shíshálh first nation

Fisheries and Oceans Canada | Pêches et Océans Canada

South Coast Salmon Bulletin
30 August, 2024 Adult Enumeration #8
Sakinaw Lake Sockeye – Strait of Georgia Stock Assessment

Overview

The Sakinaw Sockeye population was designated as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 2002 and again most recently in 2016. This Sockeye population is a Conservation Unit under the Wild Salmon Policy. This designation has resulted in a recovery strategy lead by Fisheries and Oceans Canada (DFO); which includes a captive breeding program with fry released into the lake each year. DFO has also published a Recovery Potential Assessment for Sakinaw Sockeye in 2017. The shíshálh (Sechelt) people have a long history with this unique Sockeye stock, which are the first salmon to return to this region each year. The adult returns historically provided an important food source for the shíshálh people.

Adult Sockeye return from the open ocean and migrate primarily through Johnstone Strait before entering the lake from June to September each year. The shíshálh First Nation have been very appreciative of the support given by First Nations communities delaying their harvest of food, social and ceremonial fisheries until the last week of July in Johnstone Strait. This delay has allowed substantial progress in the recovery of this Sockeye population. **In 2024, the expected return to Sakinaw Lake is estimated to be 49 adults** (see Table 1 below for recent returns) using marine survival data from recent returns.

Based on run timing data and incidental catch data of Sakinaw Sockeye, migration through Johnstone Strait to the lake takes about 8 days and most of the run has entered the lake by mid-August. Most adult Sockeye return as 4 year olds with some as age 3 or 5. The adults hold in the lake until they are ready to spawn in November and December. The fry from natural spawners emerge from the gravel at the spawning beaches in the spring each year. Fry releases from the captive breeding program are released into the upper basin of Sakinaw Lake between May and July each year at 0.5 years old, with an additional fall release since 2019. Fry remain in the lake for one year until they smolt and migrate to the ocean (at age 1.5 or older) from April to June. Recently, hatchery smolts have been released in the spring of 2019 to 2024, of which a portion were PIT tagged to monitor outmigration success and survival. Additional juvenile release strategies are being explored, including a smolt release directly from Big Qualicum hatchery (each year since 2021), as well as a smolt transport program from the smolt trap to several kilometers offshore (piloted spring 2022 and conducted spring 2023 and 2024). A portion of Fall Fry were also PIT tagged in 2022 and 2023 which were observed leaving the lake as smolts in 2023 and 2024. The enumeration of smolts migrating to the ocean and adults returning to the lake are important metrics used to evaluate the success of the recovery strategy.

In 2019, DFO and shíshálh First Nation also began additional stock assessment on coho enumeration to develop a wild indicator for the Sunshine Coast. Activities include adult counts during the entire fall migration period as well as creek inspections to determine the distribution of spawners. Since the spring of 2020, a portion of the smolt migrants have been PIT tagged to estimate survival to return. These data will allow a more complete assessment of the heath and productivity of the watershed, as well as a better understanding of the coho stocks in the area.

This bulletin provides weekly updates on annual Sakinaw Lake Sockeye and Coho assessment activities involving DFO and the shíshálh First Nation. In the spring, this bulletin focuses on smolt emigrations of both species and through the summer the bulletin highlights sockeye adult returns (see our fall escapement bulletin for adult coho returns).

Adult Enumeration Methods

Sockeye adults are enumerated as they migrate from marine waters to the lake from late June to September each year. Sockeye tend to move into the lake during night-time high tides. Access to the lake is through an unobstructed fishway, where a video camera records their upstream migration. The video clips are reviewed and counts of Sockeye are added to the cumulative total escapement. Two PIT tag antennas have also been installed to record returning adults that were tagged as smolts. This will be particularly useful for evaluation of the smolt transport program over the next several years.

