



South Coast Salmon Bulletin

September 13, 2024 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.

2024 Pre-Season Expectations

Chinook: There are no formal forecasts for Chinook returns to the Cowichan River. Returns in 2023 surpassed 10,000 adult fish for the seventh year in a row. Expectations are for continued rebuilding with a strong possibility of reaching the target escapement for the system (6,500 naturally spawning adults). Informal forecasts for Natural Spawners (including age-2) through brood-year projections and *Forecast-R* modelling suggest a return of 30,085 and 27,219 respectively. Figure 1 shows recent and historic Chinook escapement in Cowichan River. Figure 2 displays the brood-year projection for 2024, and Figure 3 illustrates *Forecast-R* modelling for the 2024 return year.

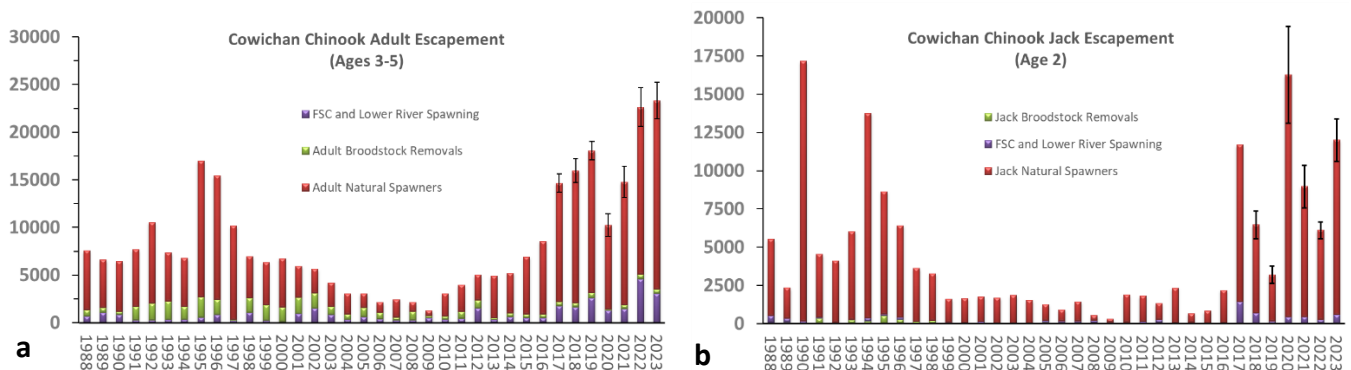


Figure 1: Cowichan Chinook escapement from the beginning of the indicator program to present (1988-2023). (a) Adult (age 3-5) returns are compared to the adult escapement target of 6500 and broken into natural spawners, broodstock removals and returns below the fence. (b) Jack (age-2) returns are also broken down to natural spawners and returns below the fence, with some broodstock removals.

Brood Year	Age 2	Age 3	Age 4	Age 5	Total
2011	2313	4014	4797	473	11597
2012	668	1853	3739	92	6352
2013	887	4335	4623	141	9986
2014	2179	8439	5420	115	16153
2015	13282	10476	11415	173	35346
2016	6445	6569	6051	136	19201
2017	3335	3905	3437	316	10993
2018	14597	11196	10338	584	36715
2019	8975	11976	11956	465	
2020	6105	10778	8076		
2021	12006	14544			
2022	7000				
2023					

Figure 2: Brood-year projections for the 2024 return of naturally spawning Chinook in the Cowichan River. The forecast from this method totals 30,085 Chinook, including 23,085 adults and an estimate of 7,000 jacks (age-2).

