



Fisheries and Oceans
Canada

Pêches et Océans
Canada



FIELDNOTES

2022 – 2023

Pacific Science Field Operations



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Cover illustration: Two male Coho Salmon (*Oncorhynchus kisutch*) circling a redd during spawning season. Hicks Creek, BC.

Photo credit: Shane Kalyn, Fisheries and Oceans Canada.



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INTRODUCTION

Fisheries and Oceans Canada (DFO) conducts research and undertakes monitoring surveys of the marine and freshwater environment in support of sustainable fisheries, healthy aquatic ecosystems and living resources, and safe and effective marine services.

In an effort to effectively inform and ensure Canadians feel engaged in the delivery of its science mandate, DFO produces *Fieldnotes*, an annual compendium of planned science field operations in the North Pacific and Arctic oceans, as well as in the coastal and interior waters of British Columbia and Yukon.

Fieldnotes aims to:

- inform Canadians of research and monitoring programming scheduled for the coming year;
- promote the sharing of key information and data in a coordinated, timely, open and transparent manner in order to encourage dialogue and collaboration;
- provide a platform from which to build and nurture fundamentally more inclusive, trust- and respect-based relationships with all Canadians;
- reaffirm and honour the [reconciliation commitment](#) to renewed relationships with Indigenous peoples based on the recognition of rights, respect, cooperation and partnerships;
- foster conditions that facilitate the pooling of collective expertise, experience, and resources, and,
- further DFO's commitment to the principles and pursuit of [scientific integrity](#).

To sum up, *Fieldnotes* is a contribution to DFO's commitment to continuous improvement, stronger relationships, and to doing better together.



COVID-19



Two years into the global pandemic, DFO remains committed to delivering innovative science and services to Canadians.

All scientific field activities that proceed continue to be guided by a prioritization assessment, adhere to guidance provided by public health authorities, and follow safe work procedures.

Regular monitoring and evaluation of safety protocols remain paramount to ensuring the health and safety of DFO employees and their families, as well as that of collaborators, Indigenous communities and the public.

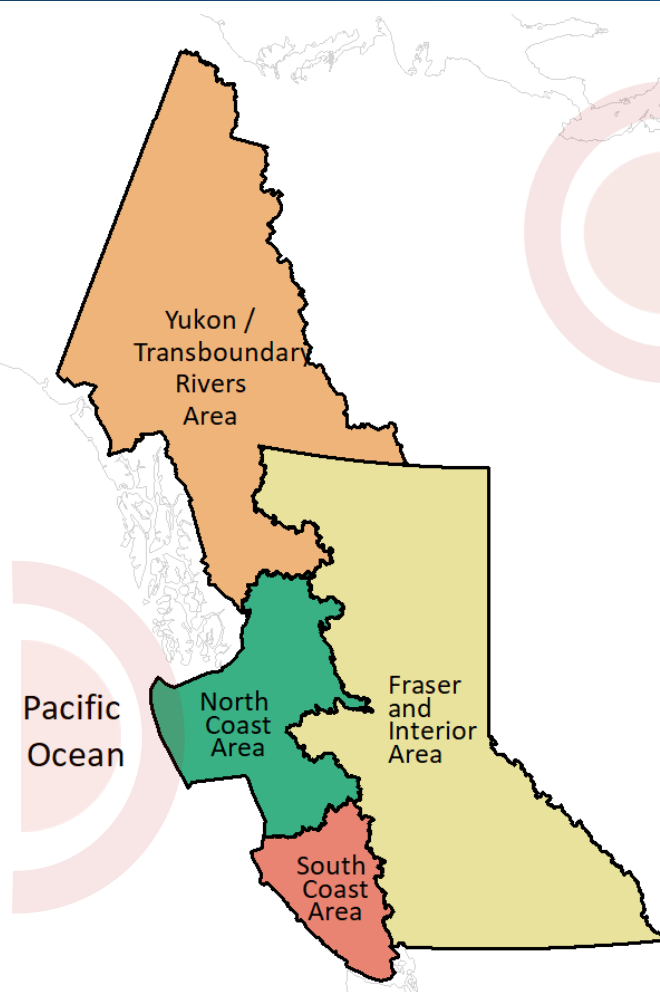
For up-to-date information on the status of field operations, please contact the Lead Scientists identified in Annex B, or visit [DFO's website](#).

DFO PACIFIC SCIENCE

On behalf of all Canadians, approximately 850 DFO Science employees in Pacific Region are committed to fulfilling DFO's vision of healthy oceans, aquatic ecosystems, species, and sustainable fisheries while ensuring the well-being and prosperity of the Indigenous and coastal communities that depend on these vital resources for their livelihoods.

Through focused and collaborative initiatives aligned with the Department's [core priorities](#), [Science Branch](#) employees provide foundational services, products and advice for the Department's management and conservation decisions, and play a pivotal role in ensuring commitments under several international treaties are realized.

Refer to Annex A to learn more about the innovative, high quality research and extensive monitoring Science Branch employees undertake; the robust science advice, products and services they deliver; and the valuable data and information management services they provide in support of evidence-based decision-making.



Pacific Region researchers and scientists conduct their work throughout the North Pacific, coastal and interior British Columbia, the Yukon, as well as the Western Arctic.




Further, with a functional presence across the Region, Pacific Science staff are uniquely positioned to play a key role in the transformation of the Government of Canada's [relationship with Indigenous peoples](#) based on the recognition and implementation of rights, respect, cooperation and partnership related to fisheries, oceans, habitat and marine waterways.

