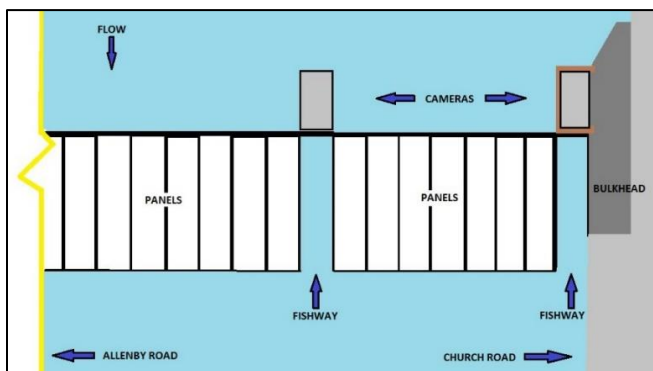
The passageways, one located against the bulkhead and one mid-river, have replaced traditional camera boxes to improve fish migration as of 2019. Each passageway is instrumented with two under water cameras with motion detection capability as well as LED lights for night time operation. Results from 2018-2021 indicate that fish strongly prefer the wider passages compared to the traditional camera tunnels. Delays below the fence have been reduced with the highest single day migration totals observed in 2019 for the 33 year program.

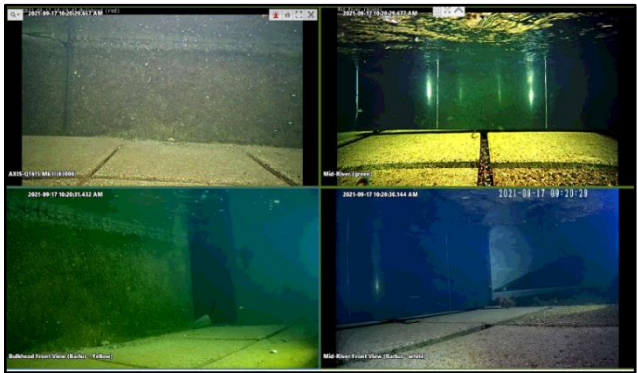


Escapement Monitoring Methods

Counting Fence

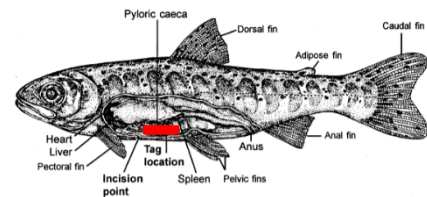
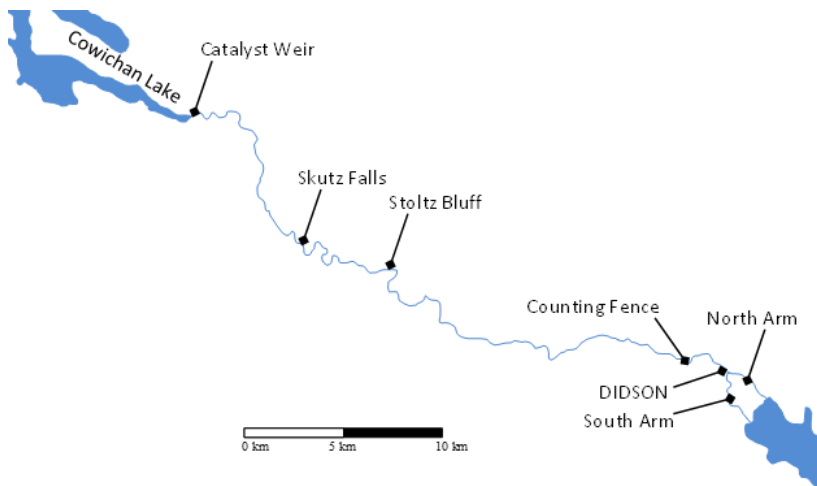
The counting fence is located 150 m downstream of the Allenby Road bridge crossing and is accessed via Church Road on Cowichan Tribes land. The fence funnels migrating fish through two passages where species, size and origin can be evaluated. Cameras are set to record each migration event based on a motion trigger such that periods of inactivity can be skipped efficiently. Crews are present at the fence 24 hours per day to enumerate fish as they move past the cameras as well as to clear debris and maintain equipment as required. The floating panels pivot based on water levels and are expected to remain operational through mid-October. The fence is not designed to withstand high flows and will be removed when the discharge exceeds 30 m³/s.