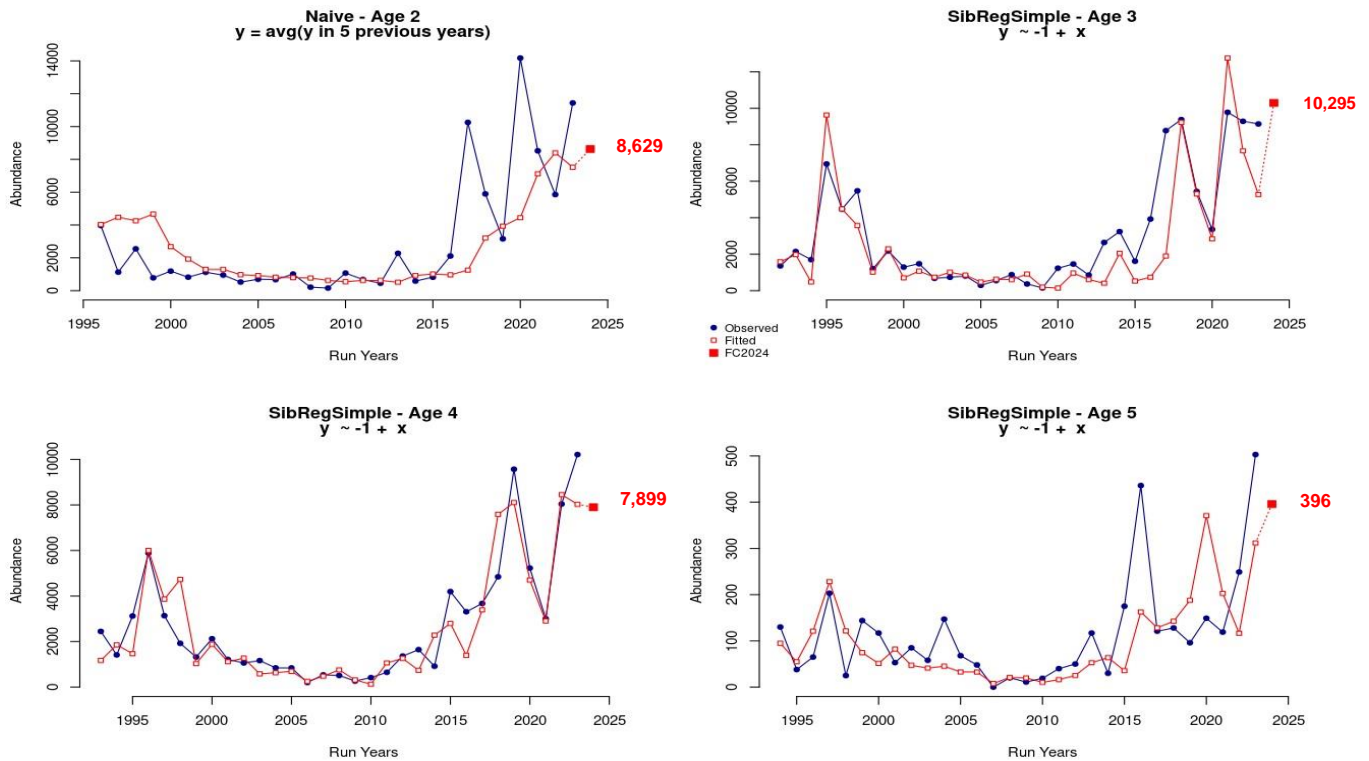


Figure 3: Observed, fitted, and 2024 forecast for Age-2 to Age-5 naturally spawning Chinook in the Cowichan River. The age-2 forecast is a Naïve model using the last five years of returns for that age class. Forecasts for age-3 to age-5 are from Sibling Regression models. Cumulatively these models predict a return of 27,219 naturally spawning Chinook.

Coho: Coho are expected to remain in a low productivity period throughout Southern BC Marine survivals are forecast remain similar to 2023 levels at 3.5% for wild and 1.8-2.6% for hatchery indicators in the Georgia Basin. 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 (2019-2023) 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 2024 are forecast to be lower than the escapement target of 160,000 for Cowichan at 133,600 based on contributing brood year escapement and normal survival values (“normal forecast”). However, if recent low survivals persist through 2024 then we expect to see around 30,700 chum return (“like last year model”). Forecasts for chum are highly uncertain and will be revised in-season as returns are enumerated using sonar enumeration. 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.

