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South Coast Salmon Bulletin

October 21, 2022 Escapement Update #6

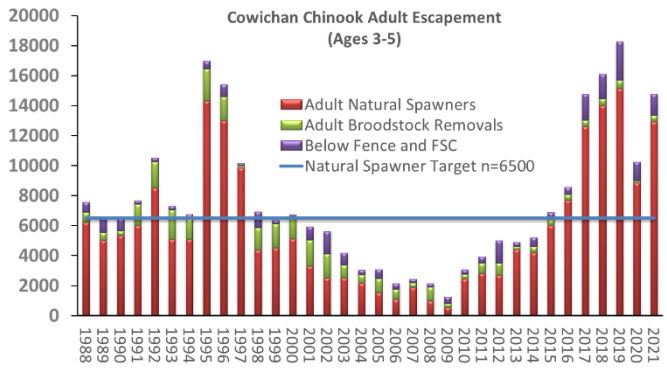
Chinook, Coho and Chum – Area 18 Cowichan River

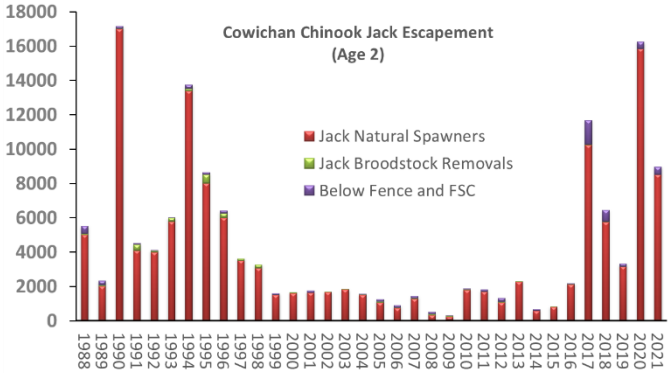
Summary

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.

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.





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.

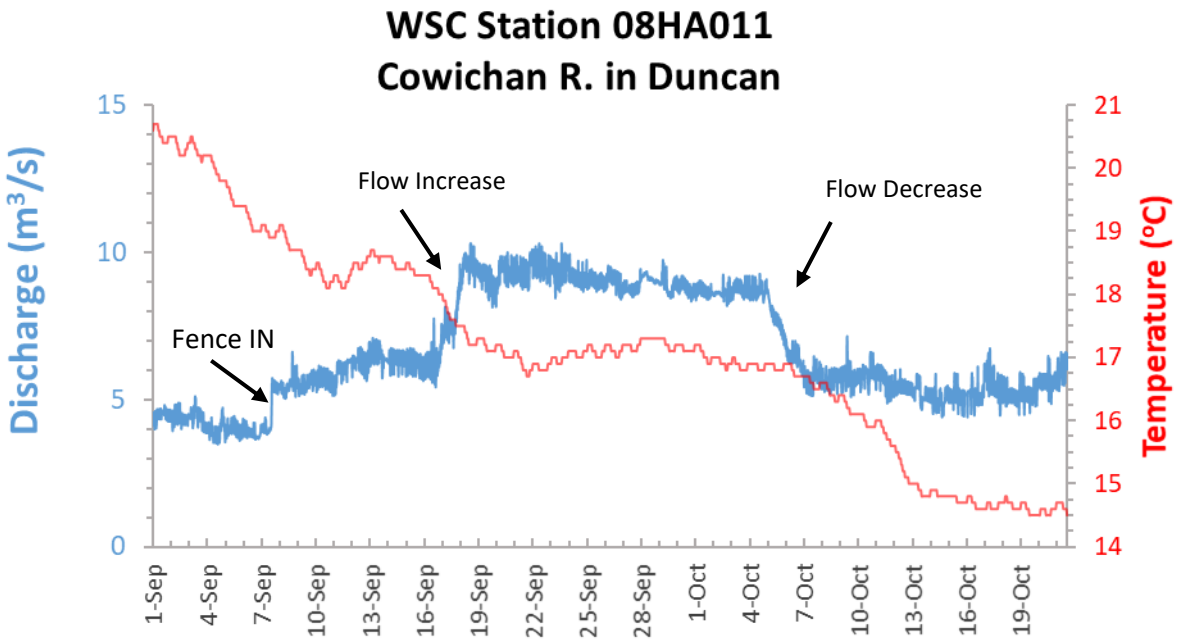
Pink: A small number of pinks (~100) are typically observed at the fence every fall.

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.