PIT Tags

Returning chinook will also continue to be scanned for PIT tags using the in-river arrays at the counting fence and Skutz Falls, as well as during brood stock collection. Temporary arrays have also been installed in the south and north arm channels in order to better understand lower river migration behavior. Over 75,000 juveniles have been implanted with tags since 2014 with funding from the Pacific Salmon Foundation as part of the Salish Sea Marine Survival Project (2013-2018) and more recently the Pacific Salmon Commission. Due in part to the success of this tagging work, a new project has been funded through BCSRIF (BC Salmon Restoration and Innovation Fund) to investigate marine survival Bottlenecks through the first marine winter. PIT tag arrays and tag deployments have now occurred in other ECVI Chinook systems such as Nanaimo, Big Qualicum, Puntledge and Quinsam in addition to ongoing work in Cowichan.



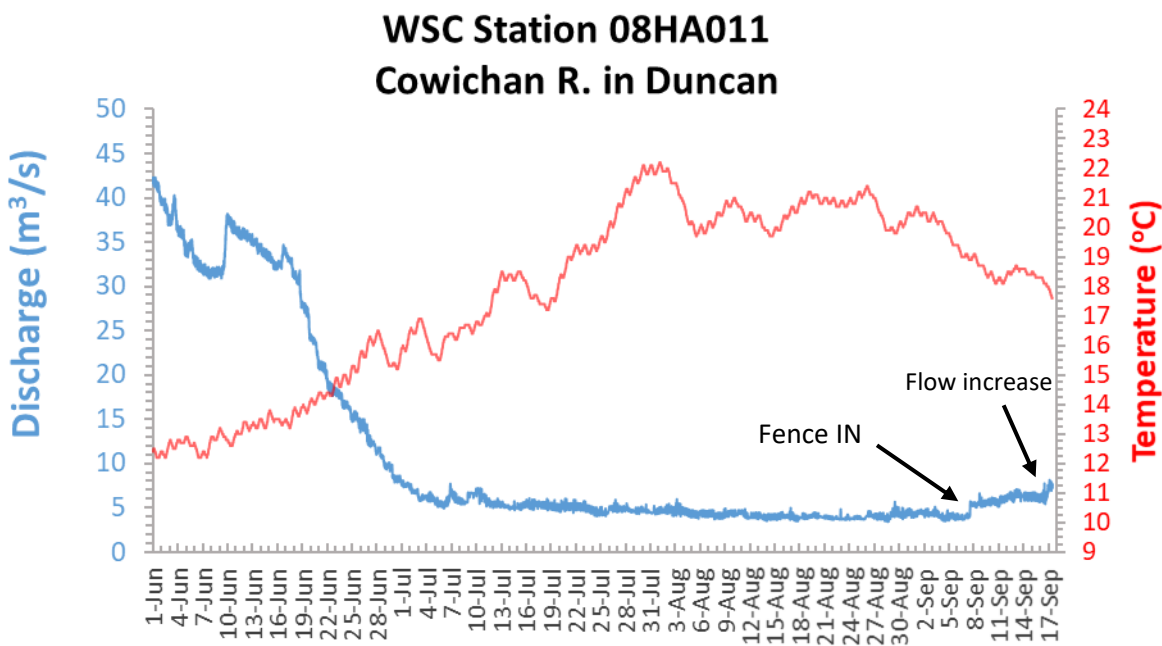
PIT tags operate on Radio Frequency Identification (RFID) technology and do not have a battery. They can be read at short distances (50-150 cm) with an antenna that both charges the tag with a magnetic field and listens for the response. Tag detections are linked to a tagging data base which provides information on the time, location, origin and size of each fish on the day it was tagged. The proportion of tags in the population passing through the fence and/or in brood sets can be used to expand the number of detections on the permanent arrays to a total run size. This can be particularly useful in years when the operation of the fence does not cover the entire run time (installed late or removed due to high water).

DIDSON

Dual-frequency Identification Sonar (DIDSON) technology uses high frequency sound waves to visualize and count fish in a wide range of stream conditions. DIDSONs are especially useful when water is turbid and traditional video cameras would not be able to capture a clear image. The images produced can tell us the size of fish, how many pass through and which direction they are going. This information, combined with species composition information, helps us count how many fish are moving upstream to spawn.