2024 Operations

General operations at the counting fence in 2024 incorporate a new low-flow design at the start of the season to increase fish passage when discharge is below baseflow. The design involves four 8 ft passageways with underwater and overhead cameras in half the river, while the other side still utilizes the traditional fence panels. Once river flow increases the regular two-passage configuration will be installed, with one passageway located against the bulkhead and one mid-river (Figure 4).

Past 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) and new Passive Integrated Transponder (PIT) in-river arrays (2020). Since 2019, the two-passage design replaced traditional camera boxes to improve fish migration. Each passageway is instrumented with two underwater cameras with motion detection capability as well as LED lights for night time operation. Results from 2018-2023 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.



Figure 4: Two-passage counting fence configuration with wide passageways located mid-river and at the bulkhead, first piloted in 2019.

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 in the traditional design and four open passages in the low-flow design (Figure 5). The species, size and origin are evaluated in these passageways. 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.

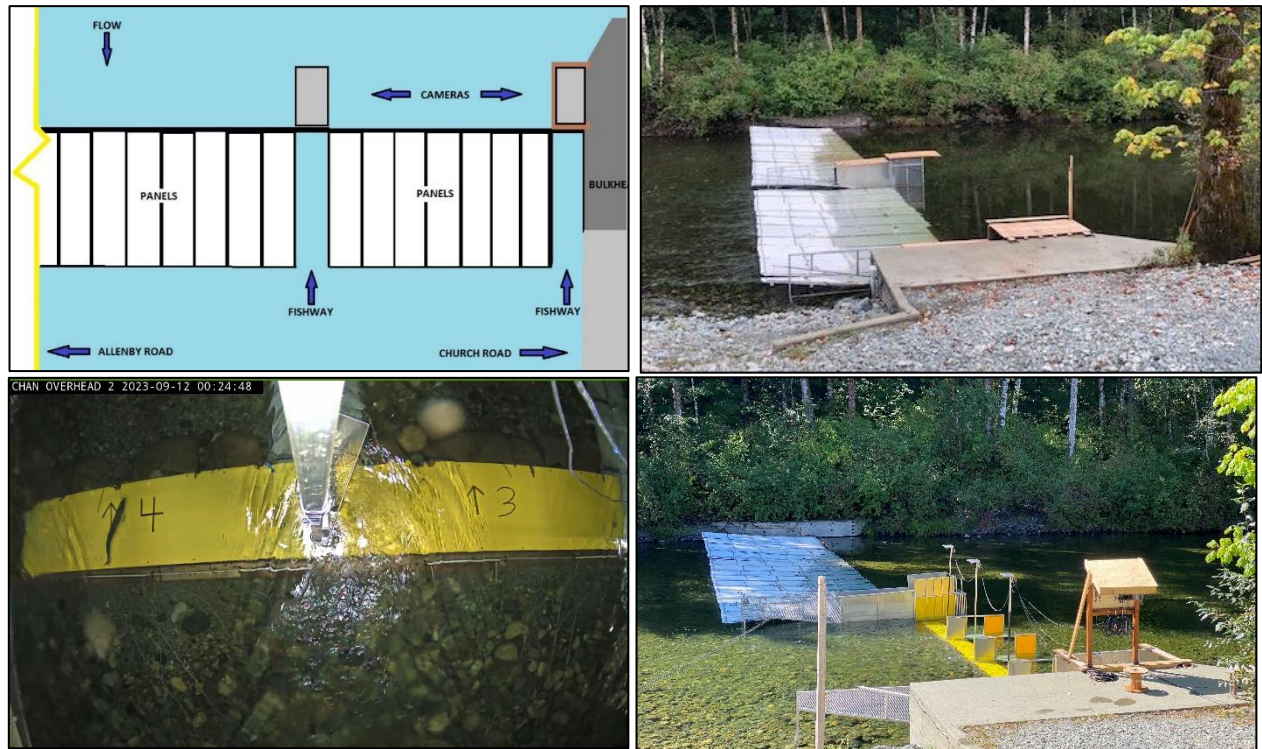


Figure 5: Traditional two-passage counting fence design used since 2019 (top) compared to the new low-flow design with four open passageways and overhead camera views (bottom).