Environmental Conditions

Cowichan Lake levels were high throughout the summer months, allowing for Catalyst to maintain baseflow conditions of 7 m^3/s and increase flow to 10 m^3/s between September 16th and October 4th. The increased flow served to encourage Chinook movement into the river and reduce Lake storage levels in anticipation of fall rain. However, BC's South Coast has been experiencing unseasonably dry weather this fall, leading to concerns about low Lake storage levels. Following discussions with Cowichan Tribes and DFO, Catalyst began reducing flow back to 7m^3/s on October 4th. Current Lake storage levels allow for baseflow to be maintained until October 27th with no new rainfall. Cowichan Tribes and DFO have been closely monitoring fish movement and health, and have decided to remove panels from the counting fence as a mitigative measure. The fence configuration may be readjusted following rainfall and more significant fish movement.



2022 Adult Enumeration

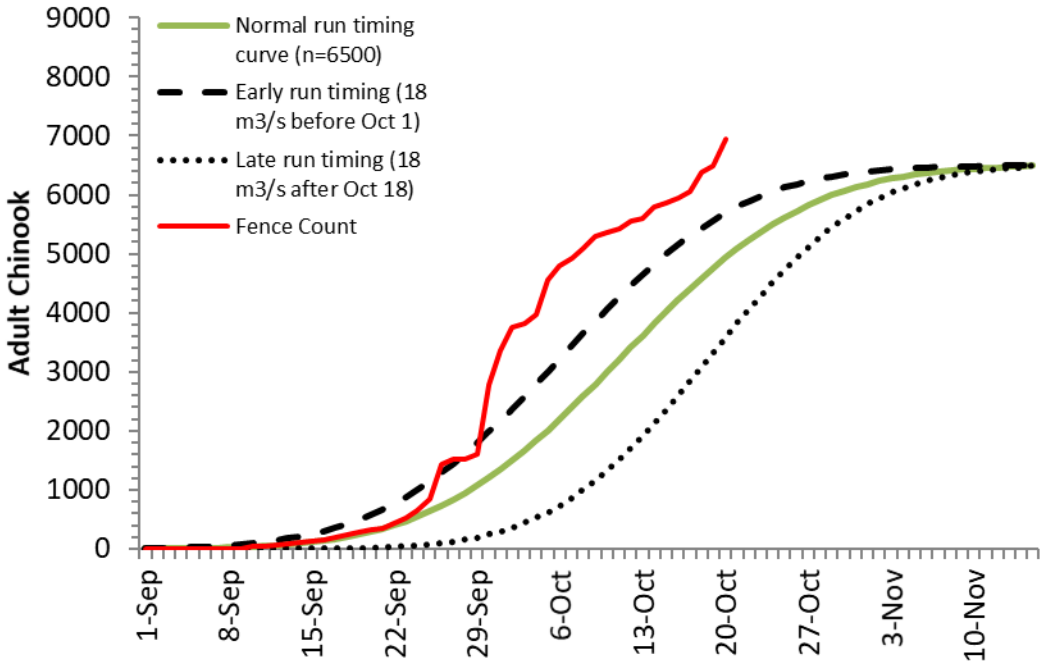
Counting Fence

Chinook enumeration at the counting fence began on September 9th at 4:00 PM. Totals from video based counts are presented below and will be reviewed post season to produce a final escapement estimate for 2022. The fence was closed for hatchery brood collection of Chinook on September 27th and was opened again on September 29th. On October 13th two fence panels in the mid-river were removed and modified to increase fish passage through the fence.

Chinook: Cumulative totals for 2022 Chinook migration past the fence, up to October 21st at 8:00 AM are:

	Wild (unclipped)	Hatchery (clipped)	Unknown	Total
Adults	6661	202	123	6986
Jacks	1888	73	80	2041
Total	**8549**	**275**	**203**	**9027**

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



Coho, Chum and Pink: Cumulative totals for 2022 migration past the fence, up to October 21st at 8:00 AM are:

	Coho	Chum	Pink	Unknown
Adults	1018	114	58	62
Jacks	167			
Total	**1185**	**114**	**58**	**62**

2022 Photos

Below are photos captured during Chinook Floy tagging work completed by DFO and Cowichan Tribes. The goal of this work is to provide a secondary estimate of population size using a mark-recapture analysis comparing the number of initially tagged fish to those recovered in dead-pitch, post-spawning. Tagged fish can also be recorded as they move past the fence and Skutz falls cameras. Included are photos of a chum salmon captured during seining (top left), an adult Chinook before receiving it's tags (top right), crews performing the tagging and biological sampling (bottom left), and a Chinook with the orange Floy tag deployed below it's dorsal fin (bottom right).