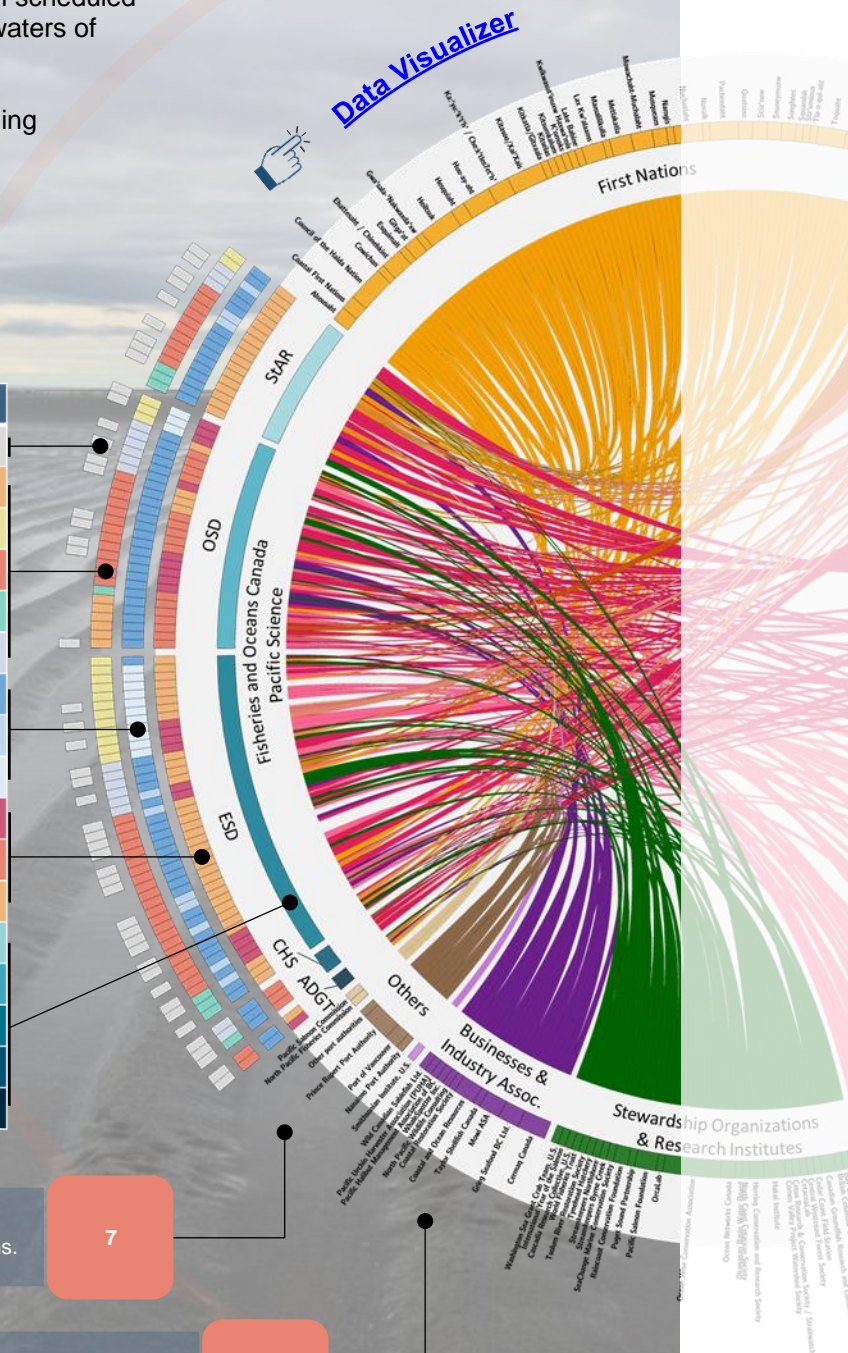
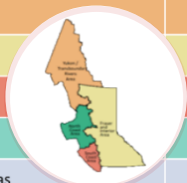
SCHEDULED FIELD OPERATIONS: 2022—2023

95 DFO Science field operations have been scheduled for the offshore, nearshore, and inland waters of British Columbia and Yukon.

Fact sheets outlining details of this field programming are available in Annex B.

 Fact sheet #97 references an additional 247 population, catch, and ecosystem monitoring projects in support of area-based [salmon stock assessment](#) in Pacific Region.

By the numbers		
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	Ecosystem Science (ESD)	43
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	Aquatic Diagnostics, Genomics and Technology (ADGT)	2



International commissions, port authorities, and museums participating in 7 field operations.

7

Businesses and industry associations participating in 15 field operations.

11

A CULTURE OF COLLABORATION

Each year DFO Science staff team up with a broad range of regional, provincial, national and international collaborators for the planning, design, delivery, and evaluation of field research and monitoring.

First Nations, Inuit communities and Indigenous organizations participating in 43 field operations.

41, 5, & 13

Data Visualizer

Illustrates the connection between DFO Science and 154 unique collaborators in this edition of *Fieldnotes*:

- The **length of the box** in front of each collaborator is proportional to the number of unique field operations engaged in by that collaborator.
- Each **strand** represents a unique collaboration between DFO and a collaborator; **346** collaborations in total, or an average of **3.6** collaborators per field operations.

Governments participating in 56 field operations.

18

Academic institutions participating in 31 field operations.

31

Stewardship organizations and research institutes participating in 26 field operations.

28



DID YOU KNOW?

Science staff conducting field research and monitoring collaborate with, support, and depend on colleagues in a wide range of disciplines and organizations in order to deliver innovative, high quality science in support of evidence-based decision-making.

Tech for Success

Science staff develop, configure, maintain, and operate a range of technologies to support non-destructive biological monitoring including Remotely Operated Vehicles (ROVs), drop cameras and hydrophones, as well as non-destructive multi-beam echo sounders and Light Detection and Ranging (LIDAR) scanners for seabed mapping.

These technologies support the determination of species abundance & identification, the measurement of habitat characteristics and changes over time, in addition to return captivating images and sounds.

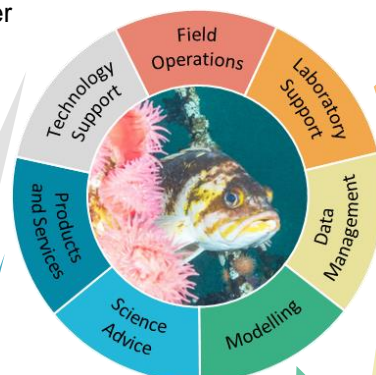
Up-to-date Information

Science staff provide vital products and information services that ensure the safety of Canadians and enable the protection of aquatic ecosystems. These include navigation charts, sailing directions, notices to mariners and shipping, and water level information.

Peer Excellence

DFO's Centre for Science Advice - Pacific leads ~ 25 peer review processes and publishes ~ 40 peer-reviewed scientific articles annually through the [Canadian Science Advisory Secretariat](#).

Evidence Gathering
Consult Annex B for Field programming.



Modelling our World

Science staff combine observations from the field and laboratories studies to develop models and simulations that enable an improved understanding of fisheries stocks, oceanographic processes, ecosystems interactions, and future climate scenarios at the global and local scale.

LabWorks

Science staff working in DFO's ship- or land-based laboratories process and analyze data and samples collected by DFO or its collaborators.

