Data sources

As part of the Vancouver Island Salmon Committee project work, two gap analysis reports were prepared by LGL Limited (www.lgl.com). A-Tlegay Member Nations Mainland Inlet Territory Escapement Report and Cowichan Assessment Unit Report card. The sections below outline the publicly available data sources that were used to create the reports.

Escapement Data

The Salmon Escapement Database (NuSEDS) is the DFO Pacific Region's central database that stores individual spawner survey data records, spawner abundance estimates and the linkages between the two. Annual abundance estimates are maintained by population, as defined by freshwater location and run timing.

https://open.canada.ca/data/en/dataset/c48669a3-045b-400d-b730-48aafe8c5ee6

- All Areas NuSEDS.csv – escapement records that were filtered to populations/runs that were within the territory or conservation units of interest.
- Conservation Unit System Sites.csv – List of individual populations/runs and the corresponding species-based conservation units (see Holtby and Ciruna 2007).

Note 1: Pink even and odd years are often treated as different populations in most Pacific Salmon analyses, including Conservation Unit biological status designation; however, NuSEDS does not directly distinguish this difference in their POP_ID (unique population identification number) designation. Instead, this can only be determined based on the ANALYSIS_YR designation.

Note 2: The TOTAL_RETURN_TO_RIVER field provides a complete accounting of sexually maturing fish that have returned to the freshwater environment but may not be provided even though subcomponents (e.g., NATURAL_ADULT_SPAWNERS) may be available.

Conservation Units

Conservation Units form the basic unit for assessment under Canada's Policy for the Conservation of Wild Salmon Policy (WSP; DFO 2005). The biological status of a CU is evaluated using a number of metrics (Holt et al. 2009; Holt 2009), which indicate a WSP status zone: Red (poor status), Amber (marginal status), or Green (healthy status). A final step then incorporates all metric and status-related information into a final integrated status for each CU, along with expert commentary to support the final status determination (e.g., DFO

2012; DFO 2016). This information is used as inputs to fisheries management processes to help prioritize assessment activities and management actions.

Hotby and Ciruna (2007) provide the framework and procedure for determining CU definitions:

https://www.dfo-mpo.gc.ca/csas-sccs/Publications/ResDocs-DocRech/2007/2007_070-eng.htm

CU definitions and biological status assessments:

https://open.canada.ca/data/en/dataset/1ac00a39-4770-443d-8a6b-9656c06df6a3

Conservation Units Biological Status

Under **Canada's Policy for the Conservation of Wild Salmon (WSP)** the DFO monitors escapement within Conservation Units (CUs) to assess for population diversity and abundance. A CU is defined as "a group of wild salmon sufficiently isolated from other groups that, if lost, is very unlikely to recolonize naturally within an acceptable timeframe (e.g., a human lifetime or a specified number of salmon generations)". This data is then compared to calculated population abundance benchmarks (limit reference points) such that genetic diversity is retained. The outcome of the population assessments is either a Red (poor status), Amber (marginal status), or Green (healthy status) zone designation.

CU definitions and biological status assessments: https://open.canada.ca/data/en/dataset/1ac00a39-4770-443d-8a6b-9656c06df6a3

The **Pacific Salmon Foundation (PSF)** developed a standardized assessment for the NuSEDS data based off the tenets of the WSP with the inclusion of hatchery- production salmon. Generally, the available data is compared against one of two benchmarks broadly dependant on the quality of the data and the time scale it encompasses. Where multi-year, high quality CU-level spawner-recruitment data exists, it is compared to calculated expected spawner-recruitment upper and lower benchmarks. Where spawner-recruitment relationships are not available, the CU is assessed as data deficient unless the following is met; there is over 20 years of data, at least one CU-level spawner abundance estimate, and the CU is not experiencing low production or high exploitation. When these conditions are met, the CU is compared against high and low benchmarks calculated based on percentiles of historical spawner abundance. Based on either of these two benchmarks, a CU is designated as Good, Fair, Poor, or Data Deficient for spawner abundance and catch.

PSF Salmon Explorer tool: https://salmonexplorer.ca/#!/pop=BENCHMARK_STATUS

The **Committee on the Status of Endangered Wildlife in Canada** is an annual panel of experts drawn from academia, government, non-governmental organizations, and the private sector which meet to assign risk categories for all native species. The COSEWIC assessments do not take political, social or economic factors into account. COSEWIC uses Designatable Units (DU) which it defines as units of Canadian biodiversity that are discrete (very little genetic transmission) and evolutionarily significant (unique traits or evolutionary history). Due to the organizational structure of DUs and CUs, one of more CU may be assessed as part of a DU status designation. The COSEWIC process of species assessment scores as Not at Risk, Threatened, Endangered, Data Deficient, and Not Assessed.