Marine migration data on Sakinaw Lake Sockeye is limited. Current data suggests Sakinaw Lake Sockeye have a prolonged migration period commencing in Johnstone Strait in late May to July and arriving at the entrance to Sakinaw

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Lake in upper Strait of Georgia in July and August. Given this timing pattern, Sakinaw Lake Sockeye are most vulnerable to harvest directed at Fraser River Sockeye stocks in July extending into mid-August.

Average run timing, for years where adequate data are available (from 2002-2023), suggest that 50% of the run are in the lake by 29 July each year (varying from 19 July to 10 August), and on average 80% are in the lake by 9 August (varying from 27 July to 21 August). Fraser River Sockeye fisheries openings are limited to later timing when the majority of Sakinaw Sockeye have entered the lake. Information from Sakinaw Sockeye adult enumeration and test fishing results are used to make decisions on fishery openings.

2024 Adult Expectations

In 2022, the estimated number of smolts that emigrated from Sakinaw lake was 68,036. The average smolt to adult survival observed from recent adult returns is approximately 0.059% for hatchery smolts and 0.228% for wild smolts, meaning that only 1 or 2 of every 1000 smolts emigrating from the lake have returned as adults. Assuming average survival from recent years, **we expect approximately 49 adults (37 clipped from clipped fry and smolt releases and 12 not-clipped from not-clipped fry releases or natural production) to return in 2024**.

The hatchery raised fish from 2020 brood year, which were released as fry in 2021 and migrated to the ocean as smolts in spring 2022, were 95.5% marked with an adipose fin clip. Therefore, the not clipped adults returning this year will likely be from natural production. Clipped hatchery adults will be distinguishable from the natural adults returning to Sakinaw Lake, and from other Sockeye stocks.

2024 Adult Enumeration

The adult fishway and video system were installed on 2 July and enumeration began immediately. Video has been reviewed each night while the crew is on site to check for new migrants which appear as motion events in the recordings. The first 2 fish of 2024 were observed on 5 July, and fish arrived each day until 14 July, and then again every day since 18 July up until 5 August. The day with the most fish was 29 July, with a total of 32. One PIT tagged fish has been detected on 29 July, which was a PIT tagged fall fry release that left the lake on 2 May 2023. Overall marine survival has been over 3.5 times the average.

Cumulative totals for 2024 Sockeye migration, up to the midnight on 22 August are:

Sex	Clipped	Not Clipped	Unknown	Total
Female	84	20	0	**104**
Male	60	18	0	**78**
Unknown	0	0	0	**0**
Total	**144**	**38**	**0**	**182**

Additionally, a total of 57 sockeye have returned to Big Qualicum hatchery since 7 July from the smolt releases in the Big Qualicum River. DNA results will confirm if returns to Big Qualicum are Sakinaw sockeye, in which case they will be used for broodstock at Rosewall Hatchery.

Contacts

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Sakinaw Sockeye Data

Table 1. The numbers of adult sockeye salmon that returned to Sakinaw Lake each brood year (BY), including those removed as male and female broodstock. The estimated number of adults that spawned naturally in the lake is the difference between the return and the hatchery removal, minus any natural mortality before spawning. The numbers of fry (in thousands) released into the lake in the following year (BY+1) separated by 1st year brood releases and captive brood releases, and the numbers of natural and hatchery smolts (in thousands) emigrating from the lake after two years (BY+2) are also shown. Zeros indicate no fish; dashes indicate no data. ***Unk*** indicates an unknown number of natural smolts were included in the hatchery smolt total because there was no adipose clipping of hatchery juveniles from that year. Numbers in parentheses indicate Sakinaw sockeye parents from which fertilized eggs were used to found the captive breeding program at Rosewall hatchery.