- **Molecular Genetics Labs** staff provide genetic stock identification and genetic health information for the assessment and management of fish stocks.
- **Aquatic Animal Health Labs** staff provide aquatic animal diagnostic information and exploratory research on infections and diseases.
- **Sclerochronology Lab** staff assess the age of fish using scales, ear bones, and fin bones to better understand the life history of populations.
- Staff from the **Plankton Lab**, the **Nutrient Lab**, the **Chlorophyll Lab**, and the **Trace Metals Lab** contribute to a better understanding of the health of our ecosystems and resources.
- Science staff working in **Wet Labs** systematically investigate the effects of a stressor (e.g., high temperature) or variable (e.g., diet) on the performance or physiology of individual fish and invertebrates.

Data Matters

Science staff provide data stewardship services in support of invertebrates, salmon, pelagic fish, groundfish, and marine mammal stock assessment, marine spatial planning and protected areas, oceanographic and ecosystem modelling, bathymetry and water level readings, the state of the Arctic and Pacific oceans, and emergency response.

They keep data holdings secure and promote best practices to support Findable, Accessible, Interoperable and Reusable (FAIR) data principles. They also respond to both internal and external requests for data to support analyses and they make data sets available through the [Open Government Data Portal](#).

REPORTING RESULTS

Ensuring that research and scientific information is produced and disseminated in an open, timely and transparent manner is essential to the successful fulfillment of DFOs' science mandate.

Field program results are communicated through technical and data reports available on the [Federal Science Library](#), [Open Government Portal](#), and in publications from the [Centre for Science Advice Pacific](#).

Nautical charts, navigational products and survey results can be accessed from the [Canadian Hydrographic Service](#).

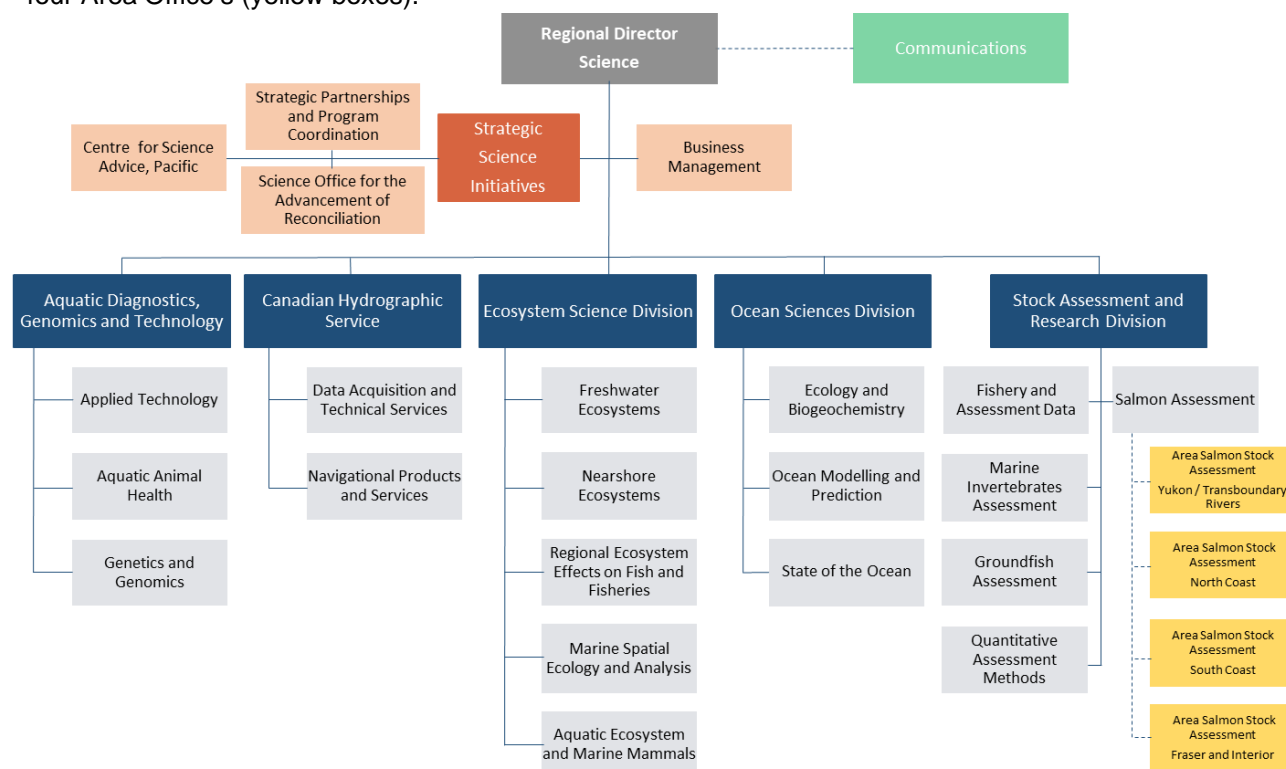
Additionally, each September, Pacific Science publishes a [technical report](#) on the State of the Pacific Ocean presenting results of the most recent year's monitoring information about the state of the physical, biological and selected fishery resources of Pacific Canadian marine ecosystems.

Refer to Annex C for a list of datasets published on the Open Government Portal in 2021 – 2022, and instructions on how to access them.



ANNEX A: PACIFIC SCIENCE ORGANIZATION

Science in the Pacific Region is delivered through a workforce housed in six divisions (blue and orange boxes) at four regional science centers and through salmon stock assessment science staff located in four Area Office s (yellow boxes).



Strategic Science Initiatives (SSI)

Business Management Unit: Provides financial management and human resource planning support for Science Branch, supports planning and reporting functions, and oversees health and safety, site operations, storage and warehousing.

Strategic Partnerships and Program Coordination Unit: Establishes and nurtures strategic partnerships, supports planning, coordination and engagement on priority files.

Science Office for the Advancement of Reconciliation: Support the Branch on its journey to deliver more inclusive and collaborative science that fosters strengthened relationships with Indigenous peoples.

Centre for Science Advice – Pacific: Coordinates the scientific peer review and publication of science advice for Pacific region. CSAP provides a formal, transparent process for the delivery of science advice to the department's decision makers.



Approximately 52 employees are located at the Pacific Biological Station (PBS) in Nanaimo and at the Institute of Ocean Sciences (IOS) in Sidney.

Director

Alain Magnan

Email: Alain.Magnan@dfo-mpo.gc.ca

Tel: (250) 714-9196

Aquatic Diagnostics, Genomics, and Technology Division (ADGT)

Develops, improves and applies new technologies to support fisheries and aquaculture management. Work includes:

- Providing genetic research and advice on best practices for breeding programs, develops and applies molecular tools that are required for fishery enhancement management, regulation, and policy development within DFO;
- Contributing to the applied research and resource management mandates of other DFO research by developing tools and analysis for high-resolution identification; monitoring and assessment of organisms and their environments; and by assessing the cumulative impacts of stressors on organisms and ecosystems;
- Developing and maintaining expertise and equipment, including shared multi-user live-animal research facilities, a fisheries acoustics and remote operating vehicle program, and marine spatial planning processes; and,
- Conducting risk assessments of novel organisms and pathogens.

