

CANADA

**Report on Groundfish Activities in British Columbia, Canada, by Fisheries and
Oceans Canada in 2025**

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Prepared for the
Canada-United States Groundfish Technical Committee

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1. Executive Summary

In 2025, the Groundfish Section in the Pacific Region of DFO Science had a productive year. The Multispecies Synoptic Bottom Trawl surveys took place on the Hecate Strait and Queen Charlotte Sound. Hard Bottom Longline (HBLL) surveys in waters Inside and Outside of Vancouver Island both surveyed their northern regions (Inside HBLL: Campbell River to Port MacNeil; Outside HBLL: Haida Gwaii and North Coast), and the Sablefish survey took place throughout offshore outside waters. Offshore Pacific Hake Acoustic-Trawl Survey was on a survey year and Hake were only found south of the Canada-US border. The Strait of Georgia Hake survey took place in Winter of 2025 and 2026.

Several research and monitoring outputs were completed in 2025 and are summarized in the Research section. These include technical reports such as updated Groundfish (GF) Synopsis reports; analyses of groundfish species trends presented at the annual *State of the Pacific Ocean* meeting; summaries of commercial groundfish biological sampling; updates to enhanced salmon monitoring; and Canadian Science Advisory Secretariat (CSAS) research on sablefish ageing requirements for operating models and on Rockfish Conservation Area (RCA) monitoring.

Primary peer-reviewed publications this year addressed a wide range of topics, including the mystery of declining dogfish populations on the Pacific coast; groundfish body condition as a shared response to environmental variability; development of monitoring methods for inshore rockfishes using passive acoustic monitoring and echosounders; analyses of sablefish tagging data and the benthic impacts of sablefish trap fisheries; and the introduction of *surveyjoin*, an R package that integrates bottom-trawl survey data from NOAA Fisheries and Fisheries and Oceans Canada to support coastwide analyses of demersal species across the Northeast Pacific. Several additional papers advanced spatio-temporal modeling approaches through the development and application of the R package *sdmTMB*.

During 2025/26, DFO Science provided coastwide harvest advice in full stock assessments for Outside Lingcod, Dover Sole, Silvergray Rockfish, and Outside Yelloweye Rockfish. Advice was provided for Sablefish in the form of a management procedure (MP) update.

2. Surveys and Monitoring

Fishing Surveys

The Fisheries and Oceans Canada (DFO) Groundfish section of the Stock Assessment and Research Division conducts a suite of fishing surveys using bottom trawl, longline hook, and longline trap gear that, in aggregate, provide comprehensive coverage for all offshore waters of Canada's Pacific Coast. The core surveys include the Multispecies Synoptic Bottom Trawl, Hard Bottom Longline Hook (HBLL), and Sablefish Longline Trap surveys (Figure 1).

Data from the synoptic bottom trawl surveys and hard bottom longline hook surveys are published annually to the Government of Canada Open Government Portal and to OBIS:

- Open Government Portal
 - [Synoptic Bottom Trawl Surveys](#)
 - [Hard Bottom Longline Surveys](#)
 - [Sablefish Offshore Longline Trap Survey](#)
 - [Sablefish Inlet Longline Trap Survey](#)
- OBIS
 - [Queen Charlotte Sound Bottom Synoptic Trawl Survey](#)
 - [West Coast Vancouver Island Synoptic Trawl Survey](#)
 - [Hecate Strait Synoptic Trawl Survey](#)
 - [West Coast Haida Gwaii Synoptic Trawl Survey](#)
 - [Strait of Georgia Synoptic Trawl Survey](#)
 - [Inside North Hard Bottom Longline Survey](#)
 - [Inside South Hard Bottom Longline Survey](#)
 - [Outside North Hard Bottom Longline Survey](#)
 - [Outside South Hard Bottom Longline Survey](#)

All the core surveys follow similar random depth-stratified designs and have in common full enumeration of the catches (all catch sorted to the lowest taxon possible), size composition sampling for most species, and more detailed biological sampling of selected species. Most of the surveys are conducted in collaboration with the commercial fishing industry under the authorities of various Collaborative Agreements. In addition to these randomized surveys, a fixed-station longline hook survey targeting North Pacific Spiny Dogfish in the Strait of Georgia has been completed every three to five years (Figure 2). The Groundfish Section also routinely participates in two hydroacoustic surveys and collects groundfish data from a Small Mesh Multispecies Bottom Trawl Survey (Figure 2).

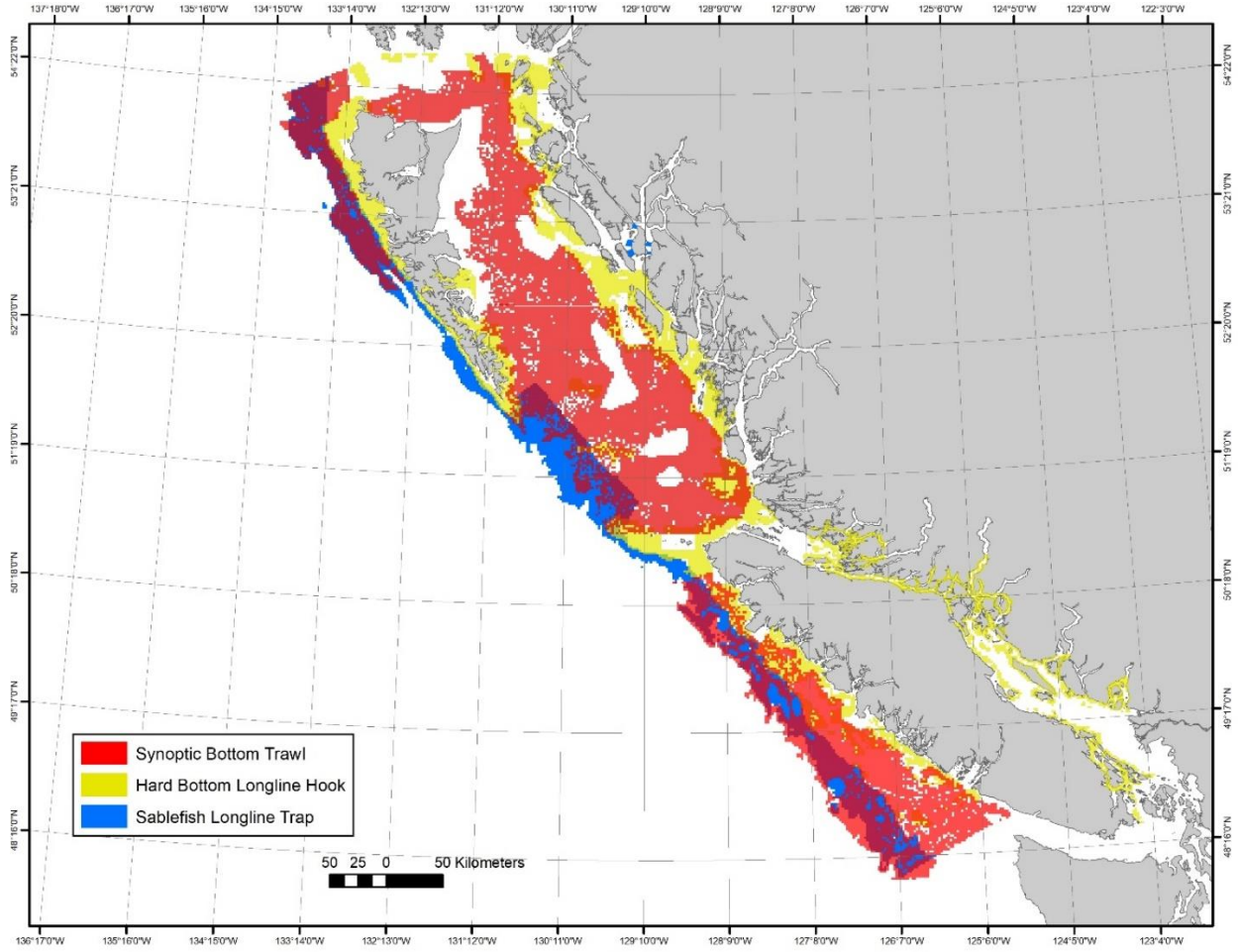


Figure 1. Random depth-stratified survey coverage.

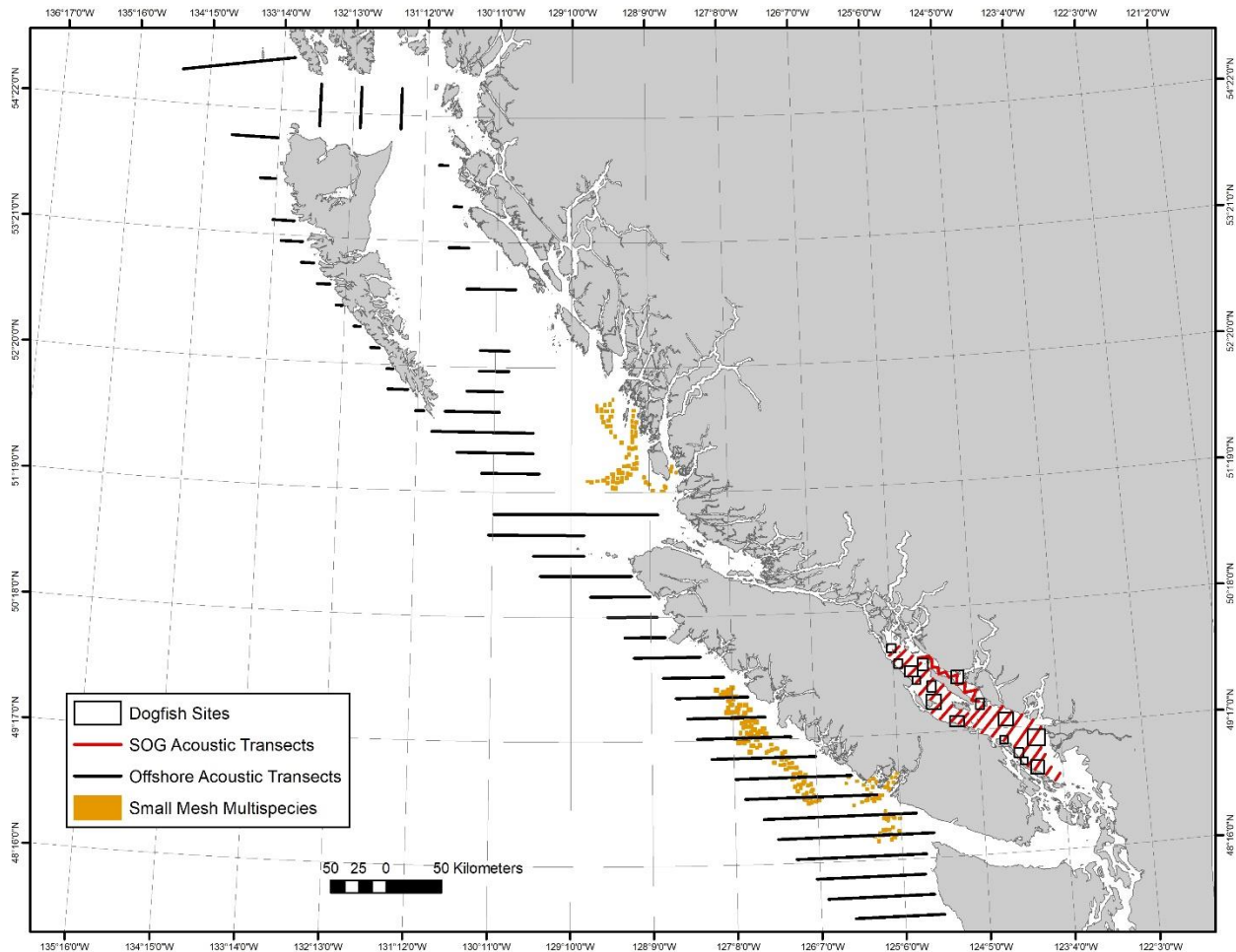


Figure 2. Coverage of surveys other than the random depth-stratified surveys shown in Figure 1. Surveys shown include the Strait of Georgia Dogfish Longline Hook Survey sites, the Offshore Pacific Hake Acoustic-Trawl Survey transects, the Strait of Georgia (SOG) Acoustic-Trawl Survey transects, and the Small Mesh Multispecies Bottom Trawl Survey tow locations.