The status reports can be found through the COSEWIC website (https://www.cosewic.ca/index.php/en/status-reports.html), as part of the SARA listing (https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html) and as part of the Salmon Explorer tool (see above)

Hatchery Releases

Hatchery information was obtained from a data request to Fisheries and Oceans Canada (DFO) for a copy of the Enhancement Planning and Assessment Database (EPAD).

Harvest Data

Canadian catch was summaries as either an aggregate or by individual Pacific Fishery Management Areas, see https://www.pac.dfo-mpo.gc.ca/fm-gp/maps-cartes/areas-secteurs/index-eng.html. In some cases, the data was required to be further aggregated because data was not available or due to privacy issues (third party rule). LGL can assist with making data requests to the Fisheries Management Data Unit.

First Nation Harvest Data

Canadian First Nation harvest data was a direct request to the Fisheries and Oceans Canada (DFO) Fisheries Management Data Unit. The following First Nation catch metadata was requested:

First Nation Food, Social and Ceremonial and Economic Catch:

- Areas 12-25, 28-29 and marine areas 121-125 (by sub-area)
- Species by gear type: salmon
- Gear types: if available
- Effort (hours) by gear type
- Catch in pieces
- Stock compositions of catch (if available)
- By month from (1950-2021)

The request was to the Fisheries Management Data Unit (DFO.PACCatchStatistics-StatistiquesCapturesPAC.MPO@dfo-mpo.gc.ca); specifically, John Davidson, who in turn requested the data from the regional DFO resources managers.

The data request took over 14 months to deliver and the data had to be aggregated by quarter instead of by month:

Qtr1= Jan 1 – Mar 31

Qtr2= Apr 1 – Jun 30

Qtr 3= Jul 1 – Sep 30

Qtr 4= Oct 1 – Dec 31

In addition, the PFMA's had to be aggregated into larger areas:

Inside = PFMA's 11, 12, 13, 14, 15, 16, 17, 18, 19, 29-1 to 29-5

Outside = PFMA's 20, 21, 22, 23, 24, 25, 26, 27, 121, 123, 124, 125, 126, 127

Fraser River (Approach and tidal) = PFMA 29 - subareas 29-6, 29-7 and 29-9 to 29-17

There was also data that could not be released because it was not readily available or it did not meet the privacy requirements.

Recreational Harvest Data

Recreational catch data was derived from the Georgia Strait recreational catch creel surveys and was obtained through as a direct request to the Fisheries and Oceans Canada (DFO) catch unit via a South Coast Area Salmon Stock Assessment Data Request Form. The form was submitted via email to Fisheries and Oceans Canada Integrated Data Services (DFO.PACCatchStatistics-StatistiquesCapturesPAC.MPO@dfo-mpo.gc.ca). The following recreational catch metadata was requested:

- Areas 12-25, 28-29 and marine areas 121-125
- Species by gear type: salmon and any groundfish
- Gear types: if available
- Effort (hours) by gear type
- Catch in pieces
- By month from (2010-2022) – if possible
- Biological metadata (length, sex, if scales/fins were collected, tag info)

Recreational data before 2010

Recreational Catch Statistics - Georgia Strait Creel Summary - Open Government Portal (canada.ca)

Commercial Harvest Data

Canadian commercial catch information with the following metadata was requested via e-mail:

1. Areas 12-25, 28-29 and marine areas 121-125 (by sub-area)
2. Species by gear type: salmon
3. Gear types: if available
4. Effort (hours) by gear type
5. Catch in pieces
6. Stock compositions of catch (if available)
7. By month from (1950-2021)

The request was to the Fisheries Management Data Unit (DFO.PACCatchStatistics-StatistiquesCapturesPAC.MPO@dfo-mpo.gc.ca); specifically, Jason Parsley from the Salmon Unit.

