Cowichan Salmon Update: Current Programs and Trends

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December 18, 2023

2009 – How bad was it?
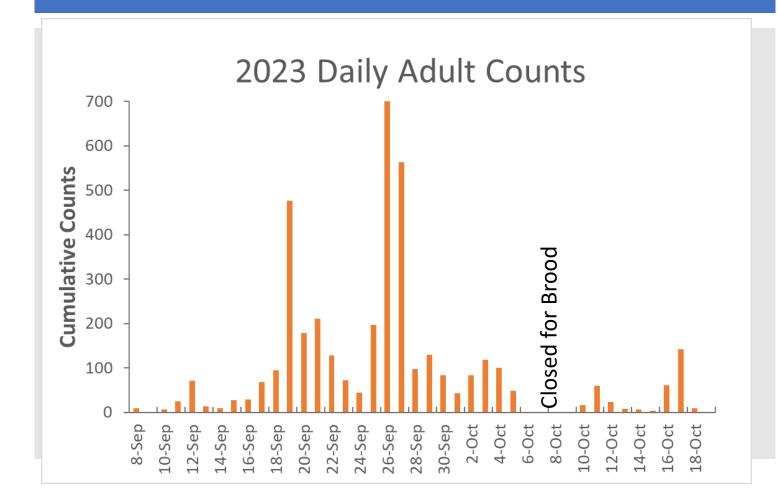
Daily Adult Counts

- 2009 fence count = 173 adults from Sept 9 to Oct 21

- 2022 fence count = 7,074 adults during same period

- 2023 = 8,658 Sept 9 – Oct 18

2023 – How good was it?

2023 Daily Adult Counts

- 16 of 37 days with more than 100 fish

- 6 days with more than 500

- Peak count was 1685 on Sept 27

- More than half the run came through after the fence was removed – not accounted for here.

End of Season Conditions

Expansions

- Rarely do we count the entire run through the fence on any given year.

- Fence counts need to be expanded in most years based on the operating period and flow conditions

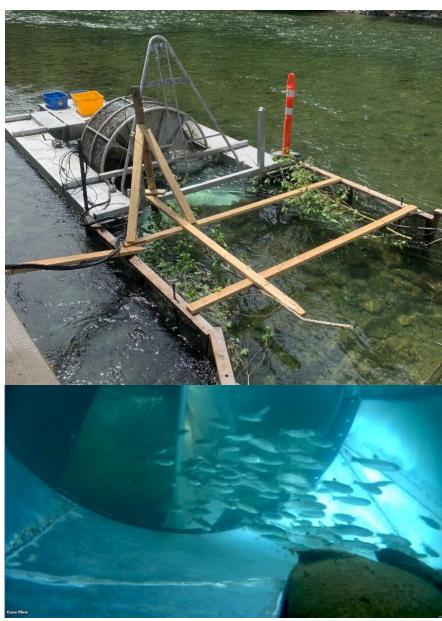- Expansion methods have been inconsistent over time

Appendix 2b. Counting weir and/or Mark/Recapture (M/R) estimates of escapements

| Year	Weir operation: Start	End	Weir Counts: Adults	Jacks	M/R Adult est.	Estimated Popn. Size	Comments
1988	Sept. 10	Nov. 02	5164	4244	NA	6200 Age 3+ 5000 Jacks	
1989	Sept. 13	Oct. 22	1324	1022	NA	No estimate made	Low flows, weir lost on first flood
1990	Sept. 12	Oct. 25	4164	15200	NA	4900 Age 3+ 17000 Jacks	
1991	Aug. 19	Nov. 11	2375	1626	NA	6000 Age 3+ 4100 Jacks	Major flood very early, minimum popn. Estimate
1992	Aug. 18	Oct. 30	7740	3694	7230	8500 Age 3+ 4000 Jacks	Minimum popn estimated, mark /recapture too few tag recoveries
1993	Aug. 22	Nov. 22	5058	5768	4601	5058 Age 3+ 5768 Jacks	First year of complete weir counts
1994	Aug. 15	Nov. 13	5050	13381	3848	5050 Age 3+ 13381 Jacks	Complete weir counts
1995	Sept. 08	Oct. 18	10715	7906	6329	14300 Age 3+ 8000 Jacks	Major flood mid-Oct., expanded counts based on cumulative run curve
1996	Aug. 30	Oct. 23	10385	5752	9411	12980 Age 3+ 6000 Jacks	Flooding again, expanded counts based on cumulative run curve
1997	Sept. 05	Oct. 03	4349	2374	5547	7876 Age 3+ 3500 Jacks	Major flood in early Oct., Mark/Recapture estimates used assuming a 50:50 sex ratio
1998	Sept. 05	Nov. 08	4328	3065	2087	4760 Age 3+ 3065 Jacks	Weir count + 10% for returns after Nov. 8th, no inflation of Jacks
1999	Aug. 27	Oct. 30	3836	1290	3440	4500 Age 3+ 1500 Jacks	Weir count +15% for returns after Oct.30th, mark re-capture less than these values
2000	Sep. 8	Oct. 24	4667	1391	2364	5109 Age 3+ 4110 jacks	Weir count +15% for returns after Oct.24th, mark re-capture less than these values