Departmental Core Responsibility: Fisheries

We ensure Canada's fisheries, including aquaculture, are protected, managed sustainably and support Indigenous participation, and that our national network of harbours is open and in good repair.

2022–2023 Fact Sheet ID

16 and 32



Approximately 81 ADGT employees are located at the Pacific Biological Station (PBS) in Nanaimo, and at the Pacific Science Enterprise Centre (PSEC) located in West Vancouver.

Manager

Lesley MacDougall **Email:** Lesley.MacDougall@dfo-mpo.gc.ca **Tel:** (250) 756-7395

Canadian Hydrographic Service (CHS)

Provides products and services to aid safe navigation of vessels in Canada's marine waters, including the Arctic. Work includes:

- Providing up-to-date, authoritative, and standardized hydrographic information in the form of bathymetric surveys, hydrographic charts, and water level information in real-time;
- Developing standards, methodologies and technologies (including GIS and remote sensing) in order to provide professional advice and services related to hydrography;
- Maintaining a national network of tide gauges to measure and disseminate water level data;
- Producing products, Sailing Directions, Tide and Current Tables and tidal atlases, Notices to Mariners, and Notices to Shipping, and through its network of tide gauges, participating in tsunami and storm surge warning monitoring; and,
- Participating in hydrographic surveys aboard a variety of maritime vessels to collect data using modern equipment and technologies (e.g., LIDAR).

Departmental Core Responsibility: Marine Navigation

We maintain waterways year round so they are safely navigable by mariners and all Canadians.

2022–2023 Fact Sheet ID

8, 65 and 66



Approximately 56 CHS employees are located at the Institute of Ocean Sciences (IOS) in Sidney.

Director

Mark Leblanc **Email:** Mark.Leblanc@dfo-mpo.gc.ca **Tel:** (250) 363-6347

Ecosystem Science Division (ESD)

Conducts research and monitoring activities to enhance understanding of aquatic ecosystems, and supports the integrated management of diverse human activities. Work includes:

- Conducting research on marine mammals, species at risk and marine ecosystem characterization;
- Conducting ecosystems research and monitoring for Pacific Region freshwater and anadromous species, especially salmon;
- Conducting research on aquaculture including nutrition and invertebrates, monitoring aquatic invasive species and the effects of human activity on coastal marine and estuarine environments;
- Identifying conservation priorities and ecologically important areas, monitoring of MPAs and spatial closures, habitat mapping, ecological risk assessment, trade-off analysis, and conducting research on habitat ecology, deep sea biology, seascape connectivity, and biological impacts of climate change;
- Executing surveys, completing analysis, supporting assessments and developing models of regional freshwater and marine ecosystem effects on fish and associated capture and culture fisheries.

Departmental Core Responsibility: Aquatic Ecosystems

2022–2023 Fact Sheet ID

We protect our oceans, freshwater and aquatic ecosystems and species from the negative impact of humans and invasive species through sound science and in collaboration with Indigenous communities.

12 - 15, 19, 20, 23, 30, 31, 33, 37, 39, 42, 48, 51 - 63, 75 - 81, 83, 86 - 91, 94, 95



Approximately 200 ESD employees are located at the Pacific Biological Station (PBS) in Nanaimo, the Institute of Ocean Sciences in Sidney, the Pacific Science Enterprise Centre (PSEC) in West Vancouver, and at the Cultus Lake Salmon Research Laboratory.

Director

Eddy Kennedy

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Tel: (250) 756-3360

Ocean Sciences Division (OSD)

Conducts monitoring and research to provide information and advice on the past and current state of the North Pacific and Western Arctic Oceans and to predict future trends in their physical, chemical and biological states. Work includes:

- Conducting collaborative research and development on ocean and coastal models in support of enhanced environmental protection and improved safety for navigation;
- Conducting Arctic oceanography research and monitoring to support decision-making and planning for all Arctic marine issues, such as climate change, navigation, oil spills, etc.; and,
- Contributing data to cumulative effects assessment, harmful algal blooms, noise, and other stressors on the marine ecosystem.

Departmental Core Responsibility: Aquatic Ecosystems

2022–2023 Fact Sheet ID

We protect our oceans, freshwater and aquatic ecosystems and species from the negative impact of humans and invasive species through sound science and in collaboration with Indigenous communities.

1 - 7, 17, 18, 21, 22, 24 - 29, 38, 40, 50, 64, 67 - 71, 82, 84, 85



Approximately 130 OSD employees are located at the Institute of Ocean Sciences (IOS) in Sidney, the Pacific Science Enterprise Centre (PSEC) in West Vancouver, and at the Pacific Biological Station (PBS) in Nanaimo.

Manager

Kim Houston

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Stock Assessment and Research Division (StAR) – Core

Conducts fishery-independent, multi-species surveys, and fish monitoring to provide data for quantitative assessment of the current status and health of finfish and marine invertebrate stocks. Work includes:

- Conducting assessments of stock status and the impact of harvest on stocks in order to provide advice on the conservation of fish and invertebrate stocks that then informs fisheries management decision-making;
- Supporting the implementation of the Fish Stock Provisions on sustainable management and stock rebuilding in the revised *Fisheries Act* within legislated timelines;
- Providing analysis and advice on marine and freshwater species assessed by COSEWIC to meet requirements of the *Species at Risk Act*;
- Conducting species/stock surveys, fishery monitoring, and other biological data collection programs to support stock assessments and the provision of advice on aquatic species in Pacific Region's fresh and marine waters to decision-makers;
- Conducting research on new methods, tools, and approaches to assessment, including data limited approaches, and developing methods to address and incorporate climate change and environmental variability into assessments and forecasts to take them into consideration for decision-makers;
- Coordinating operational Pacific salmon assessment programs; and,
- Providing regional analytical support to Area-based operational Pacific Salmon assessment programs.

Departmental Core Responsibility: Fisheries

We ensure Canada's fisheries, including aquaculture, are protected, managed sustainably and support Indigenous participation, and that our national network of harbours is open and in good repair.

2022–2023 Fact Sheet ID

9 - 11, 34 - 36, 41, 43 – 47, 49, 72 - 74, 92, 93, 96, 97



Approximately 146 StAR employees are located at the Pacific Biological Station (PBS) in Nanaimo.