Multispecies Synoptic Bottom Trawl Surveys

The Multispecies Synoptic Bottom Trawl Surveys are conducted in four areas of the BC coast with two areas surveyed each year such that the whole coast is covered over a two-year period. Typically, the West Coast of Vancouver Island (WCVI) and West Coast of Haida Gwaii (WCHG) are surveyed in even-numbered years while Hecate Strait (HS) and Queen Charlotte Sound (QCS) are surveyed in odd-numbered years (Figure 3). An additional synoptic bottom trawl survey has been conducted twice in the Strait of Georgia (SOG), but vessel availability and staffing constraints have precluded establishing a regular schedule.

These surveys are conducted under a collaborative agreement with the Canadian Groundfish Research and Conservation Society (CGRCS) and, in typical years, one survey occurs on a Canadian Coast Guard Vessel with DFO staff while one survey

occurs on a chartered commercial fishing vessel with a mix of DFO staff and contracted technicians. In aggregate, the surveys provide coast-wide coverage of most of the trawlable habitat between 50 and 500 meters depth.

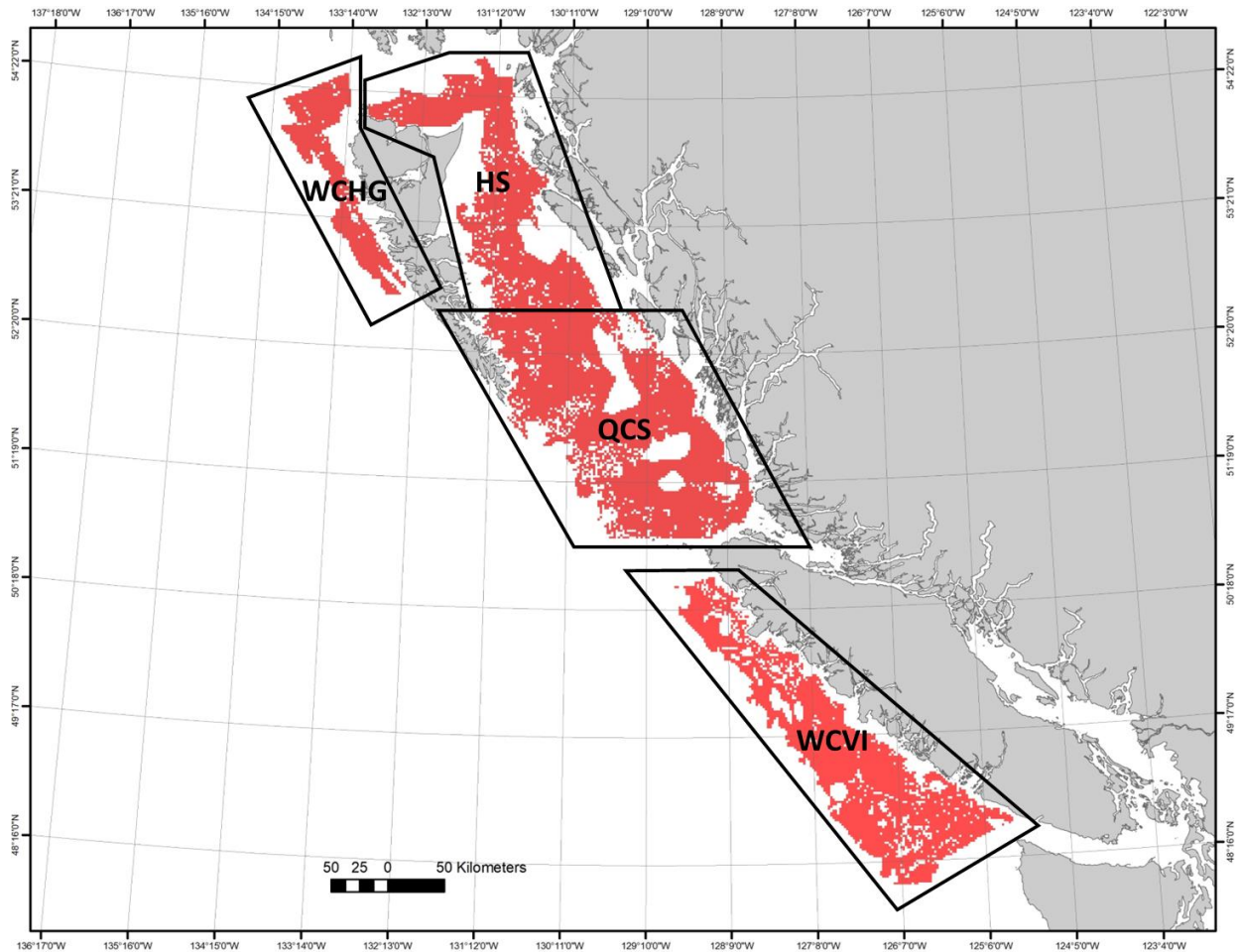


Figure 3. Multispecies Synoptic Bottom Trawl Survey coverage showing the extents of the West Coast of Haida Gwaii (WCHG), Hecate Strait (HS), Queen Charlotte Sound (QCS) and West Coast of Vancouver Island (WCVI) survey areas.

The Hecate Strait (HS) and Queen Charlotte Sound (QCS) Multispecies Synoptic Bottom Trawl surveys were conducted in 2025. The HS survey was completed on the research vessel *Sir John Franklin* from mid-May to mid-June while the WCHG survey was completed on the chartered commercial trawl vessel *Nordic Pearl* from early-July to early-August. A total of 347 successful tows were completed over the two surveys with 145 in HS and 202 in QCS (Figure 4). The dominant species in the HS survey catches were Spotted Ratfish (*Hydrolagus colliei*), Arrowtooth Flounder (*Atheresthes stomias*), Pacific Halibut (*Hippoglossus stenolepis*), Rex Sole (*Glyptocephalus zachirus*), and Dover Sole (*Microstomus pacificus*). The dominant species in the QCS survey catches were Arrowtooth Flounder (*Atheresthes stomias*), Silvergray Rockfish (*Sebastes*

brevispinis), Pacific Ocean Perch (*Sebastes alutus*), and Bocaccio (*Sebastes paucispinis*).

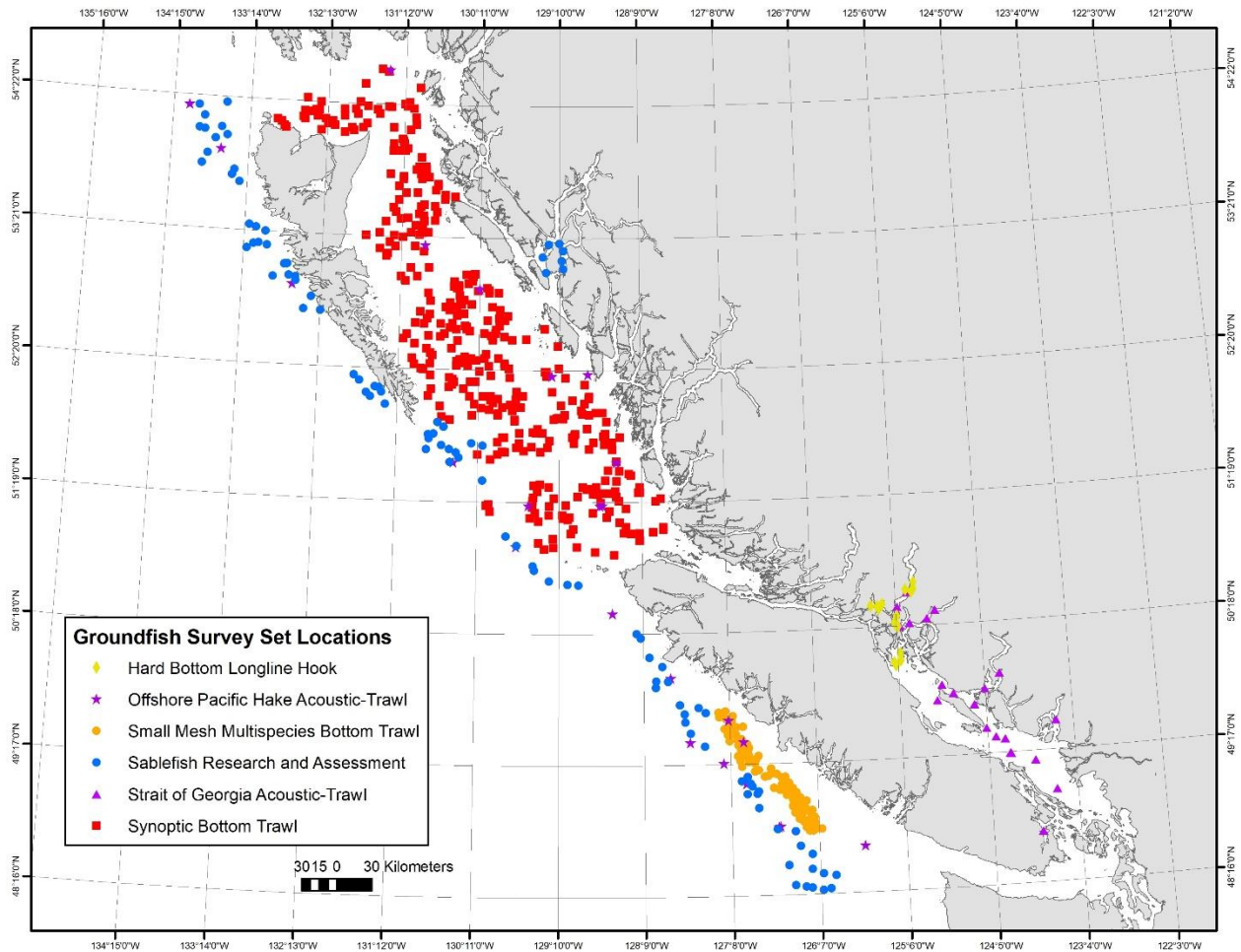


Figure 4. Fishing locations of 2025 Groundfish surveys. Locations for the Hard Bottom Longline outside survey are not shown as the data are not yet finalized.