PIT Tag Program
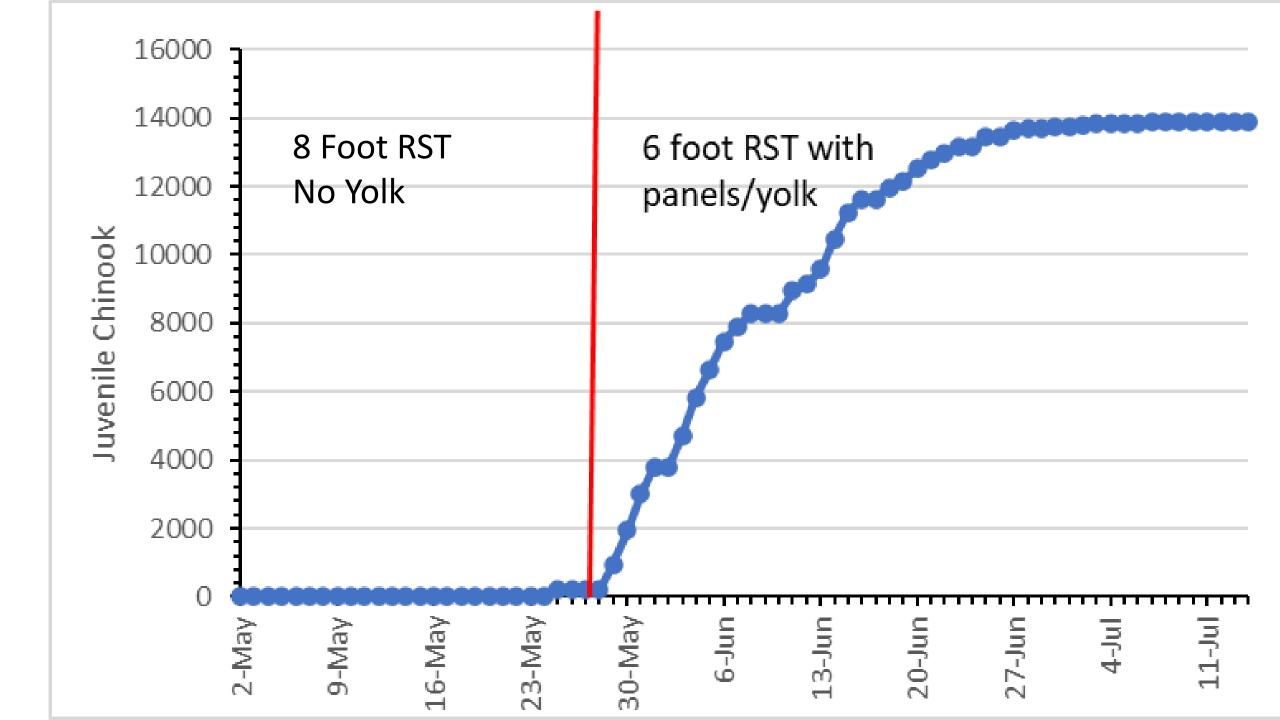
- Began in 2014 with funding from the Salish Sea Marine Survival Program (SSMSP)

- Juvenile Chinook implanted with PIT tags and returning adults scanned with antennas