Fisheries Management Data Unit
Fisheries and Oceans Canada- Pacific Region
200-401 Burrard Street Vancouver, BC V6C 3S4

US Chum Harvest Data

Reported catch and composition from the Washington Areas 7/7A commercial Chum fisheries was obtained through a data request to DFO, specifically, Brittany Jenewein, co-chair of Pacific Salmon Commission Chum Technical Committee, (brittany.jenewein@dfo-mpo.gc.ca). Catch composition in the Pacific Salmon Commission's Chum Technical Committee has been working on improving the catch composition in the US 7/7A Chum-directed fisheries in recent years through Southern Endowment Funded projects. Genetic samples have been collected from various fisheries that occurred in 2007, 2008, 2010, and 2012-2017. Below is a summary table with link to the Pacific Salmon Commission reports that contain the reported catch and composition from the Washington Areas 7/7A commercial fisheries:

Year	Report Name and Link
2007	Southern Study Area Chum Stock Distribution Assessment in Washington San Juan Islands – Pt. Roberts and in British Columbia Southern Gulf Fisheries.
2008	Southern Study Area Chum Stock Distribution Assessment in Washington San Juan Islands – Pt. Roberts and in British Columbia Southern Gulf Fisheries. Year 2
2010	Southern Study Area Chum Stock Distribution Assessment of 2010 Washington San Juan Islands – Pt. Roberts and British Columbia Southern Gulf Fisheries. Year 3 of 3
2012	Southern British Columbia Chum Salmon Mixed Stock Identification (DFO Component). Year 1
2013	Southern British Columbia Chum Salmon Mixed Stock Identification (DFO Component). Year 2 & 3
2014	Joint US and CA Mixed-stock Chum Fisheries Sampling Design and Analysis 2013-2014
2015	Southern British Columbia Chum Salmon Mixed Stock Identification. Year 4 of 4 (DFO Component)
2016	Southern British Columbia Chum Salmon Mixed-Stock Identification Report. Year 1
2017	Joint US and CA Mixed-stock Chum Fisheries Sampling Design and Analysis 2017
2018	Joint US and CA Mixed-stock Chum Fisheries Sampling Design and Analysis

There is no one single report that summarizes all the information across years, but the Pacific Salmon Commission is working on including this type of summary for the next annual report (due to be published early 2024).

Smolt Data

Cowichan Smolt (all species) Count data (2014-2020) was requested directly from DFO, specifically, Kevin Pellet, Strait of Georgia Stock Assessment Biologist, South Coast Area (Kevin.Pellett@dfo-mpo.gc.ca). In addition, partial smolt counts were received from Rotary Screw Trap (RST) and smolt trap work on the Cowichan.

River Hydrology and Weather Data

Discharge and weather data was downloaded from the BC Water Tool. Station data was individually downloaded and compiled.

- Hydrology: https://kwt.bcwatertool.ca/streamflow
- Weather: https://kwt.bcwatertool.ca/climate

Anadromous Length Data

While NuSEDS lists Pacific salmon species and run timing stocks for specific recognized streams, it does not capture all known streams with Pacific salmon present in the A-Tlegay Member Nation Mainland Inlet Territory. To address this data gap, the Fisheries Information Summary System (FISS), was queried for Pacific salmon presence. FISS is a provincial fisheries database with a comprehensive overview that is frequently updated and easily accessible through two tools, a map-based tool Habitat Wizard and a query-based tool, Fisheries Inventory Data Queries (links to access site below).

HabitatWizard - Province of British Columbia (gov.bc.ca)

Fish Inventories Data Queries (gov.bc.ca)

These tools allow users to spatially and non-spatially access detailed fish presence and habitat data that is linked to standardized provincial waterbody identifiers and combines stream/lake information into one system.

GIS Data

The provincial Freshwater Atlas (FWA) is a standardized dataset for mapping British Columbia's hydrological features and was used to support analysis in the GIS environment. Link to FWA below:

Freshwater Atlas - Province of British Columbia (gov.bc.ca)

Other Resources:

Pacific Fishery Management Areas:
Management Area Maps | Fisheries and Oceans Canada, Pacific Region (dfo-mpo.gc.ca)

Commercial Salmon Catch Statistics:
Salmon catch statistics and logbook reports | Pacific Region | Fisheries and Oceans Canada (dfo-mpo.gc.ca)

OBIS Canada: Pacific Region Commercial Salmon Fishery In-season Catch Estimates, 2005 – 2020:
Pacific Region Commercial Salmon Fishery In-season Catch Estimates (iobis.org)

Open Data Portal: Pacific Region Commercial Salmon Fishery In-season Catch Estimates, 2005 – 2021:
Pacific Region Commercial Salmon Fishery In-season Catch Estimates - Open Government Portal (canada.ca)

Open Data Portal: Pacific Region Commercial Salmon Fishery Post-Season Catch Estimates, 1996 – 2004:
Pacific Region Commercial Salmon Fishery Post-Season Catch Estimates - Open Government Portal (canada.ca)

Integrated Fisheries Management Plans:
Integrated Fisheries Management Plans | Pacific Region | Fisheries and Oceans Canada (dfo-mpo.gc.ca)