Hard Bottom Longline Surveys

The Hard Bottom Longline (HBLL) Surveys are conducted annually in “outside” waters (not between Vancouver Island and the mainland) and “inside” waters (between Vancouver Island and the mainland). Both the “outside” and “inside” areas are divided into northern and southern regions and surveys annually alternate between the regions such that the whole coast is covered over a two-year period (Figure 5). The outside surveys are conducted under a collaborative agreement with the Pacific Halibut Management Association (PHMA) and occur on chartered commercial fishing vessels with contracted technicians. The inside surveys are conducted by DFO and occur on a Canadian Coast Guard vessel with DFO staff. In aggregate, the HBLL surveys provide

coast-wide coverage of most of the untrawlable habitat between 20 and 220 meters depth.

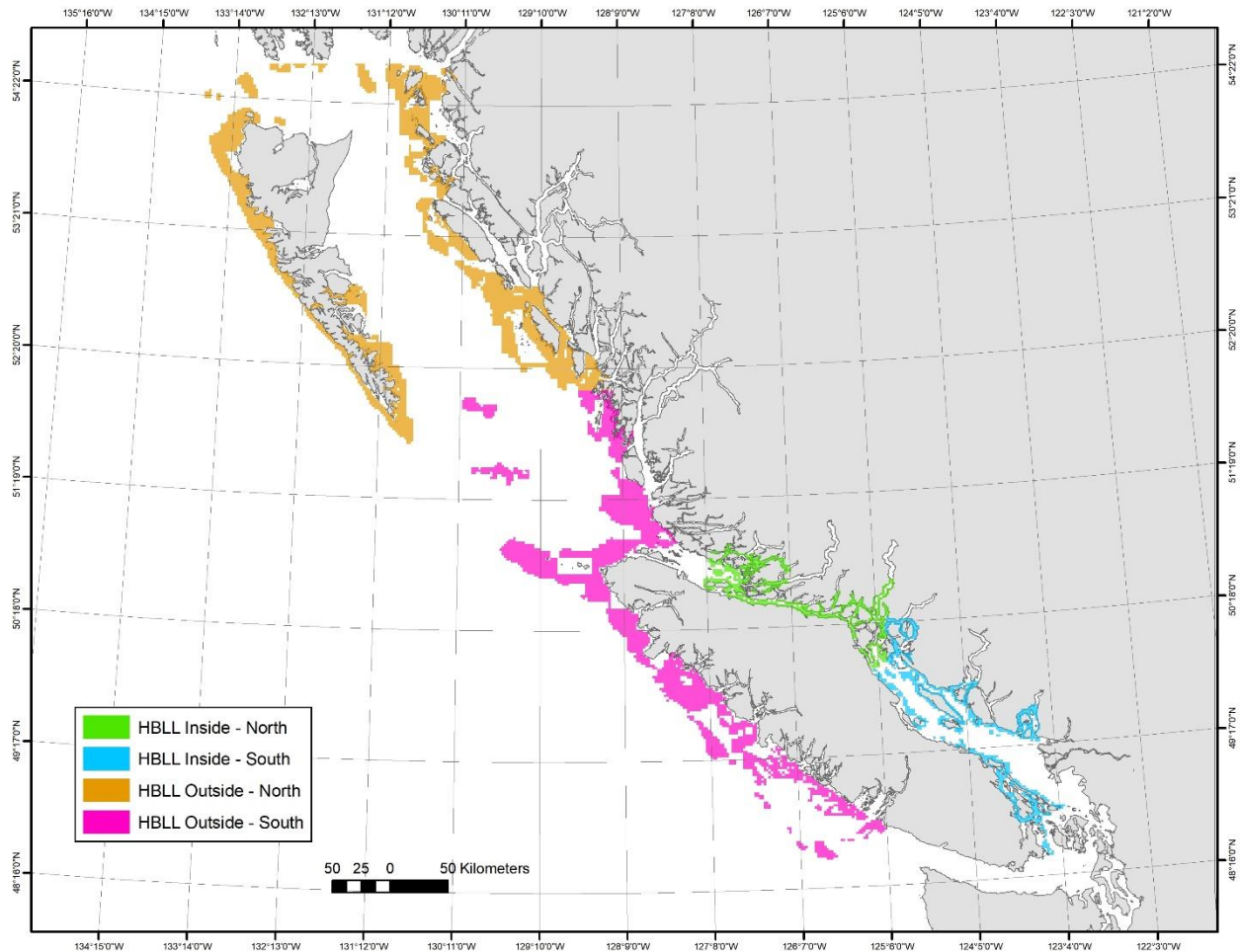


Figure 5. Hard Bottom Longline Survey coverage.

In 2025 the intent was to survey the northern regions of both the outside and inside areas (Figure 4). The outside HBL survey was conducted on the chartered commercial longline vessels *Banker II*, *Free to Wander*, and *Borealis 1* from mid-July to late-August. Approximately 175 sets were completed but the data from these trips have not yet been finalized so no summaries are available. The inside survey was conducted on the research vessel *Neocaligus* in late August but unfortunately only 16 of the planned 70 sets were completed. The survey was truncated due to a combination of mechanical issues that delayed departure and then crewing limitations that prematurely ended the survey. The 16 sets are not considered to be representative of the entire survey area. Nonetheless, the most abundant species were North Pacific Spiny Dogfish (*Squalus suckleyi*), Yelloweye Rockfish (*Sebastes ruberrimus*), Quillback Rockfish (*Sebastes maliger*), and Lingcod (*Ophiodon elongatus*).

Sablefish Research and Assessment Survey

The Sablefish Research and Assessment Survey is an annual longline trap survey targeting Sablefish. This survey fishes at randomly selected locations in offshore waters as well as at fixed stations in mainland inlets. The survey provides catch rates and biological data for use in stock assessments and, historically, Sablefish have been tagged and released from each set. The survey is conducted under a collaborative agreement with Wild Canadian Sablefish Ltd. and occurs on a chartered commercial fishing vessel by a mix of DFO staff and contracted technicians. This survey covers the depth range of 150 m to 1250 m for the entire outer BC coast as well as several central coast inlets (Figure 1).

In 2025, the survey was conducted on the commercial fishing vessel *Ocean Pearl* from early October to mid-November. Tagging operations are now on a biennial rotation and there was no tagging in 2025. The gear a gear selectivity study designed to examine the effects of different escape ring configurations continued in 2025. Poor weather prevented completion of the offshore work: 88 of the planned 91 random offshore survey sets and 7 of the 17 planned gear selectivity study sets were completed while all 5 inlets survey sets were not completed (Figure 4). The most abundant species were Sablefish (*Anoplopoma fimbria*), Lingcod (*Ophiodon elongatus*), North Pacific Spiny Dogfish (*Squalus suckleyi*), Pacific Halibut (*Hippoglossus stenolepis*), and Redbanded Rockfish (*Sebastes babcocki*).

Strait of Georgia Dogfish Longline Survey

The Strait of Georgia Dogfish Longline (DOG) Survey is conducted every two to five years and follows a fixed-station design that fishes at 10 to 12 locations in the Strait of Georgia (Figure 2). The survey was not conducted in 2025.

Small Mesh Multispecies Bottom Trawl Survey

The Small Mesh Multispecies Bottom Trawl (MSSM) Survey is an annual fixed-station survey of commercially important shrimp grounds off the West Coast of Vancouver Island (Figure 2) that was initiated in 1973, and occurs on a Canadian Coast Guard Vessel with DFO staff. Catch rate indices generated by the survey have been used to track the abundances of several groundfish stocks. Groundfish staff assist in catch sorting and species identification and also collect biological samples from selected fish species. The 2025 survey was conducted onboard the research vessel *Sir John Franklin* from late April to mid-May and a total of 83 usable tows were completed (Figure 4). The most abundant species were Rex Sole (*Glyptocephalus zachirus*), Dover Sole (*Microstomus pacificus*), North Pacific Spiny Dogfish (*Squalus suckleyi*), Slender Sole (*Lyopsetta exilis*), and Petrale Sole (*Eopsetta jordani*).

Hydroacoustic Surveys

Groundfish participates in two acoustic-trawl surveys that focus on Pacific Hake (*Merluccius productus*). One survey is conducted in offshore waters while the second is

conducted in east of Vancouver Island in the Strait of Georgia and larger mainland inlets (Figure 2).

The Offshore Pacific Hake Acoustic-Trawl Survey is part of the Joint Canada/US Hake Acoustic Survey. The survey goals alternate annually between survey and research. The 2025 trip was a survey year and continued fishing using a midwater trawl equipped with six pocket nets spread throughout the main trawl net. The survey was conducted onboard the research vessel *Sir John Franklin* from mid-August to mid-September. The survey did not locate many Hake aggregations and a total of 23 tows were completed (Figure 4). The most abundant species were Walleye Pollock (*Gadus chalcogrammus*), Pacific Herring (*Clupea pallasii*), Redstripe Rockfish (*Sebastes proriger*), and Yellowtail Rockfish (*Sebastes flavidus*) with minor catches of other species.

The Strait of Georgia Acoustic-Trawl Survey is a scaled-down version of the Offshore Pacific Hake “survey” year where the vessel collects acoustic backscatter data along predefined transects. Acoustic data are collected during daylight hours with opportunistic pelagic trawl fishing to characterize the species and size composition. The 2025 survey was conducted onboard the research vessel *Sir John Franklin* from late-February to early March and a total of 21 tows were completed (Figure 4). The most abundant species were Pacific Hake (*Merluccius productus*), Walleye Pollock (*Gadus chalcogrammus*) and North Pacific Spiny Dogfish (*Squalus suckleyi*) with minor catches of other species.

3. Research and Publications

Technical Reports and CSAS Publications

Rockfish Conservation Area Monitoring Framework

Rockfish Conservation Areas (RCAs) were created in British Columbia to help protect Inshore Rockfish, Lingcod, and their habitats. Fisheries and Oceans Canada (DFO) is responsible for checking whether these areas are working as intended. In 2025, a monitoring framework to provide guidance on how to monitor RCAs across the whole coast was reviewed at CSAS. The framework identifies what should be measured, how to measure it, and which questions the monitoring should answer. It introduces a model that shows how different parts of the RCA system are connected and uses this model to recommend survey methods, sampling tools, and the kinds of data needed to assess RCA effectiveness. It also outlines how to choose which RCAs to monitor and how to select survey sites within them while accounting for important factors like depth, habitat structure, and past fishing effort. The authors recommend using underwater imagery tools (such as ROVs, towed cameras, or divers) to count rockfish and measure their body sizes. They suggest collecting all key indicators at the same time and using an “early-later-control-impact” study design, which compares conditions before and after RCAs were created and between protected and unprotected areas. They also emphasize the importance of working collaboratively with coastal First Nations. The document lays out a five-phase plan for planning surveys, collecting and analyzing data,

and producing the first coastwide assessment of RCA ecological effectiveness. It also highlights how Indigenous Knowledge can be included in the process. While the report offers detailed monitoring guidance, some operational details—such as funding and partner roles—will depend on available resources. The Science Advisory Report and the Research Document are both in press.

Groundfish Synopsis Report

The combination of fishery-dependent data, such as catch and effort, and fishery-independent survey data, such as biomass indices and age compositions, forms the backbone of most fisheries stock assessments. For British Columbia groundfish, vast quantities of such data are collected. However, the Fisheries and Oceans Canada Pacific groundfish section lacks the capacity to conduct formal stock assessments for most stocks annually, and therefore, much of these data are not summarized to represent the nature of the data holdings. Here, we update a reproducible report that gives a snapshot of population and fishing trends, growth and maturity patterns, as well as data availability, for 116 groundfish species in British Columbia. This update includes data up to 2024. This report is generated using the gfsynopsis package (<https://github.com/pbs-assess/gfsynopsis>).