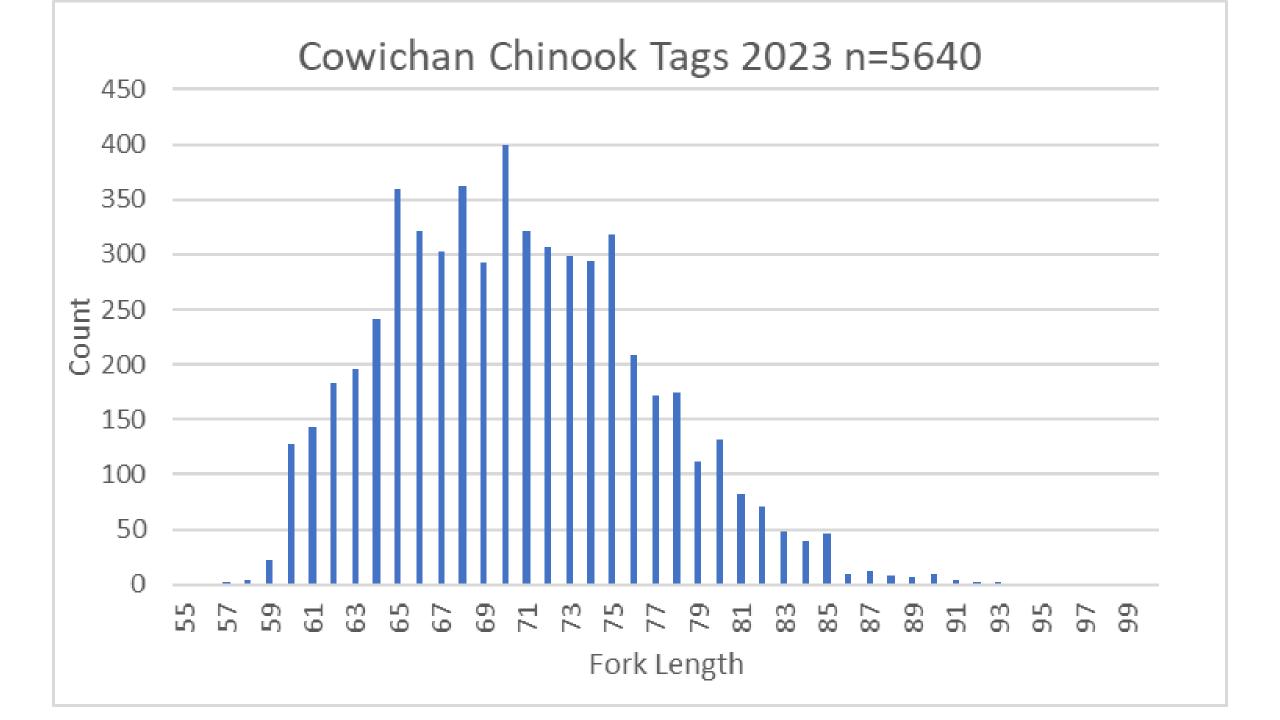- Can approximate run timing with detections to expand fence (antennas stay in all year)

RST: Yolk ("Smolt Gobbler")