Manager

John Holmes

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Tel: (250) 756-7145





Stock Assessment and Research Division (StAR) – Areas

Operational Pacific salmon assessment programs are delivered through four Area offices to facilitate the effective collection of information, surveys, and assessments of Pacific Salmon status and abundance. Science staff work closely with staff from other sectors, and often with external partners, to deliver salmon stock assessment. Area Science staff report to Area Directors.



Departmental Core Responsibility: Fisheries

We ensure Canada's fisheries, including aquaculture, are protected, managed sustainably and support Indigenous participation, and that our national network of harbours is open and in good repair.



Yukon – Transboundary Rivers Area (YTRA)

	YTRA encompasses the Yukon, Stikine, Taku and Alsek River Drainages as well as portions of the MacKenzie River Drainage in south east Yukon. This area has approximately 590,000 km ² , of which 15,000km ² is inland freshwaters.
	Approximately 35 StAR employees are located at the YTRA headquarters in Whitehorse.
Area Chief	Marc Ross (Yukon) Email: Marc.Ross@dfo-mpo.gc.ca Tel: (867) 393-6842 Bill Waugh (Transboundary) Bill.Waugh@dfo-mpo.gc.ca Tel: (867) 393-6764



North Coast Area (NCA)

	NCA includes tidal waters stretching from the Alaskan boundary in the north to Cape Caution in the south and incorporates the non-tidal waters that flow into this area. NCA encompasses an area of approximately 88,000 km ² .
	Approximately 40 StAR employees are located at the NCA headquarters in Prince Rupert.
Area Chief	Shaun Davies Email: Shaun.Davies@dfo-mpo.gc.ca Tel: (250) 627-3472

South Coast Area (SCA)

	SCA includes Vancouver Island, the Sunshine Coast and Mainland inlets north to Cape Caution. Vancouver Island is about 32,000km ² and includes lakes, rivers, inlets, and estuaries.
	Approximately 46 StAR employees are located at the SCA headquarters in Nanaimo.
Area Chief	Erin Rechisky Email: Erin.Rechisky@dfo-mpo.gc.ca Tel: (250) 756-7222

Fraser and Interior Area (FIA)

	FIA encompasses the Fraser River Basin, as well as the Thompson, Okanagan, and Columbia Rivers.
	Approximately 145 StAR employees are located at the FIA headquarters in Delta, BC, and in Kamloops, BC. (250) 851-4950
Area Chief	Main Office Email: n/a Tel: (250) 851-4950

ANNEX B: FACT SHEET SERIES

Field Operations Category



Human Impacts
Research and Monitoring



Hydrographic
and Oceanographic Surveys



Population
and Ecosystem Assessments

Fact Sheet
Identification
number

Research
Platform

Title of
Field Operation

Geographic
area




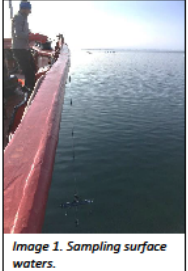




Dates
Recurrence
Locations
DFO lead scientist
Contact information

Description of the
programming and
associated objectives

Collaborators

For more
information

 An Observation Network Studying Marine Biogeochemistry (ArcticNET)		1	Yukon & Arctic
<p> Dates: Summer 2020 Recurrence: Annually, since 2003 Locations: Canadian Archipelago, Baffin Bay, Beaufort Sea, Hudson Bay Vessel: CCGS Amundsen Lead scientist: Lisa Miller (250) 363 6673 Lisa.Miller@dfo-mpo.gc.ca </p>		 <p>CCGS Amundsen</p>	
<p><u>Description</u></p> <p>In combination with improved observations and modelling, data from annual time series of ocean carbon chemistry in the Canadian Arctic supports the development of adaptation strategies to minimize negative impacts and maximize positive outcomes resulting from the transformation of the Canadian Arctic.</p> <p><u>Objectives</u></p> <ol style="list-style-type: none"> 1. Use a distributed network of research vessels, ocean observatories, and land-based instrument installations to measure marine biogeochemical processes across the Canadian Arctic to understand regional impacts on greenhouse gas cycling, primary production, and ocean acidification; and, 2. Use expanded observational network to provide real-time environmental observations to Inuit communities, extend training and research opportunities to Northern residents, and connect with other potential stakeholders. <p><u>Collaborators</u></p> <ul style="list-style-type: none"> • University of Calgary • University of Manitoba 		 <p>Map 1. Study area.</p>	
<p><u>FOR MORE INFORMATION – ArcticNet:</u></p> <p>http://www.arcticnet.ulaval.ca/project/co-operative-observation-network-address-community-research-priorities-while-studying</p>		 <p>Image 1. Sampling surface waters.</p>	
 Fisheries and Oceans Canada		Pêches et Océans Canada	
			

Map
of
study
area

COVID-19

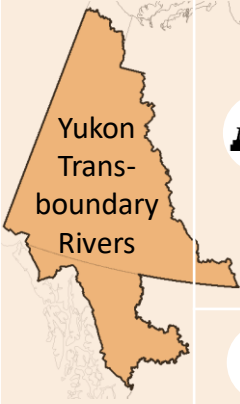







Two years into the global pandemic, DFO remains committed to delivering innovative science and services to Canadians.

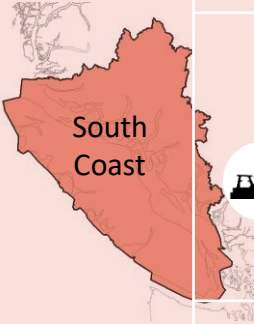



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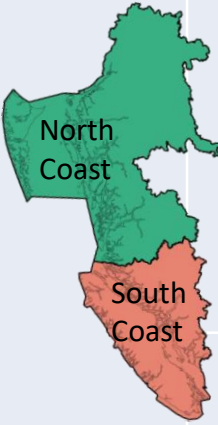



For up-to-date information on the status of field operations, please contact the Lead Scientists identified in Annex B, or visit [DFO's website](#).