Anderson, S.C., and J.C. Dunic. 2025. [A data synopsis for British Columbia groundfish: 2024 data update](#). Can. Tech. Rep. Fish. Aquat. Sci. 3718: viii + 263 p.

Summary of Commercial Biological Samples 1996-2022

Biological data collected from commercial fishing catches are an important component of fisheries stock assessments. In Canada's Pacific Region, these data have been collected by the At-Sea Observer Program (ASOP), dockside sampling programs, and special projects. However, during the COVID-19 pandemic, the ASOP was paused, and it has not been reintroduced, profoundly affecting the type and quantity of data collected from commercial fishing catches. This report was developed to provide an overview of data collection and availability from 1996 to 2022 for major BC groundfish species of commercial and conservation interest. The data were presented at a coastwide scale and also by finer Pacific Marine Fisheries Commission (PMFC) areas so that spatial and temporal trends in British Columbia could be identified. The goals of the report were to (1) summarize available data collected on commercial fishing vessels and (2) represent the temporal and spatial trends of the biological data by groundfish species. This report highlights which data are no longer being collected and can guide decisions on future sampling programs, data collection, and resource allocation.

Walker, L.C., Rogers, L.A., Anderson, S.C., and Haggarty D.R. 2025. A review of biological samples collected from commercial groundfish fisheries in British Columbia, 1996-2022. Can. Tech. Rep. Fish. Aquat. Sci. 3722: vi + 148 p.
<https://doi.org/10.60825/ywpx-4051>

State of the Pacific Ocean: Trends in Pacific Canadian Groundfish Stock Status and Surveys

Since 1999 an annual State of the Pacific Ocean meeting has been convened by DFO to bring together the marine science community in the Pacific Region and present the results of the most recent year's monitoring in the context of previous observations and expected future conditions. The workshop to review ecosystem conditions in each year is a hybrid meeting which alternates between Nanaimo and Sidney, BC. A technical report includes submissions based on presentations given at the meeting and poster summaries. Groundfish trends are presented at this meeting annually and a summary is published in the report. Trends for 2025 were presented at the meeting on March

Average groundfish stock status declined from 1950 to around 2000, and following management changes, has remained relatively stable since then. In 2025, assessments were updated for four stocks (Yellowtail Rockfish, Yelloweye Rockfish, Outside Lingcod and Dover Sole). Over the last two decades, survey indices increased for ~66% of stocks, remained neutral for ~14%, and declined for ~20% stocks. All assessed shelf rockfish (Bocaccio, Canary, Redstripe, Silvergray, Widow, Yellowtail) and several slope rockfish increased in surveyed biomass over the last 5–7 years; surveyed biomass also increased for several flatfish (Petrale, English, Rex, and Dover Sole) but declined for Arrowtooth Flounder over the last 5–10 years, although the most recent data point from the Synoptic Trawl surveys is increasing. Survey indices for Pacific Spiny Dogfish stocks had the steepest declines across all stocks—particularly for the outside stock, which excludes inside Vancouver Island waters—despite low fishing pressure compared to historical levels.

Sean C. Anderson, Jillian C. Dunic, Philina A. English, Trends in Pacific Canadian Groundfish Stock Status and Surveys. *In* Boldt, J.L., Joyce, E., Tucker, S., Gauthier, S., and Jackson, J. (Eds.). 2024. Can. Tech. Rep. Fish. Aquat. Sci. 3687: viii + 337 p. <https://waves-vaques.dfo-mpo.gc.ca/library-bibliotheque/41298834.pdf>

Enhanced Salmon Sampling Program

In fall 2022, new rules were introduced for the Pacific Region groundfish trawl fishery to improve how salmon bycatch is monitored. These rules included better tracking of salmon caught by accident and collecting more information about Chinook salmon, such as where they come from and whether they carry coded-wire tags. This report summarizes the results from the 2024/25 groundfish fishing season and the 2024 calendar year. It includes information on how many salmon were caught, what species they were, what stocks they came from, how many coded-wire tags were recovered, and the age makeup of the Chinook salmon caught. The 2024/25 season was the first year of a new bycatch management plan that set a fleet-wide annual limit of 9,500 Chinook salmon. The estimated total salmon bycatch for the season was 7,527 fish, including 7,040 Chinook. Genetic and coded-wire tag information showed that most of the Canadian-origin Chinook salmon caught (about 78%) came from the Fraser River

Fall 4(1) stock management unit. This group includes key indicator stocks from the Chilliwack and Harrison rivers.

Lagasse, C.R., Fraser, K.A., Braithwaite, E., Komick, N. 2026. Salmon Bycatch Monitoring and Sampling Results for the Pacific Region 2024/25 Groundfish Trawl Fishery. Can. Manuscr. Rep. Fish. Aquat. Sci. 3318: vi + 38 p.
<https://doi.org/10.60825/s7pb-fq56>

Summaries of the 2023 and 2024 British Columbia Sablefish (*Anoplopoma fimbria*) trap surveys

The 2023 and 2024 British Columbia Sablefish survey technical reports describe the coastwide stratified random design of the annual longline trap survey, its sampling procedures, and the collection of fishery independent data. These data provide the primary index of abundance for evaluating sablefish stock status and conditioning the operating model used in coastal management strategy evaluation (MSE). Methodology and results from an additional experimental component of the survey examining how the number and location of escape rings affected catch rates and the proportion of sub-legal sized catch in 2023 and 2024 are also described.

Lacko, L.C., Hardy, S.M., Holt, K.R. and Temple, K.L. 2026. Summary of the 2023 British Columbia Sablefish (*Anoplopoma fimbria*) trap survey, September 29–November 13, 2023. Can. Tech. Rep. Fish. Aquat. Sci. 3750: vii + 65 p.
<https://doi.org/10.60825/v9h9-8342>

Lacko, L.C., Hardy, S.M., and Holt, K.R. 2026. Summary of the 2024 British Columbia Sablefish (*Anoplopoma fimbria*) trap survey, September 27–November 16, 2024. Can. Tech. Rep. Fish. Aquat. Sci. 3751: vii + 61 p. <https://doi.org/10.60825/rgr5-x663>

An Investigation of Ageing Requirements to Support the British Columbia Sablefish (*Anoplopoma fimbria*) Operating Model

This study examined how age composition sample size and the allocation of ageing effort among age data sources effected the performance of the Sablefish operating model, with performance quantified based on bias and precision of management parameters. Results showed that 1,200–1,600 aged fish per year was enough for reliable model performance, and that shifting effort allocation to include samples from the longline fishery was advantageous. However, even with relatively large sample sizes, the current Sablefish management procedure was unable to detect an extreme collapse in recruitment, suggesting the BC Sablefish management procedure itself may need updating to respond more quickly to declines.

DFO. 2026. An Investigation of Ageing Requirements to Support the British Columbia Sablefish (*Anoplopoma fimbria*) Operating Model. [DFO Can. Sci. Advis. Sec. Sci. Resp. 2025/013](https://www.dfo-mpo.gc.ca/science/advise-conseil/2025/013).

Primary Publications

Passive Acoustic Monitoring (PAM) of Rocky Reef Fishes

Listening to underwater sounds is a useful, non-destructive way for researchers to understand which fish species are present and how many may be in an area. However, this approach is difficult to apply to individual species because many wild fish sounds have never been recorded or described. In this study, the researchers tested a new underwater listening system that can locate where sounds come from and pair them with video, allowing them to identify which species made each sound in a diverse marine region of British Columbia. Using this system, the team recorded calls from eight sound-producing fish species, including five whose sounds had never been documented before—such as vermillion, canary, and black rockfish. They then used machine-learning models (random forests) to see whether different fish species could be identified based solely on features of their calls. The models were highly accurate for common call types (80% for knocks and 88% for grunts), but they were less reliable for species with very few recorded sounds. The study found that each species had distinct sound features, especially in the lower and mid-frequency ranges. The researchers also developed a detailed set of sound characteristics for each species that can be used to train future automated detectors. Overall, the research outlines a strong method for collecting and distinguishing wild fish sounds in areas with many closely related species. The findings can support the development of species-specific sound detectors that help monitor where fish occur, how diverse an area is, and how their ranges may shift over time. The same approach can also be applied in other regions using the same sound features and modelling techniques.

Lancaster, D., Mouy, X., Haggarty, D., and Juanes, F. 2025. Knock knock, who's there? Identifying wild species-specific fish sounds with passive acoustic localization and random forest models. *Journal of Fish Biology* 1-15.
[doi:https://doi.org/10.1111/jfb.70294](https://doi.org/10.1111/jfb.70294).

Echosounder Surveys of Nearshore Benthic Rockfishes

A PhD Candidate at UVic, Darienne Lancaster working with Dr. Dana Haggarty is exploring new ways to monitor rockfish and other bottom-dwelling fish that live around rocky reefs. Traditional tools like remote operated vehicles (ROVs) work well but are slow and can only cover small areas. Acoustic (echosounder) surveys can cover much larger areas quickly and without disturbing the habitat, but they have rarely been used in rocky areas because the hard seafloor makes it difficult to detect fish close to the bottom. In this study, we used both an echosounder and an ROV at 39 sites in Nootka Sound, within Mowachaht/Muchalaht territory, in August 2023. We looked at whether the echosounder's measure of fish biomass (called NASC) could predict how many bottom-dwelling fish the ROV actually saw. We found that higher NASC values within 10 meters of the seafloor were linked to more benthic fish on the ROV, explaining about half of the variation. This means the echosounder can help identify areas where bottom

fish are more abundant. We also compared habitat measurements (like slope and rugosity) made by the echosounder and the ROV. The two methods produced similar results, but the echosounder measurements varied less between analysts. Overall, this study shows that echosounders can be an efficient new tool for finding rocky reef fish hotspots in nearshore waters. This information can help fishers avoid sensitive or non-target species and can support choosing locations for marine protected areas.

Lancaster, D., Noth, H., Gauthier, S., Edwards, J., Picco, C., Juanes, F., Mouy, X., and Haggarty, D.R. 2025. Echosounder-derived metrics from small-scale coastal surveys identify benthic rocky reef fish hotspots within the acoustic deadzone. *Canadian Journal of Fisheries and Aquatic Sciences* **82**: 1-16. [doi:10.1139/cjfas-2024-0413](https://doi.org/10.1139/cjfas-2024-0413).

Body condition as a shared response to environmental conditions

Drs. Philina English, Sean Anderson, and Robyn Forrest are investigating how environmental changes in Canadian Pacific waters are influencing average body condition for 35 groundfish species. Because the condition of mature male, mature female, and immature individuals have different implications for population dynamics, measurement issues, and potentially different ecological drivers, they first separated individual fish and overall catches into these components and generated a density-weighted annual index of average condition for each component of the population. Then they identified common trends across species and correlations with environmental conditions. Regardless of sex or maturity, they found that spring sea surface temperature (SST) and two-year-lagged North Pacific Gyre Oscillation (NPGO, an indicator of productivity on our coast) were most related to body condition. For most species, warmer SST was either neutrally or positively correlated with body condition, while the impact of NPGO was more variable. Immature body condition was also strongly correlated with primary production, but among species this effect was equally likely to be negative (e.g., Pacific Spiny Dogfish, Lingcod, Sablefish) as positive (e.g., Quillback Rockfish, Southern Rock Sole, Spotted Ratfish). This approach has the benefit of both providing an ecosystem perspective of shared responses across an assemblage of species, while also providing species-specific inference. Components of these analysis are forming the basis for a couple R packages currently in development to aid in identifying environmental relationships for consideration in stock assessments (github.com/pbs-assess/gfcondition, and github.com/pbs-assess/gfenvriocor).