RST Installation

Cowichan Chinook Tags 2023 n=5640
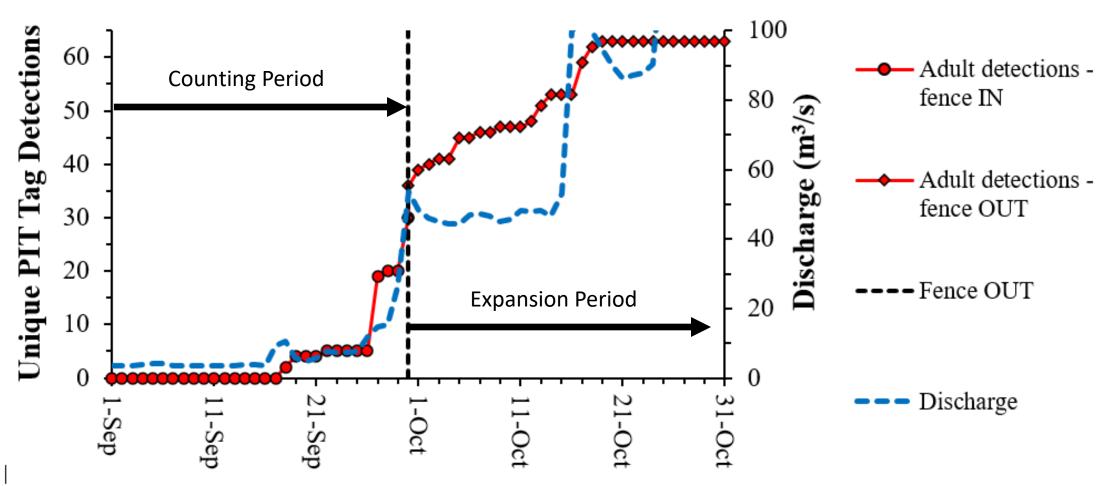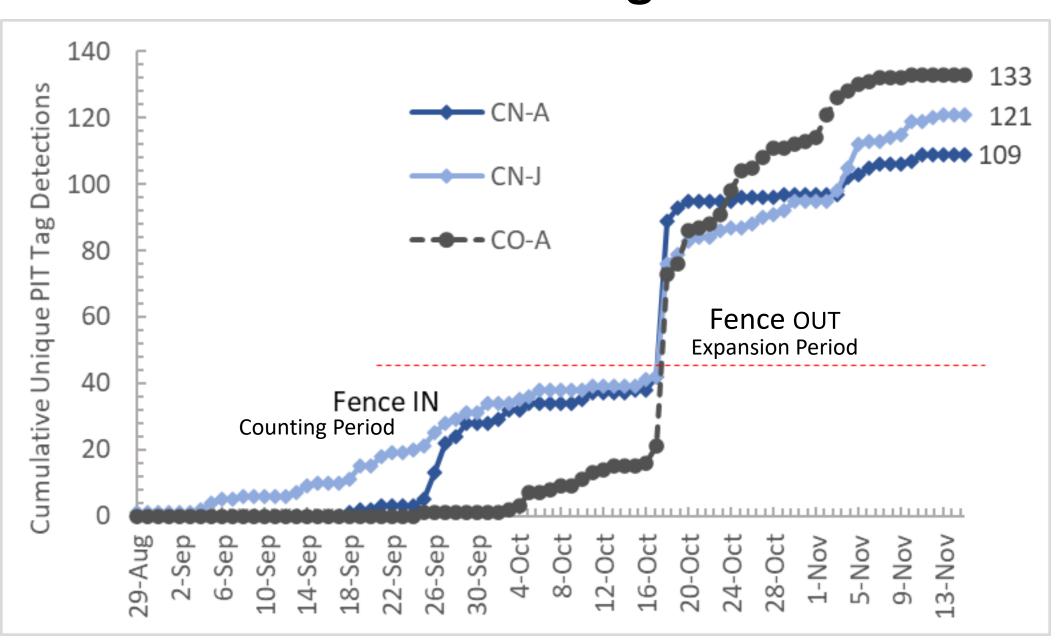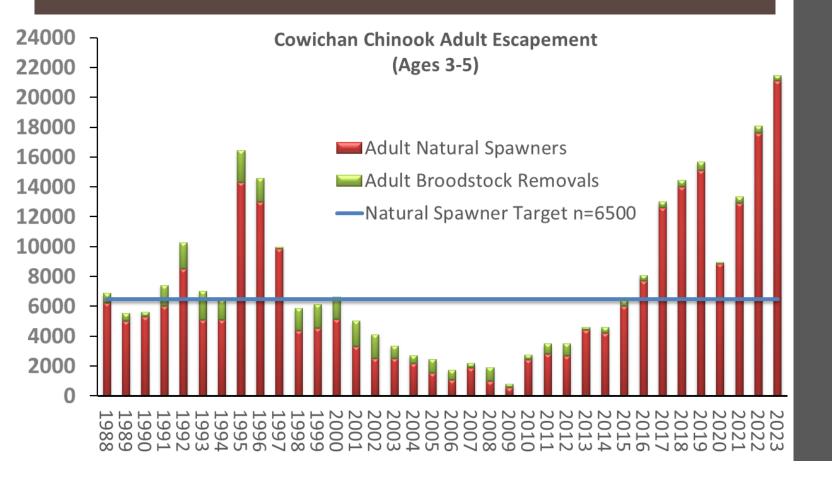
Fall 2021 PIT Detections - Adults