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. A permanent array in the north arm and a temporary setup in the south arm channel have also been installed to better understand lower river migration behavior (Figure 6a). 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. The tags 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. The 12 mm tags are implanted into the abdomen of juveniles, slightly above the pelvic girdle (Figure 6). Tag detections in returning adults 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).

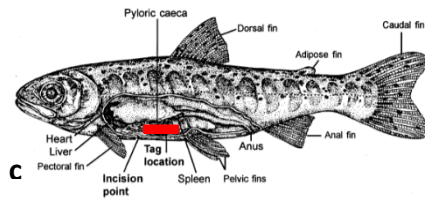
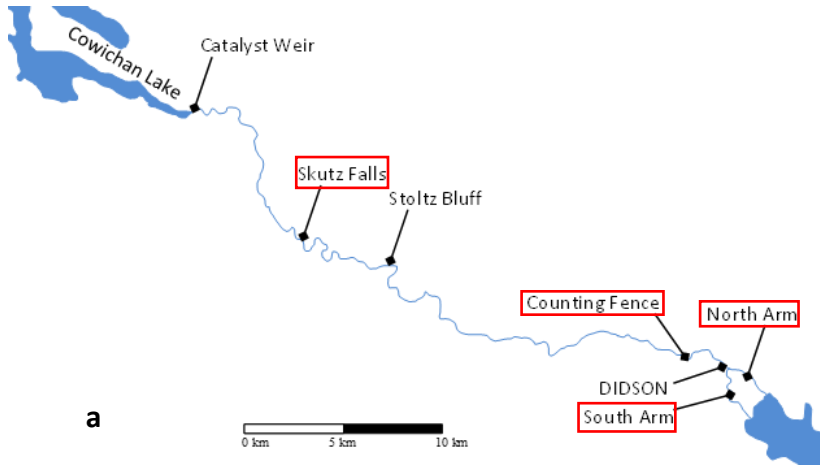


Figure 6: (a) Locations of PIT antennas (red) along with other places of interest in the Cowichan River. (b) PIT tags and implantation needle compared to the size of a mechanical pencil. (c) Anatomy of a salmon smolt with tag location in red.

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

In response to 2023 low-flow and fish health concerns, 2024 weir operation aimed to keep Lake Cowichan at full storage throughout the spring. This allowed baseflow conditions of 7 m³/s to be maintained during the summer and into the fall (Figure 7). These operations and late August rain have resulted in a very low risk of needing to reduce flow this fall.