English, P.A., Anderson, S.C., and Forrest, R.E. 2026. Body Condition as a Shared Response to Environment in a Commercially Important Demersal Fish Assemblage. *Fish and Fisheries* **27**(2): 264-284. [doi:https://doi.org/10.1111/faf.70053](https://doi.org/10.1111/faf.70053).

Quantitative estimates of contact with seafloor habitats by longline trap and hook fishing gear

This paper develops a quantitative method to estimate the extent of seafloor contact from longline trap and hook gear used in the British Columbia Sablefish (*Anoplopoma*

fimbria) fishery. The study models the fishing footprint using spatial effort data and habitat maps to quantify the intensity of gear–seafloor interactions, providing a framework to evaluate habitat impacts and inform sustainable fisheries management. Results show that 91.8% of the fished area had no seafloor contact over the 17-year period, while the remaining 8.2% experienced only low-intensity contact.

Doherty, B., Lacko, L., Kronlund, A.R., Alexander, K., and Cox, S.P. 2025. Quantitative estimates of contact with seafloor habitats by longline trap and hook fishing gear. *ICES Journal of Marine Science*, 82. <https://doi.org/10.1093/icesjms/fsaf026>

Hidden markov mark-recapture modeling highlights transboundary exchange for northeast pacific sablefish

Using nearly forty years of tagging data, researchers built a movement model to track how fish travel between Alaska, British Columbia, and the California Current. They found sablefish often migrate long distances, with British Columbia acting as a key transition area and receiving more fish than it loses. Movement differences between small and large fish were minor, though larger Alaskan fish were more likely to move south. The study recommends increased consideration of these cross-boundary movements within Sablefish management and supports international data sharing.

Kapur, M., Rogers, L., Goethek, D.R., Daniel R. Goethel, Cheng, M.L.H., Hanselman, D., Echave, K., Haltuch, M.A., Holt, K.R., English, P., Berger, A.M., Connors, B. 2005. Hidden markov mark-recapture modeling highlights transboundary exchange for northeast pacific sablefish. *Fisheries Research*. <https://doi.org/10.1016/j.fishres.2025.107498>

The Mystery of the Disappearing Dogfish

Understanding population trends and distribution changes of species that cross international borders can be challenging. Pacific Spiny Dogfish (*Squalus suckleyi*, Squalidae), is a small shark with a remarkably slow life history and wide-ranging distribution across the Pacific. Dogfish population trends have conflicted along the coast, and movement outside of national jurisdictions is often cited as a possible reason for changes in local populations. We used data from 10 fisheries independent surveys to synthesise trends in biomass, abundance, distribution for dogfish across the eastern Pacific Ocean (Alaska, Canada, and the United States west coast). Between 2003 and 2023, we found dogfish biomass declined by half across the coast (51%, 95% CI: 38%–61%) with mature females and immature dogfish showing the largest declines. Declines were the steepest in the US West Coast (71%–85%) and in Canada (58%–82%), while Alaska showed less severe declines (13%–54%). Off the US West Coast, dogfish shifted into deeper waters as temperatures rose, but this movement does not explain the coastwide declines. The findings suggest population declines are primarily driven by reduced abundance rather than individuals moving across regions. This points to growing conservation concerns for the species across the entire coast.

Davidson, L.N.K., English, P.A., King, J., Grant, P.B.C., Taylor, I.G., Barnett, L.A.K., Gertseva, V., Tribuzio, C.A. and Anderson, S.C. (2026), Mystery of the Disappearing Dogfish: Transboundary Analyses Reveal Steep Population Declines Across the Northeast Pacific With Little Evidence for Regional Redistribution. *Fish Fish*, 27: 1-12. <https://doi.org/10.1111/faf.70028>

surveyjoin: A standardized database of fisheries bottom trawl surveys in the northeast Pacific Ocean

This paper presents surveyjoin, an R package that unifies bottom trawl survey data from NOAA Fisheries and Fisheries and Oceans Canada to support coastwide analyses of groundfish and other demersal species across the Northeast Pacific. The database merges more than 3.3 million standardized observations from 14 surveys spanning Alaska to California, resolving long-standing challenges around differing formats, sampling methods, and governance boundaries. Through case studies, the authors show how the integrated data can improve management-relevant insights, including a coastwide biomass index for Pacific hake, spatial patterns in groundfish community structure, and regional variability in sablefish biomass trends. Overall, surveyjoin offers a scalable, transparent framework that enhances cross-border data sharing and strengthens groundfish stock and ecosystem assessments under changing ocean conditions.

Ward, E.J., English, P.A., Rooper, C.N., Ferriss, B.E., Whitmire, C.E., Wetzel, C.R., Barnett, L.A., Anderson, S.C., Thorson, J.T., Johnson, K.F., Indivero, J., and Markowitz, E.H. 2025. surveyjoin: A standardized database of fisheries bottom trawl surveys in the northeast Pacific Ocean. *PeerJ* 13: e19964. <https://doi.org/10.7717/peerj.19964>

sdmTMB: an R package for fast, flexible, and user-friendly generalized linear mixed effects models with spatial and spatiotemporal random fields

This paper introduces sdmTMB, an R package that streamlines spatial and spatiotemporal modeling—tools widely used for groundfish index standardization and habitat analyses—by providing a familiar interface while incorporating fast Gaussian Markov random field methods via the SPDE approach. The package supports flexible model structures such as penalized smoothers, spatially or temporally varying coefficients, hurdle models, anisotropy, and cross-validation, with estimation available through TMB or Bayesian tools. Case studies demonstrate this flexibility, and performance benchmarks show that sdmTMB can run an order of magnitude faster than R-INLA. Overall, the package lowers the barrier to applying advanced geostatistical models in fisheries science. While a preprint on the package has been out for several years, the paper completed its journal through the publishing process in 2025.

Anderson, S.C., Ward, E.J., English, P.A., Barnett, L.A.K., and Thorson, J.T. 2025. sdmTMB: an R package for fast, flexible, and user-friendly generalized linear mixed

effects models with spatial and spatiotemporal random fields. *Journal of Statistical Software*. 115: 1-46. <https://doi.org/10.18637/jss.v115.i02>

Estimating a physiological threshold to oxygen and temperature from marine monitoring data reveals challenges and opportunities for forecasting distribution shifts

This study tests whether the joint effects of temperature and dissolved oxygen on fish metabolism—summarized by the metabolic index—can be inferred directly from groundfish distribution data along the U.S. Pacific Coast. The authors developed a species distribution model that incorporates the metabolic index using an Arrhenius-based temperature sensitivity and a nonlinear threshold linking metabolic constraints to observed densities. Simulations showed that while individual physiological parameters cannot be estimated precisely from survey data, the model can recover an overall metabolic threshold. Applied to two groundfish species, the approach improved model fit for sablefish but not for longspine thornyhead, indicating species-specific utility. Overall, the work suggests that integrating metabolic theory into groundfish distribution models can improve predictions under climate-driven warming and deoxygenation, though additional physiological data will strengthen future applications.

Indivero, J., Anderson, S.C., Barnett, L.A.K., Essington, T.E., and Ward, E.J. 2025. Estimating a physiological threshold to oxygen and temperature from marine monitoring data reveals challenges and opportunities for forecasting distribution shifts. *Ecography*. e07413. <https://doi.org/10.1111/ecog.07413>

Skill testing oxygen data for distribution modeling of marine species.

This study assessed how well different methods estimate bottom dissolved oxygen across northeastern Pacific groundfish survey regions and how those estimates influence species distribution models (SDMs). An empirical statistical model predicted oxygen fairly accurately in regions with dense observations, such as British Columbia and the California Current, but performance declined markedly in Alaska, where limited sampling led to much larger errors. The Copernicus GOBH model consistently showed lower predictive skill than the statistical approach. When incorporated into SDMs, the different oxygen estimates produced shifts of 20–50 $\mu\text{mol kg}^{-1}$ in inferred oxygen thresholds, indicating that conclusions about species–environment relationships can depend strongly on the oxygen data source. The authors recommend validating oceanographic model outputs before using them operationally in fisheries analyses and testing SDM sensitivity to environmental data choices.

Indivero, J., Anderson, S.C., Barnett, L.A.K., Pohl, J.E., Rohan, S.K., Siedlecki, S., Ward, E.J., and Essington, T.E. 2025. Skill testing oxygen data for distribution modeling of marine species. *Fisheries Oceanography*: e70005. <https://doi.org/10.1111/fog.70005>

The generalized gamma is a flexible distribution that outperforms alternatives when modelling catch rate data.

This study examines the generalized gamma distribution (GGD) as an alternative error model for estimating biomass and abundance from fisheries-independent trawl surveys, with a focus on applications relevant to groundfish stock assessment and habitat modeling. The GGD is flexible—encompassing the lognormal and gamma distributions as special cases—and maintains a coefficient of variation that is independent of the mean, which is useful for modeling skewed, positive survey data common in groundfish assessments. Simulation tests showed that the GGD produced low bias, strong predictive performance, and appropriate uncertainty across a wide range of observation error types. When applied to spatiotemporal index standardization models for 14 groundfish and other demersal species from Gulf of Alaska and British Columbia trawl surveys, the GGD was the most frequently selected distribution based on AIC weights and provided superior predictive accuracy for most Gulf of Alaska species, with more mixed results for the smaller British Columbia datasets. Overall, the study suggests that the GGD is a robust and versatile choice for modeling groundfish survey data and should be considered alongside traditional distributions in assessment and ecosystem modeling workflows.

Dunic, J.C., Conner, J., Anderson, S.C., and Thorson, J.T. 2025. The generalized gamma is a flexible distribution that outperforms alternatives when modelling catch rate data. *ICES Journal of Marine Science*. 82(4): fsaf040.

<https://doi.org/10.1093/icesjms/fsaf040>

4. Stock Assessments and Management by Species/Group

During 2025/26, DFO Science provided coastwide harvest advice in full stock assessments for Outside Lingcod and Dover Sole, and Silvergray Rockfish and an OM update for Outside Yelloweye Rockfish. Advisory documents are not yet available for Dover Sole, Silvergray Rockfish and Outside Yelloweye Rockfish. Advice was provided for Sablefish in the form of a management procedure (MP) update. Updated advice for Pacific Halibut and offshore Pacific Hake continue to be provided annually by the International Pacific Halibut Commission (IPHC) and Pacific Hake Joint Technical Committee (JTC), respectively. In 2026/27 DFO Science anticipates updating stock assessment advice for Gulf Hake, Widow Rockfish, an Operating Model update for Sablefish, and MP updates for Sablefish and the outside stock of Yelloweye Rockfish.

Stocks Assessed in 2025/2026

Offshore Hake

Management of Pacific Hake has been under a treaty (The Agreement) between Canada and the United States since 2011. The stock is managed by the Joint

Management Committee (JMC) which is made up of fisheries managers and industry representatives from both the U.S. and Canada. These managers receive advice from the JTC and the Scientific Review Group (SRG), which is a committee responsible for the scientific review of the assessment.