Figure 23: Cumulative detections of PIT tagged Chinook on the mainstem array at the Cowichan River counting fence site (river km 7.0) relative to river discharge and counting fence operations, fall 2021 (WSC Station 08HA011).
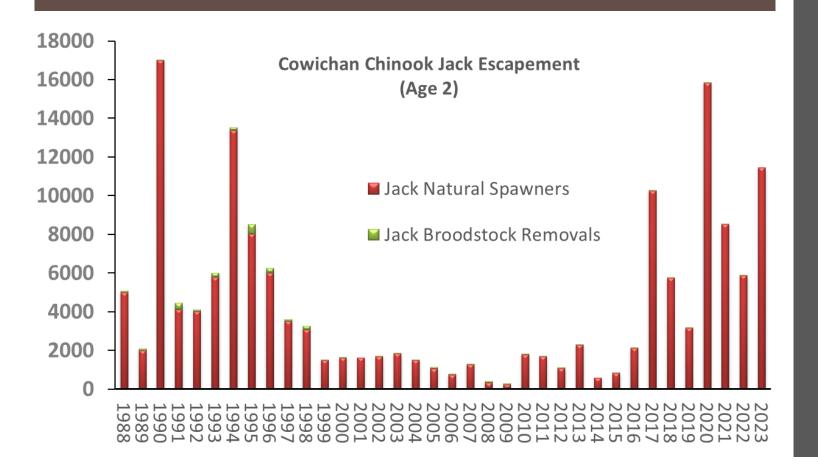
2023 PIT Tag Detections

Long Term Abundance Trend - Adults

Cowichan Chinook Adult Escapement (Ages 3-5)

- Adult Natural Spawners
- Adult Broodstock Removals
- Natural Spawner Target n=6500

- 2023 returns are **preliminarily**

- Fence operations appeared to allow for higher migration rates at lower flows

- FSC data not yet available, encompassed in below fence estimate

Long Term Abundance Trend — Jacks

Cowichan Chinook Jack Escapement (Age 2)

- Jack Natural Spawners
- Jack Broodstock Removals

- 2023 returns are preliminarily
- Jacks typically not taken for brood stock
- Long term average near 3500
- Higher returns coincident with adult recovery
- Important for forecasting – first indication of cohort survival

Forecasting

- Basic sibling model

- 2023 Forecast vs 2023 actual (preliminary

Brood Year	Natural Adults	Smolt Year	Age 2	Age 3	Age 4	Age 5
2011	2786	2012	2313	4014	4797	473
2012	2668	2013	668	1853	3739	92
2013	4406	2014	887	4335	4623	141
2014	4185	2015	2179	8439	5420	115
2015	5984	2016	13282	10476	11415	173
2016	7671	2017	6445	6569	6051	136
2017	12572	2018	3335	3905	3437	316
2018	13975	2019	14597	11196	10338	445
2019	15103	2020	8975	11976	9375	
2020	8849	2021	6105	6650		
2021	12902	2022	7000			

UNOFFICIAL – for reference

2023	Forecast
Jacks	7000
Adults	16470
Total	23470

2023 Forecast Return by Age

2023 PRELIMINARY

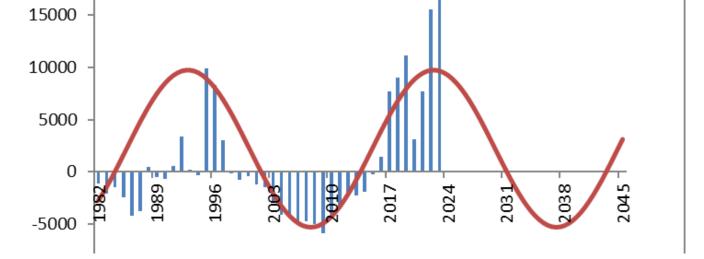|		
Jacks	11,477	+4477
Adults	21,082	+4612
Total	32,521	+9089