Area	Type	Field Operations	ID
 <p>Yukon Trans-boundary Rivers</p>		ArcticNET Observation Network: Marine Biogeochemistry	1
		Oceanographic Monitoring: Beaufort Gyre	2
		Marine Hazards Assessment: Canadian Polar Shelf	3
		Wintertime Ocean Sampling: Northwest Passage	4
		Oceanographic Exploration: Kitikmeot Sea	5
		Ocean and Clam Beds Monitoring: Bering and Chukchi Seas	6
		Chinook and Coho Salmon: Coded Wire Tag Program	96
		Salmon Stock Assessment	97

Area	Type	Field Operations	ID
 <p>North Coast</p>		Sharing Science at Sea Expedition	7
		Bathymetry, Seabed Classification, and Tide Gauge Servicing	8
		Synoptic Bottom Trawl Survey: West Coast Haida Gwaii	9
		Shrimp Assessment Survey: Chatham Sound	10
		Northern Abalone: Index Sites Survey	11
		Northern Resident Killer Whale: Annual Census	12
		Coastal Environmental Baseline: Port of Prince Rupert	13
		Subtidal and Intertidal Biodiversity Survey	14
		Chinook and Coho Salmon: Coded Wire Tag Program	96
		Salmon Stock Assessment	97

Area	Type	Field Operations	ID
 <p>South Coast</p>		Aquaculture Monitoring	15
		Aquaculture Sampling: Broughton Archipelago	16
		Juvenile Pacific Salmon: Acoustic Monitoring	17
		Marine Biotoxin Monitoring	18
		Pacific Oyster: Mitigation of Summer Mortality	19
		Northern Resident Killer Whale: Rubbing Beach Study	20
		Southern Resident Killer Whale: Impacts of Underwater Noise	21
		Southern Resident Killer Whale: Impacts of Contaminants	22
		Whales and Vessels: Detection and Monitoring	23
		Seafloor Ecosystems: Impacts of Anchorages	24
		Oceanographic Survey: Southern Canadian Continental Shelf	25
		Coastal Weather Stations Monitoring	26
		Line P Monitoring Program	27
		Biophysical Survey: Salish Sea	28
		Drift Prediction and Nearshore Modelling: Port of Vancouver	29
		Juvenile Salmon Survey: Salish Sea	30
		Juvenile Salmon Survey: West Coast Vancouver Island	31
		Juvenile Salmon Sampling: West Coast Vancouver Island	32
		Green Sturgeon Survey: West Coast Vancouver Island	33
		Hard Bottom Longline Hook Survey: Inside Area	34
		Hard Bottom Longline Hook Survey: Outside Area	35
		Synoptic Bottom Trawl Survey: West Coast Vancouver Island	36
		Integrated Pelagic Ecosystem Science Survey: WCVI	37
		Pelagic Ecosystem: Acoustic Survey	38
		Pacific Herring: Juvenile Surveys	39
		Pacific Sand Lance: Acoustic Monitoring	40

Area	Type	Field Operations	ID
		Multispecies Benthic Invertebrate Monitoring Surveys	41
		Benthic Habitat Mapping Survey	42
		Joint Canada – U.S. Pacific Ocean Seamount Exploration	43
		Small-Mesh Multi Species Bottom Trawl Survey: WCVI	44
		Shrimp Assessment Survey: Strait of Georgia	45
		Intertidal Clam: Monitoring Surveys	46
		Olympia Oyster: Monitoring Surveys	47
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		Harbour Seal: Deployment of Satellite Telemetry Tags	51
		Harbour Seal and Sea Lion: Diet Analysis	52
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		North Pacific Humpback Whale: Physiology and Metabolic Rate	54
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		Chinook Salmon – Killer Whales Interactions: Tagging Operations	57
		Harmful Algal Bloom Mitigation: Jervis Inlet	58
		Eelgrass: Biodiversity Survey	59
		Subtidal Kelp Ecosystem: Monitoring Survey	60
		Intertidal Biodiversity Survey: Strait of Georgia	61
		Chinook and Coho Salmon: Coded Wire Tag Program	96
		Salmon Stock Assessment	97

Area	Type	Field Operations	ID
		Aquatic Invasive Species: Settlement Plate Survey	62
		Invasive European Green Crab: Monitoring	63
		Southern and Northern Resident Killer Whale: Impacts of Contaminants	64
		Bathymetry, Seabed Classification, and Tide Gauge Servicing	65
		Tide, Current and Water Level Gauge Servicing	66
		Recovery and Deployment of Oceanographic Moorings	67
		Oceanographic Monitoring: British Columbia Inlets	68
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		Marine Conservation Monitoring: Deep Sea	78
		Chinook and Coho Salmon: Coded Wire Tag Program	96
		Salmon Stock Assessment	97

Area	Type	Field Operations	ID
		Long-Term Impacts of Forestry on Stream Temperature	79
		Juvenile Coho Salmon: Assessment of Land Use Impacts on Habitat	80
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Dates: July 1 – October 31, 2022
Recurrence: Annually, since 2003
Locations: Beaufort Sea, Canadian Archipelago,
Baffin Bay, Foxe Basin, Hudson Bay
Vessel: CCGS Amundsen
Lead scientist: Lisa Miller (250) 363-6673
Lisa.Miller@dfo-mpo.gc.ca



Description

In combination with improved observations and modelling, data from annual time series of ocean carbon chemistry in the Canadian Arctic support the development of adaptation strategies to minimize negative impacts and maximize positive outcomes resulting from the human-induced transformation of the Canadian Arctic.

Objectives

1. Use a distributed network of research vessels, ocean observatories, and land-based instrument installations to measure marine biogeochemical processes across the Canadian Arctic to understand regional impacts on greenhouse gas cycling, primary production, and ocean acidification;
2. Study deepwater formation, carbon sequestration, and ocean acidification in Foxe Basin; and
3. Use an expanded observational network to provide real-time environmental observations to Inuit communities, extend training and research opportunities to Northern residents, and connect with other potential stakeholders.

Collaborators

- Canadian Coast Guard
- Universities of Calgary, Alberta, Manitoba, Ottawa, and British Columbia.



Map 1. Study area.

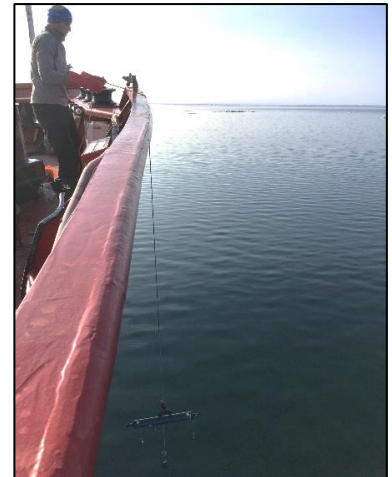


Image 1. Sampling surface waters.