	Adult Escapement (BY)				Fry (BY+1) + Smolt (BY+2) Releases (000's)			Smolt Migrants (BY+2) (000's)		
Brood Year	Returns		Hatchery Removal		Wild Brood Releases	Captive Brood Releases	Total	Natural	Hatchery	Total
	Adult	Jack	Female	Male						
2000	122		10	9	15	0	15	-	-	-
2001	87		15	14	31.9	0	31.9	4.3	8.1	12.4
2002	78		6(5)	10(9)	2.8	0	2.8	0.103	0.039	0.142
2003	3		0	0	0	0	0	0.011	0.002	0.013
2004	99		31(28)	31(28)	25.9	0	25.9	2.9	8.4	11.3
2005	28		6(6)	8(8)	7.6	87.9	95.5	0.272	3.7	4.0
2006	1		0	0	0	84.6	84.6	0	12.2	12.2
2007	0		0	0	0	420.8	420.8	0	62.6	62.6
2008	0		0	0	0	726.4	726.4	0	69.9	69.9
2009	1		0	0	0	329.4	329.4	0	32.9	32.9
2010	29		4	9	5.1	1368.7	1373.8	unk	162.9	162.9
2011	554		0	0	0	972.2	972.2	28.0	224.6	252.5
2012	244		0	0	0	856.2	856.2	4.4	121.6	126.0
2013	114	29	0	0	0	320.4	320.4	0.632	16.5	17.1
2014	452	12	0	0	0	644.7	644.7	0.722	78.2	78.9
2015	695	26	0	0	0	329.1	329.1	4.8	30.0	34.8
2016	171	1	0	0	0	256.6	256.6	11.9	33.4	45.3
2017	12		0	0	0	529.7 + 25.0	554.7	1.1	83.9	85.0
2018	3		0	0	0	774.0 + 23.5	797.5	unk	209.0	209.0
2019	13		0	0	0	632.7+21.4	654.1	unk	169.2	169.2
2020	85		0	0	0	583.9+23.4	607.3	2.3	65.7	68.0
2021	26		0	0	0	777.6+24.2	801.7	unk	138.5	138.5
2022	213		0	0	0	311.4+24.3	335.8			72.0[1]
2023	121									

[1] preliminary and under review

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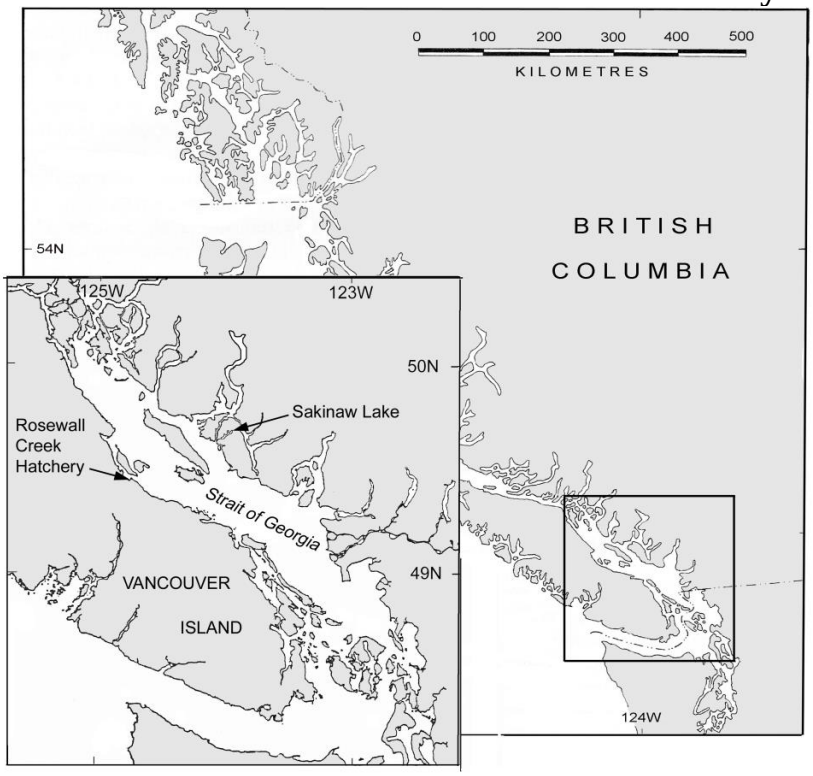

Figure 1: Location of Sakinaw Lake, on the Sunshine Coast of British Columbia, Canada.