Forecasting - 2024

- Need final escapement and natural spawners
- Need age class break down from dead pitch
- Need CWT from hatchery fish
- Need thermal mark results for proportion of hatchery fish
- Number of Jacks is a guess

Brood Year	Natural Adults	Smolt Year	Age 2	Age 3	Age 4	Age 5	Total
2011	2786	2012	2313	4014	4797	473	11597
2012	2668	2013	668	1853	3739	92	6352
2013	4406	2014	887	4335	4623	141	9986
2014	4185	2015	2179	8439	5420	115	16153
2015	5984	2016	13282	10476	11415	173	35346
2016	7671	2017	6445	6569	6051	136	19201
2017	12572	2018	3335	3905	3437	316	10993
2018	13975	2019	14597	11196	10338	500	36631
2019	15103	2020	8975	11976	12000	615.669	33566.7
2020	8849	2021	6105	9000	7292.17		
2021	12902	2022	11400	13587.2			
2022	17574	2023	7000				

2023 Forecast Return by Age

2024	Forecast
Jacks	7000
Adults	21495
Total	28495

Brood Sampling

Dead Pitch

TO DO: Complete Terminal Return

- Roll up of all sampling data
- Based on expanded fence counts and PIT data

Natural Spawners		Age 2	Age 3	Age 4	Age 5	TOTAL
	Male	7774	5916	862	59	14611
	Female	747	3865	2140	59	6812
	Total	8521	9781	3003	119	21423
	Hatchery (clipped)	521	1457	595	0	2573

Brood Stock		Age 2	Age 3	Age 4	Age 5	
	Male	6	199	29	2	
	Female	0	130	72	2	
	Total	6	329	101	4	440
	Hatchery (clipped)	0	49	20	0	69

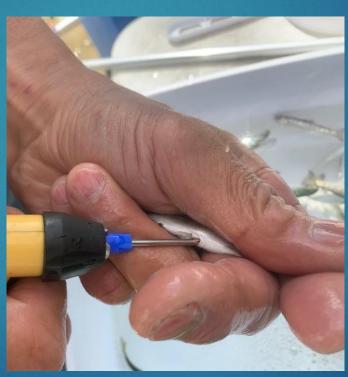| Below Fence+ FSC		Age 2	Age 3	Age 4	Age 5	
***Includes all lower	Male	409	657	96	7	1169
river spawners	Female	39	429	238	7	713
and losses***	Total	448	1087	334	13	1882
	Hatchery (clipped)	27	162	66	0	255

Cowichan Coho Survival, Run Timing and Escapement

Figure 13: Adult Coho passing through camera opening in Skutz Falls fishway, October 2019. The Axis surveillance camera provided the left view while the right view was provided by the Barlus underwater camera (i.e., same fish in both images).

Smolt PIT Tagging: add-on to Chinook program

Skutz Falls – km 34

Camera and PIT antenna

2022 Coho Program

Lower river array PIT tag return

Adult count - fishway

PIT Detections- fishway

Tag rate (1 in 45)

2022 Estimate	
Adults	
Marks	308
Captures	6481
Recoveries	143
R/C	2.206%

Peterson Pop Estimator	Pop	Var.	SD	CV
Hypergeometric	13908	696644	835	6.0%

2023 Skutz Video Counts

SKUTZ Oct 17- Nov 1

12,624 Chinook
2,211 Coho

CHINOOK						COHO		CHUM	STHD	OTHER	BROWN TROUT	
ADULTS			JACKS			ADULT	JACK					
W	H	UK	W	H	UK						UP	DOWN
7233	295	1308	252	29	9	10312	168	235	0	1	112	2