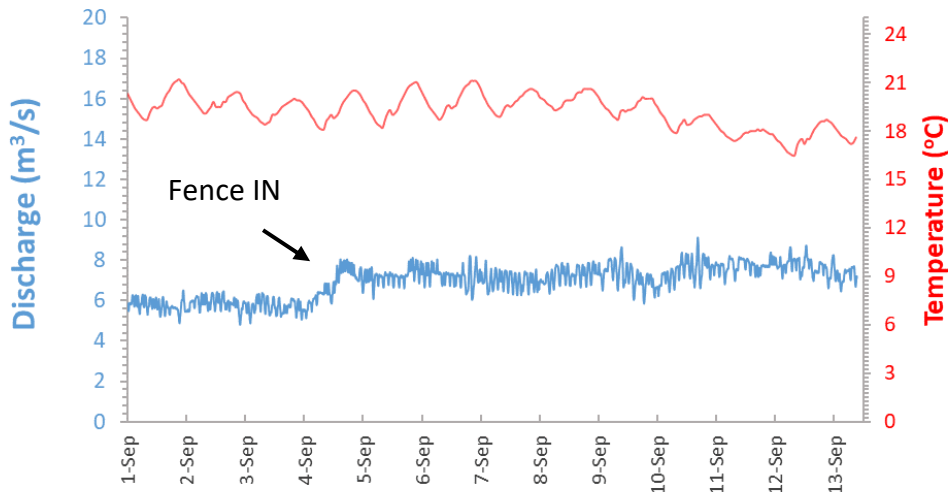


Figure 7: Discharge (m³/s) and Temperature (°C) at Water Survey of Canada Station 08HA011, Cowichan River in Duncan. Discharge levels when the salmon counting fence was installed are indicated.

2024 Adult Enumeration

Counting Fence

Enumeration at the counting fence began on September 6th 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 2024.

Chinook

Chinook migrating past cameras at the counting fence are evaluated for size to determine if they are adults or jacks, and the presence of an adipose fin to determine if they are wild or hatchery origin. Counts up to September 13th at 4:00 PM are presented in Table 1.

Table 1: Cumulative totals for Chinook migration past the fence by age and origin.

	Wild (unclipped)	Hatchery (clipped)	Unknown	Total
Adults	85	8	10	103
Jacks	171	2	27	200
Total	256	10	37	303

Adult Chinook in-season counts are compared to run-timing curves to determine if escapement is on track to meet the target of 6500, using early, normal and late run-timing based on historic escapement and flow conditions (Figure 8).

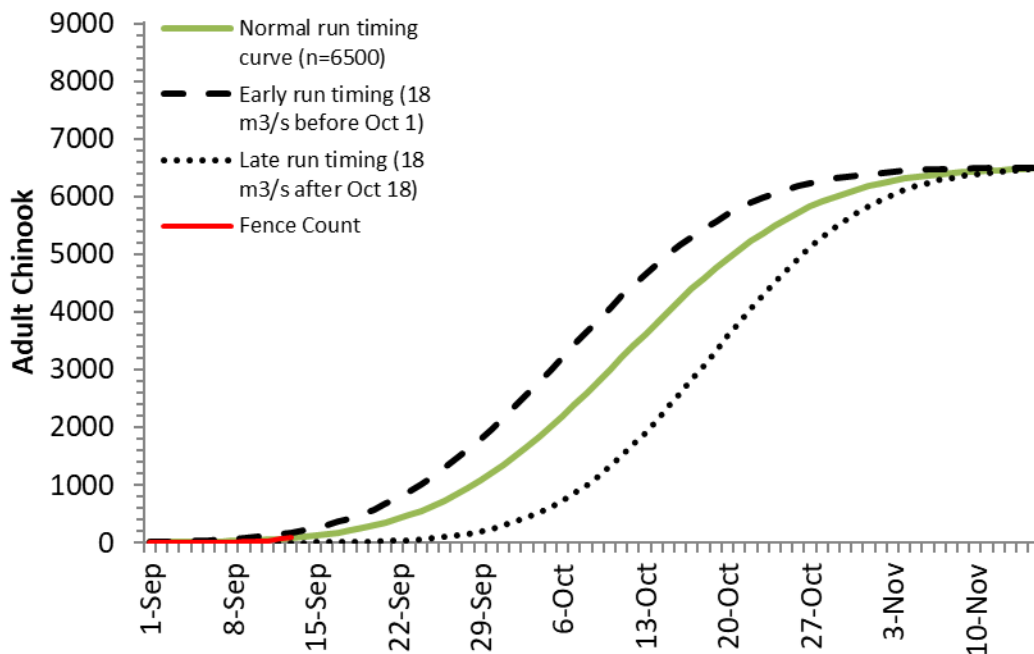


Figure 8: In-season adult Chinook counts compared to normal, early and late run-timing curves based on river conditions.