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).

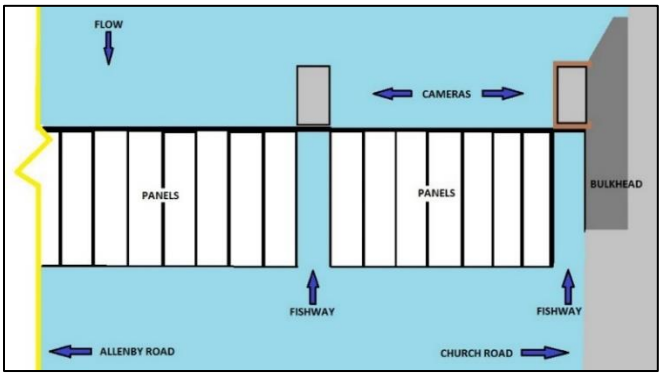
The passageways, one located against the bulkhead and one mid-river, have replaced traditional camera boxes to improve fish migration as of 2019. Each passageway is instrumented with two under water

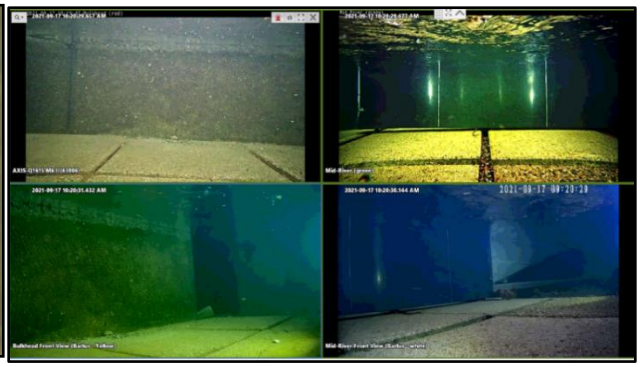
cameras with motion detection capability as well as LED lights for night time operation. Results from 2018-2021 indicate that fish strongly prefer the wider passages compared to the traditional camera tunnels. Delays below the fence have been reduced with the highest single day migration totals observed in 2019 for the 33 year program.

Escapement Monitoring Methods

Counting Fence

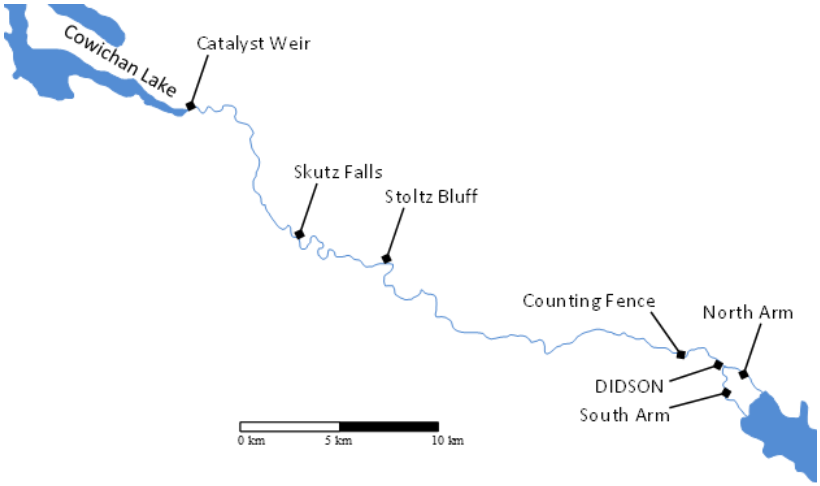
The counting fence is located 150 m downstream of the Allenby Road bridge crossing and is accessed via Church Road on Cowichan Tribes land. The fence funnels migrating fish through two passages where species, size and origin can be evaluated. Cameras are set to record each migration event based on a 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 m^3/s.

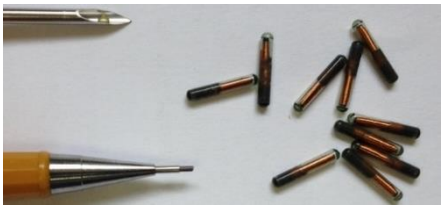


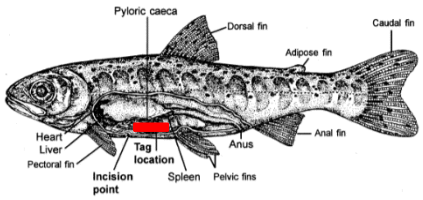


PIT Tags

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.

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