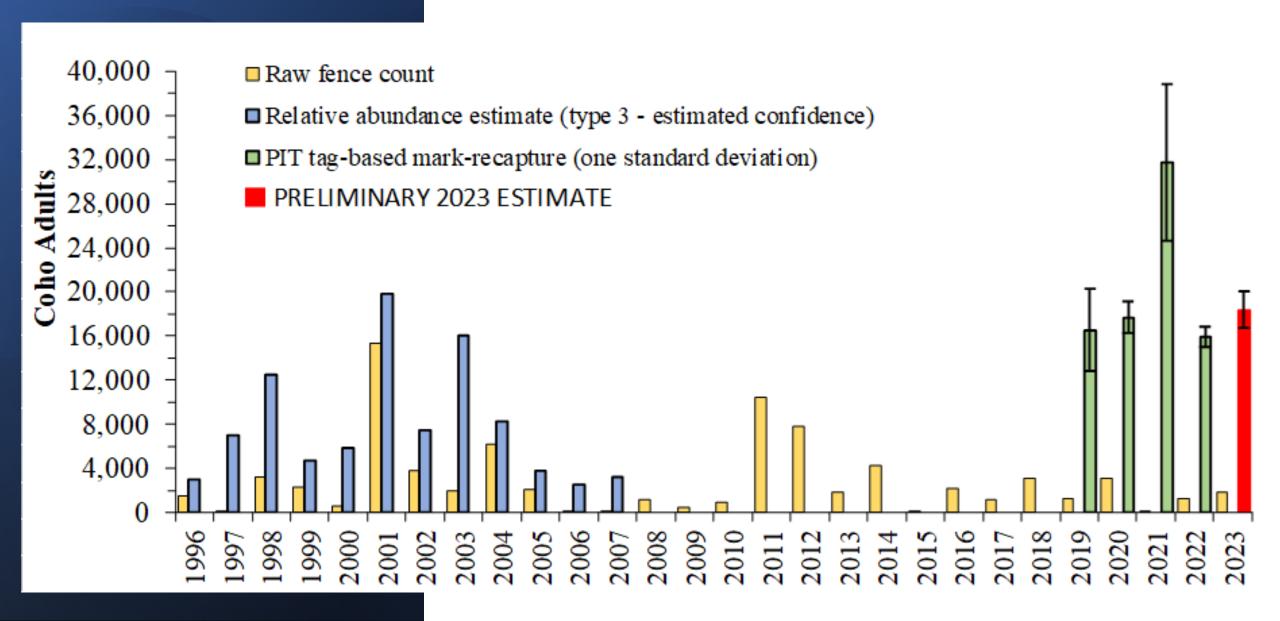# 2023 Fence Video Counts

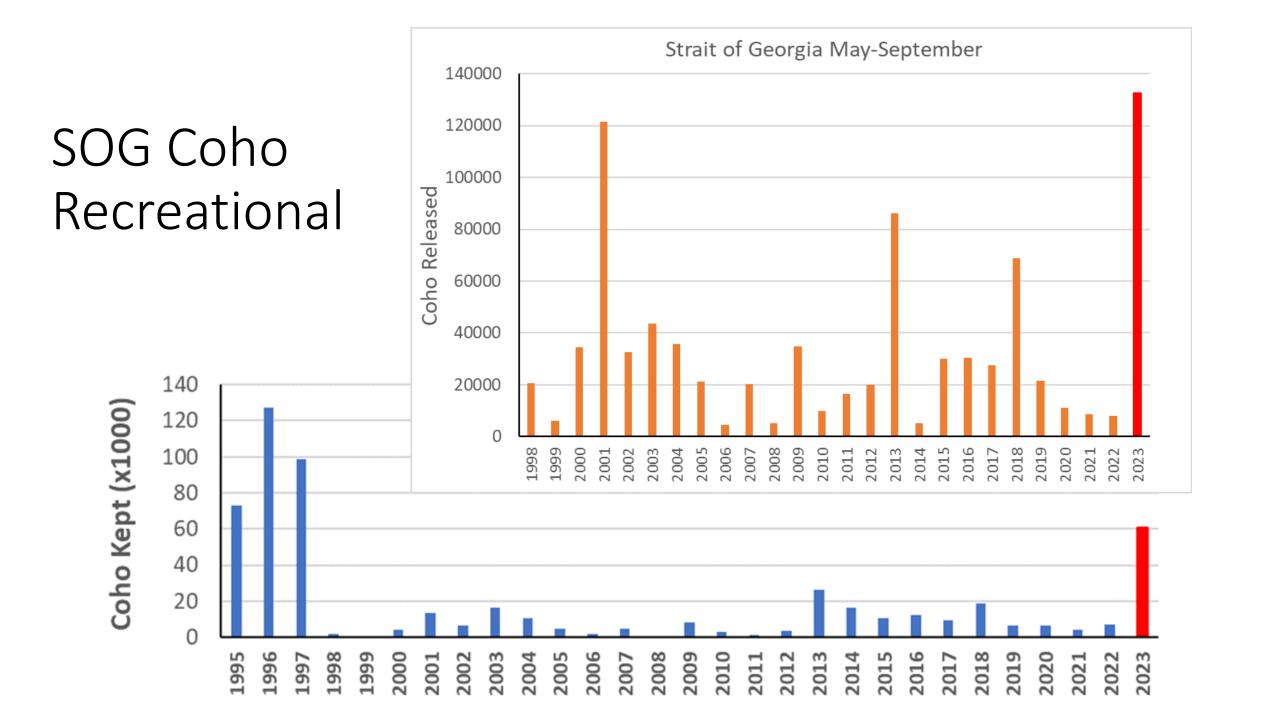## FENCE Sept 8 – Oct 18

9,126 Chinook
10,480 Coho

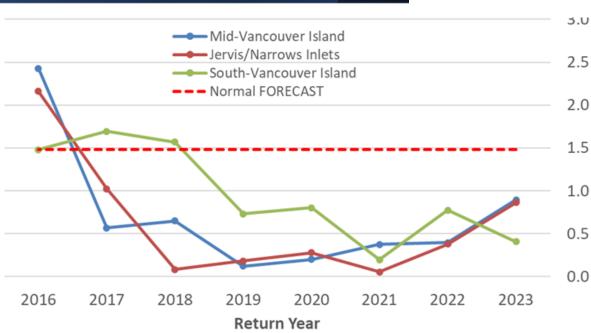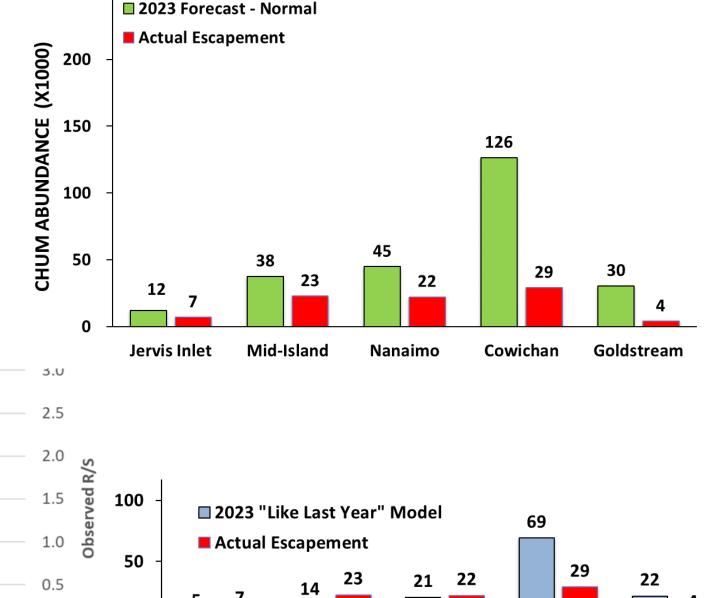| CHINOOK ADULTS			CHINOOK JACKS			COHO		CHUM	PINK	UNK
W	H	UNK	W	H	UNK	ADULTS	JACKS			
7021	195	1442	2722	157	1087	1838	373	49	416	49

Cowichan Coho

Cowichan Coho

Survival to Adult Return

Legend: Cowichan, Black Creek, Sakinaw, Quinsam, Big Qualicum, Englishman, Puntledge, Nanaimo

2018: Cowichan 3.16%, Black Creek 0.65%

2019: Cowichan 4.82%, Black Creek 1.88%

2020: Cowichan 6.73%, Black Creek 2.00%, Sakinaw 1.29%

2021: Cowichan 5.71%, Black Creek 1.34%, Sakinaw 0.38%, Quinsam 1.58%, Big Qualicum 1.35%, Englishman 1.64%, Puntledge 3.79%, Nanaimo 2.54%

Ocean Entry Year

SOG Coho Recreational

Strait of Georgia May-September

Cowichan Chum

Very poor escapement in 2023

Low returns everywhere

Questions/Discussion