Coho, Chum and Pink

In addition to Chinook, all other salmon species are identified as they migrate past counting fence cameras. Counts for Coho, Chum and Pink up to September 13th at 4:00 PM are presented in Table 2.

Table 2: Cumulative totals for Coho, Chum and Pink migration past the counting fence.

	Coho	Chum	Pink	Unknown
Adults	0	0	6	1
Jacks	0			
Total	0	0	6	1

2024 Photos

Below are photos captured during stock assessment activities in the Cowichan River. Included are photos of the fishing counting fence this fall utilizing the low-flow design (top left & right), DFO Stock Assessment Technician, Paul, checking water quality loggers (bottom left), and a new PIT array prior to anchoring at the fence site (bottom right) (Figure 9).

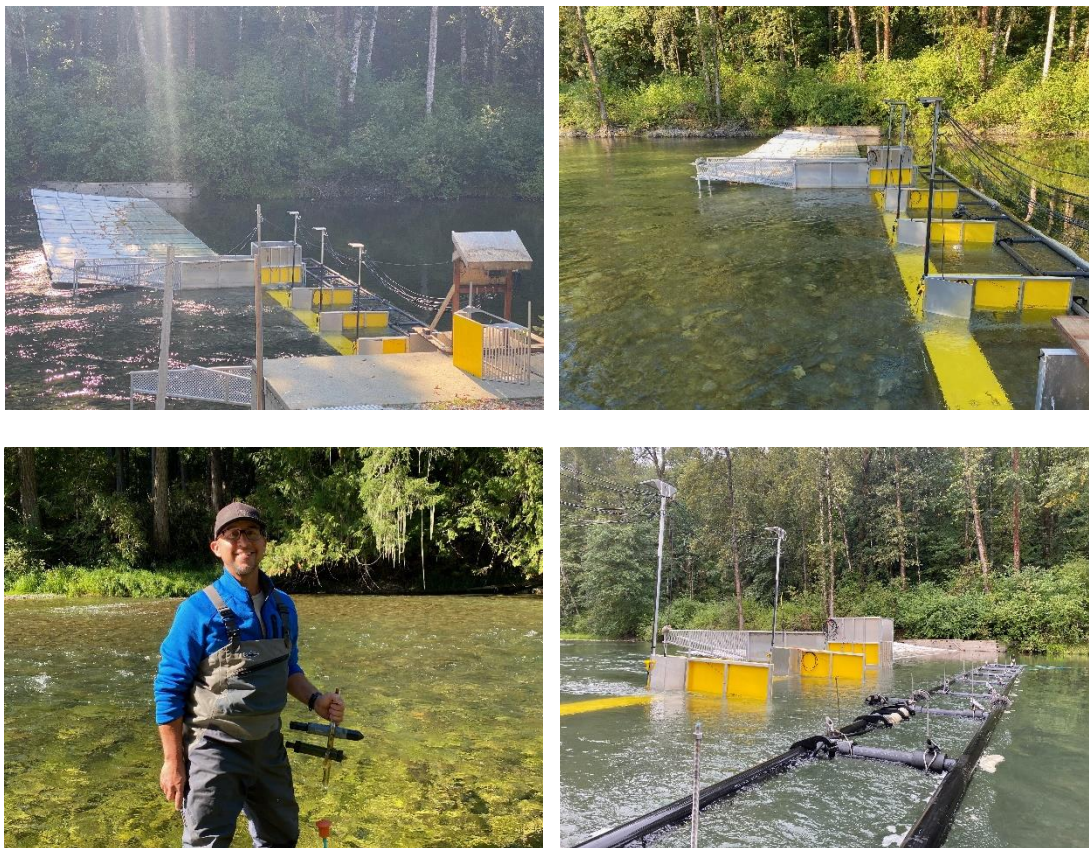


Figure 9: Photos captured during Stock Assessment activities in the Cowichan River in 2024.

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