The 2026 assessment differed from other years in that it only had the catch value for 2025 added to the model. The survey data were not available in time due to the U.S. government shutdown and the decision was made by the Joint Management Committee to not include the data other than catch for 2025.

The final assessment document and other treaty-related documents are posted at: Edwards, A.M., A.M. Berger, C.J. Grandin, C.R. Wetzel, K.F. Johnson, and K.L. Oken. 2026. Status of the Pacific Hake (whiting) stock in U.S. and Canadian waters in 2026. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific Hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 71 p.

<https://www.fisheries.noaa.gov/s3/2026-02/hake-assessment-2026.pdf>

Outside Lingcod

The 2024 assessment for Outside Lingcod (*Ophiodon elongatus*) evaluated the stock in BC's outside waters (PMFC Areas 3CD and 5ABCDE) using a two-sex, age-structured model based on data from 1927 to early 2025. Inputs included commercial and recreational catch data, survey indices, age composition from fisheries and surveys, and biological parameters estimated from local research and fishery data. Ecosystem factors were considered separately. The assessment found a very high probability (>99%) that female spawning biomass in 2025 is above the limit reference point (LRP: $0.2 B_0$) and candidate upper stock reference points (USRs: $0.35 B_0$ and $0.4 B_0$), placing the stock in the Healthy zone under the Precautionary Approach. Estimated stock status ($B_{(2025)} / B_0$) is 1.12 (range: 0.96–1.29). Fishing mortality in 2024 was very likely below all candidate removal reference rates. Stock status declined from 1927 to 1978, then fluctuated between 0.5 and $1.25 B_0$. At no point did the 95% confidence range fall below the USRs. A strong recruitment event occurred in 2016, aligning with similar events in other groundfish species. Another potential event in 2021 may be reflected in length data. Recruitment was linked to higher seafloor oxygen, lower salinity, and lower North Pacific Gyre Oscillation values, though no single environmental factor was a strong predictor.

MSY-based reference points were not used due to uncertainty in the steepness parameter. Instead, the assessment applied reference points based on B_0 :

- LRP: $0.2 B_0$
- Candidate USRs: $0.35 B_0$ and $0.4 B_0$
- Candidate Removal References (RR): $F_{0.4 B_0}$, $F_{0.45 B_0}$, $F_{0.5 B_0}$
- Candidate Target Reference Points (TRP): $0.4 B_0$, $0.45 B_0$, $0.5 B_0$

Decision tables show:

- >95% chance of staying above the LRP over 10 years with catches $\leq 6,500$ t/year
- >90% chance of staying above USRs with catches $\leq 5,000$ t/year
- $\geq 64\%$ chance of staying below RR rates with catches $\leq 4,500$ t/year

The stock is expected to decline over the next decade as the 2016 cohort ages, even with no fishing. However, it is very likely to remain above the LRP and USRs with catches up to 3,500 t/year.

DFO. 2025. Outside Lingcod (*Ophiodon elongatus*) stock assessment for British Columbia in 2025. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2025/054. <https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41309091.pdf>

Dover Sole

The 2026 assessment for Dover Sole (*Microstomus pacificus*) evaluated the stock in Canadas Pacific Exclusive Economic Zone (PMFC Areas 3CD, 4B, and 5ABCDE) using a two-sex, age-structured model based on data from 1950 through 2025. Inputs included commercial catches, survey indices, age composition from fisheries and surveys, and biological parameters estimated from research and fishery data. The assessment found a very high probability (>99%) that female spawning stock biomass (SSB) in 2025 is above the limit reference point (LRP: 0.1 SSB_0) and candidate upper stock reference point (USRs: 0.2 SSB_0), placing the stock in the Healthy zone under the Precautionary Approach. Estimated stock status ($\text{SSB}_{2025} / \text{SSB}_0$) is 0.70 (range: 0.50–0.94). There is a high probability (> 99%) that the fishing mortality rate (F) in 2025 was below the candidate removal reference (RR: fishing mortality rate that reaches 0.25 SSB_0 in equilibrium) rate. Annual relative biomass ($\text{SSB}_y / \text{SSB}_0$) for Dover Sole trended consistently downward between 1950 and 2014, dropping from 1.0 in 1950 to 0.51 in 2014. Since then, it has trended consistently upward to the current estimate in 2026 of 0.70. At no time did the lower bound of the 95% credibility interval fall below the candidate USR. Above-average age-1 recruitment in 2014 and 2015 has likely contributed to the recent increase in female spawning stock biomass. Ecosystem factors were considered separately to the stock assessment model, with no single environmental factor proving to be a strong predictor of Dover Sole recruitment. MSY-based reference points were not used due to uncertainty in the steepness parameter. Instead, the assessment applied reference points based on SSB_0 :

- Limit Reference Point (LRP): 0.1 SSB_0
- Candidate Upper Stock Reference (USR): 0.2 SSB_0
- Candidate Target Reference Point (TRP): 0.25 SSB_0
- Candidate Removal Reference (RR): F_{MSYproxy} (F that reaches TRP in equilibrium)

Decision tables of 10-year projections show:

- >99% chance of being above the LRP in 2036 with catches $\leq 2,735$ t/year
- >99% chance of being above the candidate USR in 2036 with catches $\leq 2,735$ t/year

97% chance of being below candidate RR rate in 2035 with catches $\leq 2,735$ t/year

DFO. 2026. Assessment of Dover Sole in the Canadian Pacific Exclusive Economic Zone in 2026. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2026/nnn. In Press

Outside Yelloweye Rockfish

The 2024 assessment for Outside Yelloweye Rockfish (*Sebastes ruberrimus*) details the transition of the operating models (OMs) from AD Model Builder (ADMB) to the Template Model Builder (TMB) platform and incorporates new data through 2024. The work supports the second Management Strategy Evaluation (MSE) cycle for Outside Yelloweye Rockfish management, providing updated stock status estimates and reference points for continued management under the current framework.

Four core OMs representing key structural uncertainties (start year, catch reconstructions, natural mortality) were transitioned to the new Spatially Integrated Statistical Catch-at-Age Yelloweye (SISCAY) framework implemented in TMB. The modernized SISCAY framework provides improved computational efficiency, Bayesian analysis capabilities, and integration with contemporary R workflows while maintaining continuity with previous assessments and ensuring compliance with the Fisheries Act Fish Stock Provisions. Transition and bridging analyses confirmed that the platform shift to the SISCAY framework in TMB had little effect on key parameters and reference points (<5%), while new data and methodological improvements drove meaningful updates to estimates of stock status. Specifically, the updated OMs incorporate new survey indices, catch, age composition, and biological parameters using 2019–2024 data. Key methodological changes include improved age composition likelihoods, a flexible spline maturity ogive, and extended modelled ages to 105 years.

Stock status estimates confirm that Outside Yelloweye remains in the healthy zone, with coastwide spawning biomass in 2024 estimated at 9,900 t (95% CI: 5,200–18,300 t), representing 1.48 times the biomass at maximum sustainable yield ($B_{2024}/BMSY = 1.48$; 95% CI: 0.75–2.54). The stock has a 96% probability of being above the Upper Stock Reference ($0.8*BMSY$) and a 100% probability above the Limit Reference Point ($0.4*BMSY$), confirming no rebuilding plan is required. The Management Procedure will be updated and reviewed as a Science Response in 2026.

DFO. 2026. Operating model code transition and stock status update for Outside Yelloweye Rockfish (*Sebastes ruberrimus*) in British Columbia. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2026/nnn. In Press

Silvergray Rockfish

Silvergray Rockfish (*Sebastes brevispinis*) range from the Gulf of Alaska to central Baja California and in British Columbia are an important commercial species typically caught at 100–400 m, often alongside Arrowtooth Flounder, Pacific Ocean Perch, Yellowtail

Rockfish, and Dover Sole, forming loose off-bottom aggregations with other rockfish. This stock assessment analyzed a coastwide BC population using three subareas, with trawl gear accounting for ~96.6% of catch from 1996–2024 and midwater trawl making up ~4% of total catch, leading to combined bottom, midwater, and non-trawl data due to similar selectivity patterns. An annual statistical catch-at-age model was fit using commercial catch data back to 1935, multiple CPUE and survey indices from 1967–2025, and age compositions, implemented as a two-sex Bayesian model estimating natural mortality, steepness, recruitment deviations, selectivity, and survey scaling. Two scenarios—a three-area model and a single-area coastwide model—were explored with extensive sensitivity analyses, and reference points were updated to use $B_{TRP} = 0.4B_0$, with $LRP = 0.2B_0$ and $USR = 0.32B_0$. The three-area model estimated B_{2026}/B_0 at 1.22 (0.90–1.65) and the coastwide model at 0.79 (0.55–1.13), both placing the stock in the Healthy zone, though the coastwide model was recommended for management due to more plausible biomass estimates. Under the coastwide base run, the probability of being above the USR was >0.99, with <0.01 probability of being in either the Cautious or Critical zones, and a 0.96 probability that the 2025 exploitation rate was below that at the TRP.

DFO. 2026. Silvergray Rockfish (*Sebastes brevispinis*) stock assessment for British Columbia in 2026. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2026/nnn. In Press

Sablefish

Sablefish (*Anoplopoma fimbria*) stock status is regularly evaluated as part of a management strategy evaluation (MSE) process. An operating model (OM) is used to both estimate stock status and simulate data for prospective testing of management procedure (MP) performance relative to stock and fishery objectives. The intention is to select an MP that can be repeatedly applied to produce a catch limit each year using updated monitoring data. Once an MP is selected, it is applied annually until the next round of OM update and MP evaluation. The last update to the BC Sablefish OM was done in 2022 (DFO 2023), with simulation testing used to inform selection of the current Sablefish MP.

In 2025, the Sablefish MP was applied to updated stock and fishery survey data to set the TAC for the 2025-26 fishing year (DFO 2025). MP biomass was estimated to be well above the upper control point below which harvest rates are reduced, which meant that the target harvest rate for 2025-26 was set at the maximum target harvest rate of 6.4%. The MP recommended catch limit for 2025-26 was 3,440 tonnes, which was 411 tonnes higher than the previous year's TAC.

DFO. 2023. A Revised Operating Model for Sablefish in British Columbia in 2022. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2023/010. <https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41102587.pdf>

DFO. 2025. Application of the British Columbia Sablefish (*Anoplopoma fimbria*) Management Procedure for the 20254-265 Fishing Year. DFO Can. Sci. Advis. Sec. Sci. Resp. 2025/018. Application of the British Columbia Sablefish (*Anoplopoma fimbria*) Management Procedure for the 2025-26 Fishing Year. <https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41244072.pdf>

Summary of Assessment Advice by Stock

Table 1. List of Groundfish Stocks Assessed in British Columbia with references.