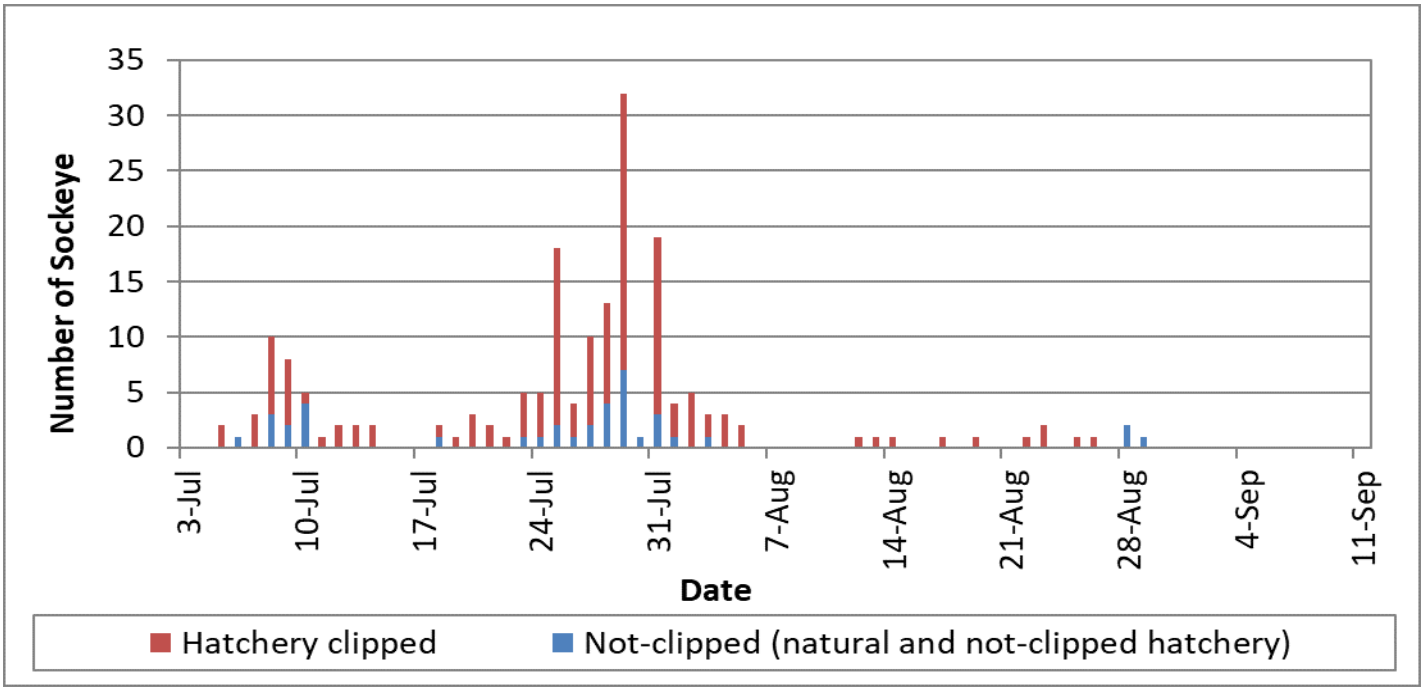

Figure 2: Daily Sockeye counts 2024, separated by clip status (hatchery clipped and natural and hatchery not-clipped).