FOR MORE INFORMATION



[ArcticNet](https://arcticnet.ca)



Fisheries and Oceans
Canada

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Dates: September 15 – October 13, 2022
Recurrence: Annually, since 2003
Locations: Beaufort Gyre, Canada Basin in the Arctic
Vessel: CCGS Louis S. St-Laurent
Lead scientist: Bill Williams (250) 858-3699
Bill.Williams@dfo-mpo.gc.ca



Description

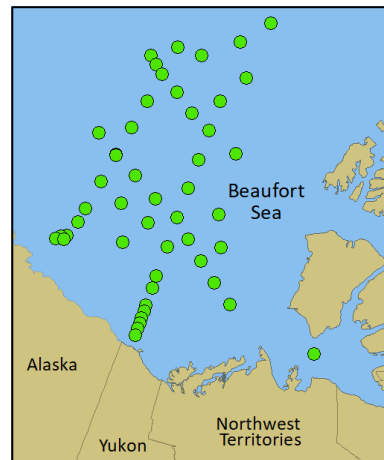
The Beaufort Gyre is one of the Arctic Ocean's primary circulation features, storing and transporting freshwater, sea ice, and heat across the Canadian Basin. The Joint Ocean Ice Studies program collects biogeochemical water samples and deploys moorings and ice buoys to monitor the response of the Beaufort gyre to climate change.

Objectives

1. Monitor ocean acidification due to sea-ice retreat and melt;
2. Monitor the wind-forced freshwater accumulation in the gyre from Arctic rivers sea ice melt;
3. Monitor the changing contributions of Pacific- and Atlantic-origin water in the gyre; and
4. Monitor the increasing summertime melt and loss of old ice.

Collaborators

- Canadian Coast Guard
- Japan Agency for Marine-Earth Science and Technology
- United States National Science Foundation
- Université de Sherbrooke, Université Laval, Concordia University, University of British Columbia, Yale University, University of Montana, Oregon State University, Tokyo University of Marine Science and Technology, Kitami Institute of Technology
- Woods Hole Oceanographic Institution, U.S.



Map 1. Study locations.



Image 2. Deployment of a rosette, a deep water sampling apparatus.

FOR MORE INFORMATION



[Beaufort Gyre Exploration Project](#)





Dates: September 27 – October 10, 2022
Recurrence: Annually, since 1990
Locations: Canadian Polar Shelf — Beaufort and Chukchi Seas
Vessel: CCGS Sir Wilfrid Laurier
Lead scientist: Bill Williams (250) 858-3699
Bill.Williams@dfo-mpo.gc.ca

CCGS Sir Wilfrid Laurier

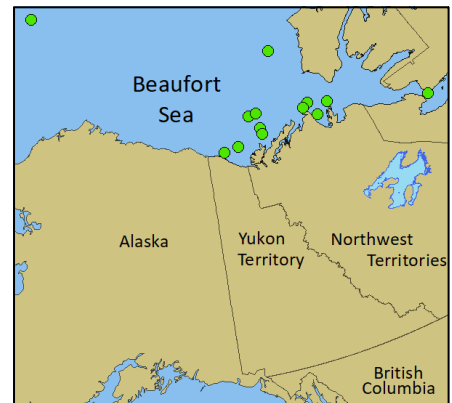


Description

An initiative to document conditions related to sea ice, waves and storm surge that are hazardous to coastal infrastructure, ships and offshore structures in the Arctic Ocean; as well as the progressive impacts of climate change on the marine Arctic.

Objectives

1. Recover and service recording instruments from 10 to 20 submerged moorings, retrieve data, and redeploy the observing array;
2. Collect marine mammal sound recordings, sea-surface temperature, salinity, fluorescence, water & airborne contaminants, and mapping of the seabed; and
3. Establish estimates of the recurrence intervals for rare extreme marine hazards of high severity, & reliable projections of the future state of the marine Arctic under the influence of climate change.



Map 1. Study locations.

Collaborators

- Inuit communities via the Inuvialuit Environmental Impact Screening Committee
- Canadian Coast Guard
- Environment and Climate Change Canada
- National Oceanographic and Atmospheric Administration



Image 1. Crew retrieves ocean mooring among ice floes.

FOR MORE INFORMATION



Contact the Lead Scientist at Bill.Williams@dfo-mpo.gc.ca





Wintertime Ocean Sampling Northwest Passage

4

Yukon
& Arctic

Dates: April 2022 and February 2023
Recurrence: Annually, since 2009
Locations: Northwest Passage (Cambridge Bay, Kugluktuk, Paulatuk, Gjoa Haven)
Vessel: N/A
Lead scientist: Mike Dempsey (250) 363-6452
Mike.Dempsey@dfo-mpo.gc.ca



Image 1. Ranger snowmobile patrol.

Description:

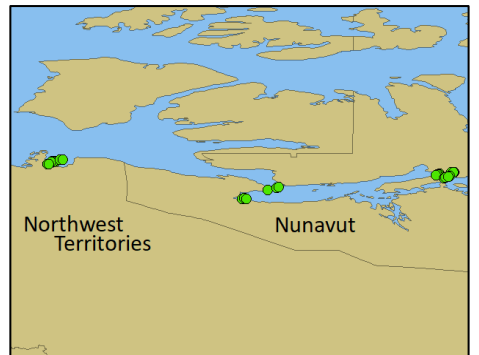
The Canadian Ranger Ocean Watch (CROW) is a partnership between DFO and the Canadian Rangers to collect winter oceanographic sampling data in frozen conditions in the Canadian Arctic Archipelago. The results add seasonality to over 30 years of summer ship based observations. Snow and ice data is shared with Canadian Ice Service.

Objectives

1. Monitor wintertime oceanographic conditions at standard locations by collecting full depth Conductivity, Temperature, and Depth (CTD) profile, ice thickness, snow depths measurements, and geochemical (nutrients/dissolved inorganic carbon/alkalinity) and zooplankton samples;
2. Describe the seasonal cycle across the region, by combining winter and summer data; and
3. Engage local residents in an exchange of information about the ocean.

Collaborators

- Canadian Rangers from the Inuit communities of Kugluktuk, Cambridge Bay, Gjoa Haven, and Paulatuk
- Environment and Climate Change Canada
- Department of National Defence



Map 1. Study locations.



Image 2. Kugluktuk Rangers take water samples through the ice.