Species and Stock	Last Year Assessed	References	Next Planned Assessment
Hagfish			
Elasmobranchs			
Big Skate	2011	King, J., Surry, A., Garcia, S. and Starr, P. 2015. Big Skate (<i>Raja binoculata</i>) and Longnose Skate (<i>R. rhina</i>) stock assessments for British Columbia. DFO Can. Sci. Advis. Sec. Res. Doc. 2015/070. https://publications.gc.ca/collections/collection_2016/mpo-dfo/Fs70-5-2015-070-eng.pdf DFO. 2014. Big Skate (<i>Raja binoculata</i>) and Longnose Skate (<i>R. rhina</i>) stock assessments for British Columbia. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/027. https://publications.gc.ca/collections/collection_2014/mpo-dfo/Fs70-6-2014-027-eng.pdf	
Dogfish (Outside)	2024	Anderson, S., Huynh, Q., Davidson, L. and King, J. 2025. Pacific Spiny Dogfish (<i>Squalus suckleyi</i>) Population Modelling for Outside Waters of British Columbia in 2024. DFO Can. Sci. Advis. Sec. Res. Doc. 2025/055. iv + 164 p. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41320104.pdf DFO. 2025. Pacific Spiny Dogfish (<i>Squalus suckleyi</i>) Population Modelling for Outside Waters of British Columbia in 2024. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2025/032. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41297726.pdf	

Longnose Skate	2011	King, J., Surry, A., Garcia, S. and Starr, P. 2015. Big Skate (<i>Raja binoculata</i>) and Longnose Skate (<i>R. rhina</i>) stock assessments for British Columbia. DFO Can. Sci. Advis. Sec. Res. Doc. 2015/070. https://publications.gc.ca/collections/collection_2016/mpo-dfo/Fs70-5-2015-070-eng.pdf	
		DFO. 2014. Big Skate (<i>Raja binoculata</i>) and Longnose Skate (<i>R. rhina</i>) stock assessments for British Columbia. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/027. https://publications.gc.ca/collections/collection_2014/mpo-dfo/Fs70-6-2014-027-eng.pdf	
Other Sharks			
Spotted Ratfish			
<hr/>			
Gadids			
<hr/>			
Grenadiers			
Pacific Cod (WCHG/HS/QCS)	2020	Forrest, R., Anderson, S., Grandin, C. and J., S. 2020. Assessment of Pacific Cod (<i>Gadus macrocephalus</i>) for Hecate Strait and Queen Charlotte Sound (Area 5ABCD), and West Coast Vancouver Island (Area 3CD) in 2018. DFO Can. Sci. Advis. Sec. Res. Doc. 2020/070. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/40952290.pdf	
Pacific Cod (WCVI)	2022	DFO. 2024. Status update of Pacific Cod (<i>Gadus macrocephalus</i>) off the West Coast of Vancouver Island in 2023. DFO Can. Sci. Advis. Sec. Sci. Resp. 2024/003. https://publications.gc.ca/collections/collection_2024/mpo-dfo/fs70-7/Fs70-7-2024-003-eng.pdf	
Pacific Hake (Inside)			2026-27
Pacific Hake/Whiting	2026	Edwards, A.M., A.M. Berger, C.J. Grandin, C.R. Wetzel, K.F. Johnson, and K.L. Oken. 2026. Status of the Pacific Hake (whiting) stock in U.S. and Canadian waters in 2026. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific Hake/Whiting	Annual

Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 71 p. <https://www.fisheries.noaa.gov/s3/2026-02/hake-assessment-2026.pdf>

Walleye Pollock	2017	Starr, P. and Haigh, R. 2021. Walleye Pollock (<i>Theragra chalcogramma</i>) stock assessment for British Columbia in 2017. DFO Can. Sci. Advis. Sec. Res. Doc. 2021/004. https://publications.gc.ca/collections/collection_2021/mpo-dfo/fs70-5/Fs70-5-2021-004-eng.pdf
<hr/>		
Rockfishes and Thornyheads		
Bocaccio	2024	DFO. 2024. Update of the 2019 Bocaccio (<i>Sebastes paucispinis</i>) Stock Assessment for British Columbia in 2024. DFO Can. Sci. Advis. Sec. Sci. Resp. 2024/033.
Canary Rockfish	2023	DFO. 2023. Canary Rockfish (<i>Sebastes pinniger</i>) Stock Assessment for British Columbia in 2022. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2023/002. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41097312.pdf Starr, P.J. and Haigh, R. 2023. Canary Rockfish (<i>Sebastes pinniger</i>) Stock Assessment for British Columbia in 2022. DFO Can. Sci. Advis. Sec. Res. Doc. 2023/070. vi + 293 p. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41218875.pdf
China Rockfish	2000	Yamanaka, K.L., and Lacko, L. 2001. Inshore rockfish (<i>Sebastes ruberrimus</i> , <i>S. maliger</i> , <i>S. caurinus</i> , <i>S. melanops</i> , <i>S. nigrocinctus</i> and <i>S. nebulosus</i>) stock assessment for the West Coast of Canada and recommendations for management. . DFO Can. Sci. Advis. Sec. Res. Doc. 2001/139. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/263391.pdf

Copper Rockfish	2000	Yamanaka, K.L., and Lacko, L. 2001. Inshore rockfish (<i>Sebastes ruberrimus</i> , <i>S. maliger</i> , <i>S. caurinus</i> , <i>S. melanops</i> , <i>S. nigrocinctus</i> and <i>S. nebulosus</i>) stock assessment for the West Coast of Canada and recommendations for management. . DFO Can. Sci. Advis. Sec. Res. Doc. 2001/139. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/263391.pdf
Pacific Ocean Perch (QCS)	2023	DFO. 2024. Pacific Ocean Perch (<i>Sebastes alutus</i>) Stock Assessment for British Columbia in 2023. DFO Can. Sci. Advis. Sec. Sci. Rep. 2024/012. https://www.dfo-mpo.gc.ca/csas-sccs/Publications/ResDocs-DocRech/2025/2025_004-eng.pdf
Pacific Ocean Perch (WCHG)	2023	DFO. 2024. Pacific Ocean Perch (<i>Sebastes alutus</i>) Stock Assessment for British Columbia in 2023. DFO Can. Sci. Advis. Sec. Sci. Rep. 2024/012. https://www.dfo-mpo.gc.ca/csas-sccs/Publications/ResDocs-DocRech/2025/2025_004-eng.pdf
Pacific Ocean Perch (WCVI)	2023	DFO. 2024. Pacific Ocean Perch (<i>Sebastes alutus</i>) Stock Assessment for British Columbia in 2023. DFO Can. Sci. Advis. Sec. Sci. Rep. 2024/012. https://www.dfo-mpo.gc.ca/csas-sccs/Publications/ResDocs-DocRech/2025/2025_004-eng.pdf
Quillback (Inside)	2021	DFO. 2023. Application of the Management Procedure Framework for Inside Quillback Rockfish (<i>Sebastes maliger</i>) in British Columbia in 2022. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2023/033. https://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2023/2023_033-eng.pdf
Quillback (Outside)	2021	Huynh, Q., Siegle, M. and Haggarty, D. 2025. Application of the Management Procedure Framework for Outside Quillback Rockfish (<i>Sebastes maliger</i>) in British Columbia in 2021. DFO Can. Sci. Advis. Sec. Res. Doc. 2024/028. https://publications.gc.ca/collections/collection_2025/mpo-dfo/fs70-5/Fs70-5-2024-028-eng.pdf

Redbanded Rockfish		
Redstripe Rockfish	2018	Starr, P. and Haigh, R. 2021. Redstripe Rockfish (<i>Sebastes proriger</i>) stock assessment for British Columbia in 2018. DFO Can. Sci. Advis. Sec. Res. Doc. 2021/014. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/40738644.pdf
Rougheye/Blac kspotted	2021	Starr, P. and Haigh, R. 2020. Rougheye/Blackspotted Rockfish (<i>Sebastes aleutianus/melanostictus</i>) stock assessment for British Columbia in 2020. DFO Can. Sci. Advis. Sec. Res. Doc. 2020/020. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41072091.pdf
Shortraker Rockfish	1998	Schnute, J., Olsen, N. and Haigh, R. 1999. Slope rockfish assessment for the west coast of Canada in 1998. DFO Can. Stock Assess. Sec. Res. Doc. 99/16. https://publications.gc.ca/collections/collection_2015/mpo-dfo/Fs70-1-1999-16-eng.pdf
Silvergray Rockfish	2014	Starr, P., Haigh, R. and Grandin, C. 2016. Stock assessment for Silvergray Rockfish (<i>Sebastes brevispinis</i>) along the Pacific coast of Canada. DFO Can. Sci. Advis. Sec. Res. Doc. 2016/042. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/365822.pdf
	2025	DFO. 2026. Silvergray Rockfish (<i>Sebastes brevispinis</i>) stock assessment for British Columbia in 2026. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2026/nnn. In Press
Tiger Rockfish	2000	Yamanaka, K.L., and Lacko, L. 2001. Inshore rockfish (<i>Sebastes ruberrimus</i> , <i>S. maliger</i> , <i>S. caurinus</i> , <i>S. melanops</i> , <i>S. nigrocinctus</i> and <i>S. nebulosus</i>) stock assessment for the West Coast of Canada and recommendations for management. . DFO Can. Sci. Advis. Sec. Res. Doc. 2001/139. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/263391.pdf
Widow Rockfish	2019	DFO. 2019. Widow Rockfish (<i>Sebastes entomelas</i>) stock assessment for British Columbia in 2019. DFO Can. Sci. Advis. Sec.

		Sci. Advis. Rep. 2019/044. https://publications.gc.ca/collections/collection_2019/mpo-dfo/fs70-6/Fs70-6-2019-044-eng.pdf
Yelloweye Rockfish (Inside)	2019	DFO. 2020. Evaluation of Management Procedures for the Inside Population of Yelloweye Rockfish Rebuilding Plan in British Columbia. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2020/056. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/40953890.pdf
Yelloweye Rockfish (Outside)	2019	DFO. 2020. Evaluation of Potential Rebuilding Strategies for Outside Yelloweye Rockfish in British Columbia. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2020/024. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/40951704.pdf
	2024	DFO. 2026. Operating model code transition and stock status update for Outside Yelloweye Rockfish (<i>Sebastes ruberrimus</i>) in British Columbia. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2026/nnn. In Press
Yellowmouth Rockfish	2022	DFO. 2022. Yellowmouth Rockfish (<i>Sebastes reedi</i>) Stock Assessment for British Columbia in 2021. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2022/001. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/4103336x.pdf
Yellowtail Rockfish	2025	DFO. 2025. Yellowtail Rockfish (<i>Sebastes flavidus</i>) Stock Assessment for British Columbia in 2024. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2025/026. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41294804.pdf
Longspine Thornyhead Shortspine Thornyhead	2016	Starr, P. and Haigh, R. 2017. Stock assessment of the coastwide population of Shortspine Thornyhead (<i>Sebastes alascanus</i>) in 2015 off the British Columbia coast. DFO Can. Sci. Advis. Sec. Res. Doc.