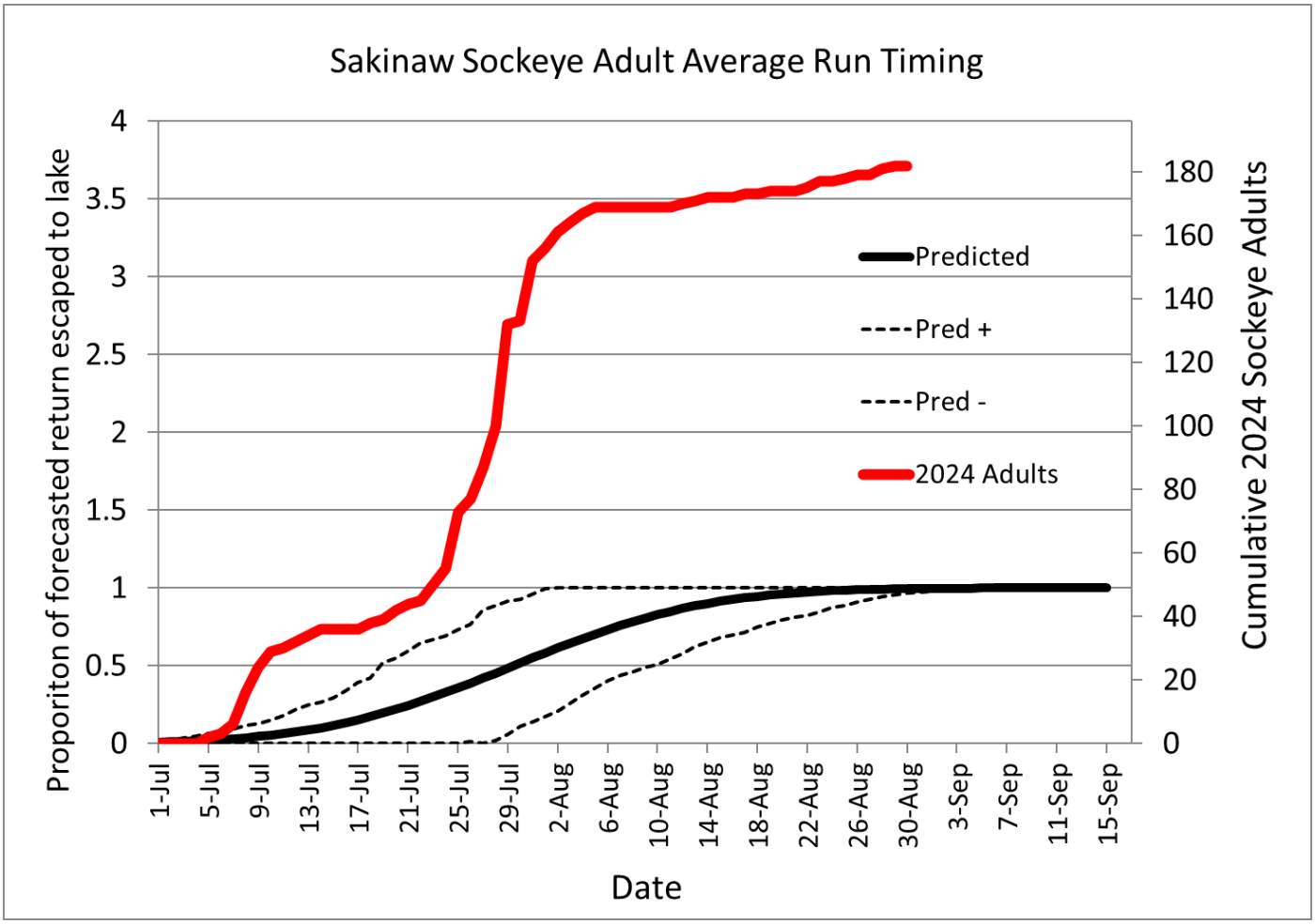

Figure 3: The solid black line indicates the Sakinaw Sockeye normalized run timing by date (natural and hatchery sockeye returns combined). The hashed black lines show the 95% confidence interval for each date. Solid red line shows the current 2024 total sockeye migration by date (right axis). The right axis is scaled to the forecasted 49 sockeye (combined 37 clipped and 12 not-clipped) for 2024 Expectations.