Environmental Conditions

Numerous rainfall events in the spring and early summer have led to maximum storage levels at Lake Cowichan, allowing for water to be released in accordance with Catalyst's rule-curve. Cool temperatures and rainfall in the spring was followed by hot, dry weather in July and August. Despite the hot conditions, lake levels remained high and baseflow conditions of 7 m³/s were able to be maintained throughout the summer. Starting September 16th discharge out of Cowichan Lake was raised to 10 m³/s to encourage Chinook movement into the river and to reduce lake storage levels prior to rainfall events this Fall.



2022 Adult Enumeration

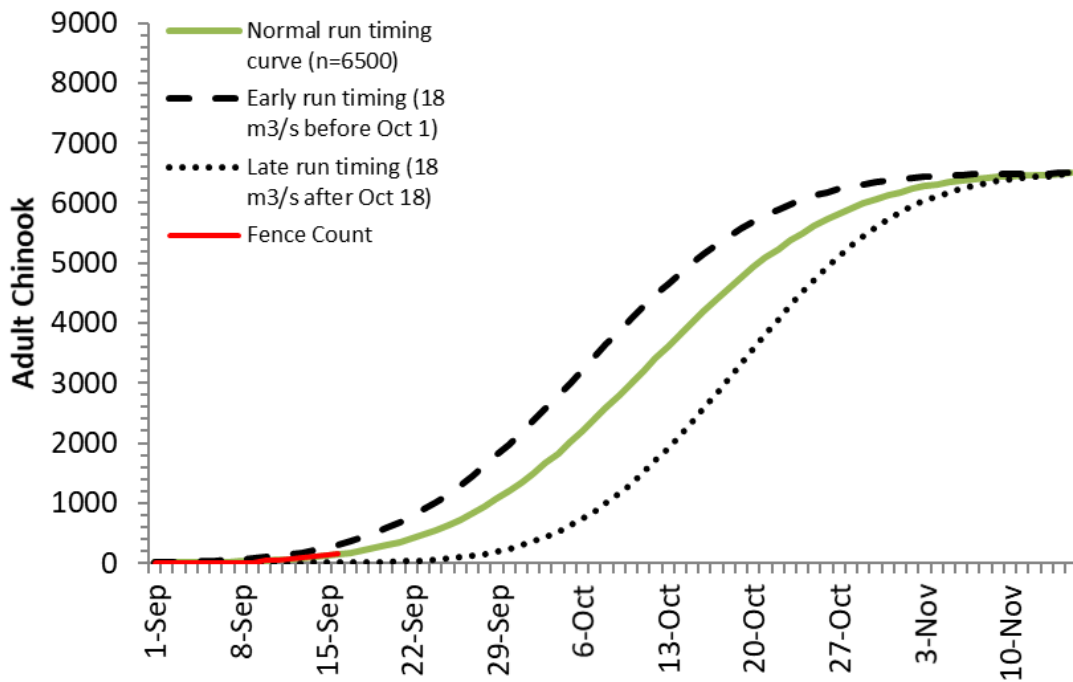
Counting Fence

Chinook enumeration at the counting fence began on September 9th at 16:00. Totals from video based counts are presented below and will be reviewed post season to produce a final escapement estimate for 2022.

Chinook: Cumulative totals for 2022 Chinook migration past the fence, up to September 16th at 4:00 PM are:

	Wild (unclipped)	Hatchery (clipped)	Unknown	Total
Adults	151	3	0	154
Jacks	107	0	3	110
Total	258	3	3	264

The graph below compares the in-season counts to run timing curves based on river conditions.



Coho, Chum and Pink: Cumulative totals for 2022 migration past the fence, up to September 16th at 4:00 PM are:

	Coho	Chum	Pink	Unknown
Adults	11	0	5	4
Jacks	1			
Total	12	0	5	4

For more information Contact:

Karalea Cantera, Strait of Georgia Salmon Stock Assessment Biologist

Karalea.Cantera@dfo-mpo.gc.ca

778-268-2847

Kevin Pellett, Strait of Georgia Salmon Stock Assessment Senior Biologist

Kevin.Pellett@dfo-mpo.gc.ca

250-756-7273

Don Elliott, Cowichan Hatchery Manager

Don.Elliott@cowichantribes.com

250-746-5741



Cowichan Tribes



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