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Sablefish,
Greenlings and
Sculpins

Sablefish 2022 Cox, S., Kronlund, A., Lacko, L. and Jones, M. 2023. A Revised Operating Model for Sablefish in British Columbia, Canada in 2016. DFO Can. Sci. Advis. Sec. Res. Doc. 2023/023. <https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41110961.pdf>

Kelp Greenling

Lingcod (Inside) 2014 Holt, K., King, J. and Krishka, B. 2016. Stock assessment for Lingcod (*Ophiodon elongatus*) in the Strait of Georgia, British Columbia in 2014. DFO Can. Sci. Advis. Sec. Res. Doc. 2016/013. <https://waves-vagues.dfo-mpo.gc.ca/Library/363960.pdf>

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Cabezon

 Flatfishes

Arrowtooth Flounder	2024	DFO. 2026. Stock Status update for Arrowtooth Flounder (<i>Atheresthes stomias</i>) for the West Coast of British Columbia in 2024. DFO Can. Sci. Advis. Sec. Sci. Resp. 2025/022. https://www.dfo-mpo.gc.ca/csas-sccs/Publications/ScR-RS/2025/2025_022-eng.pdf	
Dover Sole	2025	DFO. 2026. Assessment of Dover Sole in the Canadian Pacific Exclusive Economic Zone in 2026. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2026/nnn. In Press	
English Sole	2006	Starr, P. 2009. English Sole (<i>Parophrys vetulus</i>) in British Columbia, Canada: Stock assessment for 2006-07 and advice to managers for 2007/08. DFO Can. Sci. Advis. Sec. Res. Doc. 2009/069. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/338923.pdf	
Pacific Halibut		Assessed by IPHC	Annual
Petrале Sole	2024	DFO. 2025. Assessment of Petrale Sole in British Columbia in 2024. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2025/002. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/4127961x.pdf .	
Rex Sole			
Southern Rock Sole	2014	DFO. 2014. Stock assessment and harvest advice for Rock Sole (<i>Lepidopsetta</i> spp.) in British Columbia. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/039. https://waves-vagues.dfo-mpo.gc.ca/Library/363948.pdf Holt, K., Starr, P., Haigh, R. and Krishka, B. 2016. Stock assessment and harvest advice for Rock Sole (<i>Lepidopsetta</i> spp.) in British Columbia. DFO Can. Sci. Advis. Sec. Res. Doc. 2016/009. https://waves-vagues.dfo-mpo.gc.ca/Library/364200.pdf	

5. Reserves

The Government of Canada continue to work with First Nations, the Provinces and partners to conserve 25 per cent of Canada’s oceans by 2025 and 30 per cent by 2030 and several marine conservation areas currently exist in BC (Figure 6). No new marine conservation areas were announced in Canadian Pacific waters in 2025.

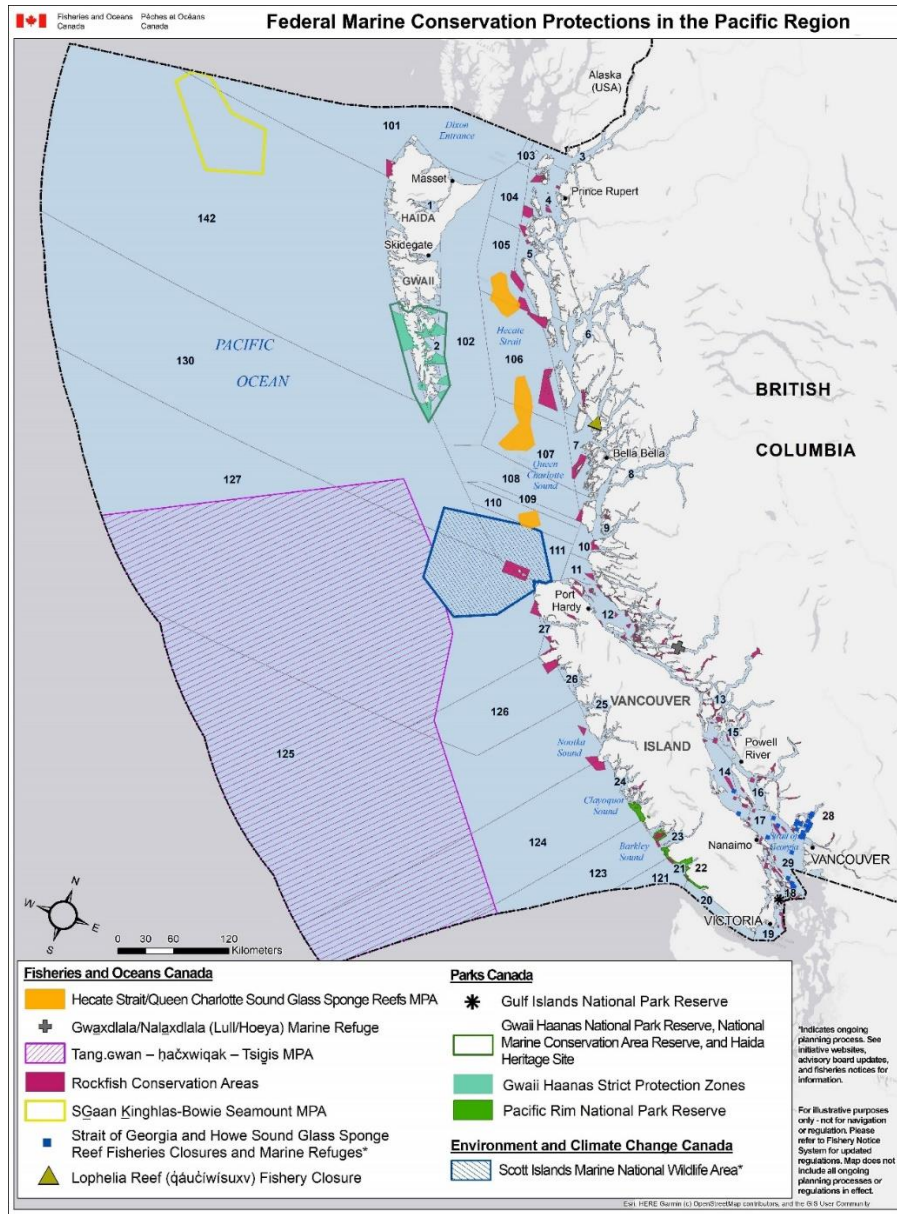


Figure 6. A map of federal marine conservation initiatives in British Columbia, Canada in 2025.

6. Data Management

No major changes have been done to GFBio, the oracle database developed in-house by DFO staff in the 1990s, which houses groundfish research survey and commercial biological data collected in British Columbia from the 1940s to the present. Minor updates have been made to data acquisition software applications, GFBioField, and the Sclerochronology Lab Direct Data Entry Application (SCLDDE). GFFOS is a SQL database developed by DFO Science staff and maintained by the Groundfish Data Unit. GFFOS contains reformatted and manipulated data from commercial groundfish fishery data held in the Fishery Operations System (FOS) oracle database. The groundfish modules of FOS are maintained by the Fisheries Management Branch of DFO and hold data such as hail out / hail in information, fisher logs, observer logs, and offload information from the dockside monitoring program. GFFOS imports key information from FOS tables, reformatted to facilitate querying by DFO Science staff, and uses the available sources of catch information to produce “best estimates” of catch.

The research vessel *Sir John Franklin* upgraded the trawl net mensuration system to Scanmar ScanBas 365. The new system does not output data using a traditional NMEA format which required the development of additional software to log the data output into the GFBioField database.

7. Upcoming Work, Emerging Needs, and Challenges

Dr. Matt Siegle and Kendra Holt, along with some other collaborators, are working on a 3 year Canadian Science Research Fellowship (CSRF) project titled “Histological identification of skipped spawning in Sablefish, Yelloweye Rockfish, and Haddock, and subsequent influence on reference points.” The objective of this project is to validate the macroscopic maturity estimates obtained in the field for three case study groundfish stocks (Sablefish, Outside Yelloweye Rockfish, and Eastern Georges Bank Haddock) using microscopic evaluations of histological preparations of ovary samples. They were not able to hire a post-doctoral fellow to lead this work in 2025-26 due to a functional hiring freeze, but hope to hire a post-doc in 2026-27. Histological samples have been collected and will be analyzed once hiring can be achieved.

The Groundfish section conducted a research survey on the *Sir John Franklin* in February of 2026 to collect biological samples during winter months. Currently, the annual monitoring surveys in BC are all conducted in the summer, so maturity data of groundfish is limited to this season. The winter trip was focussed on collecting data from Pacific Cod, Arrowtooth Flounder, Dover Sole and Petrale Sole as well samples for the skip spawning project described above. Prior to the survey it became clear that collecting Yelloweye Rockfish for the skip spawning project would not be achievable with trawl gear. The project pivoted to collect Quillback Rockfish instead but that species also proved too difficult to capture in sufficient numbers. The tentative plan for the rest of the skip-spawning project is to continue to target Sablefish and also target

Pacific Ocean Perch as it is a rockfish species easily captured with trawl gear. Although samples were collected for many targeted species, it seems that most Arrowtooth Flounder had already spawned and were already in a resting stage. Another survey is planned for winter of 2027.

An ongoing challenge exists at DFO with respect to uncertainty in Science funding over the long term and bureaucratic hurdles associated with hiring, procurement, contracting and travel. Economic uncertainty created by tariffs on Canadian goods by the United States and Chinese governments may impact the Canadian fishing industry, which may, in turn, put collaborative research surveys in jeopardy.

Another challenge we face is potential changes and a lack of support for extractive surveys in Marine Protected Areas as well as in some First Nations territories. The Haida First Nation openly opposes trawling in Haida [territory](#).

The Groundfish Section has two upcoming retirements in the coming year. Norm Olsen, a long-time member of the section who has primarily worked on data collection and data management in GFBio, GFBiofield and numerous other projects retires in May 2026. One of our most prolific stock assessors, Rowan Haigh, plans to retire in December of 2026. Both of these valued team members will be greatly missed! Succession planning has been underway and so far hasn't been interrupted by hiring delays but we have many hurdles yet to cross.

8. Agency Contact List

Government of Canada employees contacts information can be found in the [“Government Employee Directory.”](#)

Fisheries and Oceans Canada Minister

Deputy Minister

Regional Director General (Pacific)

Fisheries Management Branch

Regional Director of Fisheries Management

Director of Resource Management

Regional Manager of Groundfish

Science Branch

Regional Director of Science

Strategic Science Initiatives Division

Centre for Science Advice – Pacific

Stock Assessment and Research Division

Groundfish Section

Inshore Rockfish

Offshore Rockfish

Sablefish

Hake

Dogfish and Lingcod

Surveys Program

Surveys Support

Quantitative Methods

Quantitative Assessment Methods Section

Fisheries and Assessment Data Section

Marine Invertebrates Section

Salmon Assessment

Salmon Coordinator

Aquatic Diagnostics, Genomics & Technology Division

Applied Technology

Genetics

Aquatic Animal Health

Ecosystem Science Division

Marine Spatial Ecology & Analysis

Aquatic Ecosystem & Marine Mammals

Regional Ecosystem Effects on Fish &

Fisheries

Freshwater Ecosystems

Nearshore Ecosystems

Ocean Science Division

Canadian Hydrographic Service (CHS)

The Honourable Joanne Thompson

Paul MacKinnon

Anna Classen

Neil Davis

Melanie McNabb

Danielle Scriven

Andrew Thomson

March Klaver (Acting)

Miriam O

Ken Fong (Acting)

Dana Haggarty

Matthew Siegle

Rowan Haigh

Kendra Holt

Chris Grandin

Nick Fisch (Acting)

Malcolm Wyeth

Norm Olsen

Sean Anderson

Steve Schut

Shelee Hamilton

Janet Lohead (Acting)

Antonio Velez-Espino

Dawn Lewis

Cher Lacoste

Jackie Detering (Acting)

Geoff Lowe (Acting)

Kristen Westfall (Acting)

Eddy Kennedy

Tammy Norgard

Sean MacConnachie

Michelle Charbonneau

Jeffery Lemieux

Cher LaCoste

Jon Chamberlain

Mariah McCooley