FOR MORE INFORMATION



Contact the Lead Scientist at Mike.Dempsey@dfo-mpo.gc.ca



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Dates: August 10 – 24, 2022
Recurrence: Annually, since 2014
Location: Kitikmeot Sea
Vessel: R/V Martin Bergmann
Lead scientist: Bill Williams (250) 858-3699
Bill.Williams@dfo-mpo.gc.ca

R/V Martin Bergmann

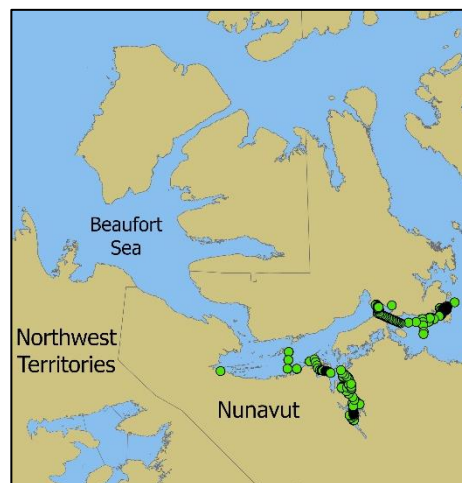


Description:

The Kitikmeot Sea Science Study uses the Arctic Research Foundation's *R/V Martin Bergmann* and community-based monitoring to conduct oceanographic exploration of the Kitikmeot Sea in the Northwest Passage.

Objectives

1. Evaluate large-scale circulation and nutrient balances in the Kitikmeot Sea;
2. Evaluate tidal-mixing of ocean nutrients in narrow straits with rapid tides;
3. Evaluate river-to-ocean flow and geochemistry;
4. Explore the remote and little-studied Bathurst Inlet; and
5. Investigate seasonal variation of oceans and rivers through year-round moorings data collection and Community-Based Monitoring.



Map 1. Study locations.

Collaborators

- Canadian Rangers from the Inuit community of Kugluktuk
- Universities of Victoria, Calgary, and Manitoba
- University of Alaska Fairbanks
- University of Tromsø, Norway



Image 1. Benthic sampling.

FOR MORE INFORMATION



[Arctic Focus](#) and [2018 Polar Knowledge: Aqhaliat Report](#)





Dates: July 3 – 23, 2022
Recurrence: Annually, since 1998
Locations: Bering Sea and Chukchi Sea
Vessel: CCGS Sir Wilfrid Laurier
Lead scientist: John Nelson (236) 464-0186
John.Nelson@dfo-mpo.gc.ca



Description

Canada's Three Oceans West program collects hydrographic, biogeochemical and biological data to monitor ocean and clam bed conditions. These data support the international Distributed Biological Observatory program.

Objectives

1. Monitor the impacts of ice retreat and ocean warming on clam beds that provide critical food for walrus and eider ducks;
2. Monitor the Bering Sea's winter-formed "cold pool" water that forms the southern boundary of the Arctic ecosystem;
3. Monitor the northward flow of nutrient-rich Pacific Ocean water, which plays a significant role in the ecology of the Canadian Arctic; and
4. Monitor the northward transport of Pacific Ocean plankton and their possible invasion of the Arctic.

Collaborators

- Canadian Coast Guard
- U.S. Fish and Wildlife Service
- University of Victoria
- University of Maryland
- Clark University



Map 1. Study locations.



Image 1. A Chukchi Sea walrus (*Odobenus rosmarus*).

FOR MORE INFORMATION



[Distributed Biological Observatory](#)





Dates: August 3 – 12, September 6 – 16, 2022
Recurrence: Annually, Year 1 of 2 (2022 - 2023)
Locations: Douglas, Finlayson and Burke Channels, Queen Charlotte Sd., North Vancouver Is.
Vessel: CCGS Franklin
Lead scientist: Stephen Page (250) 216-4807
Stephen.Page@dfo-mpo.gc.ca



Description

The Sharing Science-at-Sea Expedition brings a floating Science Centre to Indigenous communities of the Pacific Central Coast to promote relationships building and collaborative science.

Objectives

1. Engage First Nations communities to work alongside DFO scientists to conduct locally relevant ocean sampling in their own backyard;
2. Invite First Nation youth and other community members onboard to tour DFO's newest Science vessel, the CCGS Sir John Franklin;
3. Showcase Canada Coast Guard search and rescue and environmental response capabilities; and
4. Inspire First Nations youth to pursue scientific careers with DFO Science and the Canadian Coast Guard.



Map 1. Study area.



Image 1. DFO Science in School Project, June 2019.

Collaborators

- Central Coast First Nations
- Canadian Coast Guard

FOR MORE INFORMATION



Contact the Lead Scientist at Stephen.Page@dfo-mpo.gc.ca





Dates: July 13 – August 9, 2022
Recurrence: Annually, since 1891
Locations: Kitimat, Scott Islands, Queen Charlotte Sound, Queen Charlotte Strait
Vessel: CCGS Vector
Lead scientist: Stacey Verrin (250) 363-6377
Stacey.Verrin@dfo-mpo.gc.ca



Description

Mapping of the seabed and collection of bathymetry to enhance navigation safety with periodic tide gauge servicing.

Objectives

1. Collect multibeam bathymetry to improve navigational charts & products and aid scientific research;
2. Detect and classify subsurface shipping hazards;
3. Deploy and service tide gauges to support bathymetric surveying and Canadian Hydrographic Services water levels network;
4. Collect acoustic data to determine seabed classification for navigation and scientific research; and
5. Deploy Launch and ASV for additional inshore bathymetry capture.



Collaborators

- Canadian Coast Guard
- Natural Resources Canada
 - Geological Survey of Canada
- Environment and Climate change Canada
 - Canadian Wildlife Service
 - Environmental Stewardship Branch



FOR MORE INFORMATION



[Canadian Hydrographic Service non-navigational bathymetric data \(NONNA-10 and 100\)](#)





Synoptic Bottom Trawl Survey West Coast Haida Gwaii

9

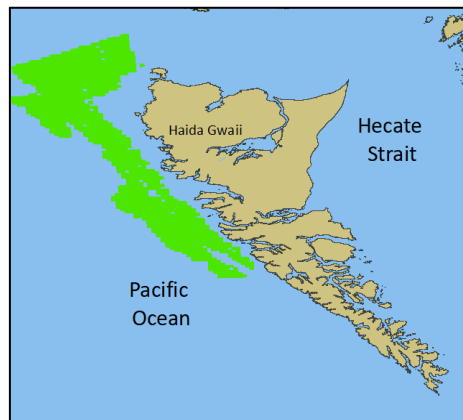
North
Coast

Dates: August 25 – September 1, 2022
Recurrence: Every 2 years, since 2006
Location: West Coast of Haida Gwaii
Vessel: Chartered commercial trawl vessel
Lead scientists: Malcolm Wyeth and Norm Olsen
Malcolm.Wyeth@dfo-mpo.gc.ca (778) 268-1184
Norm.Olsen@dfo-mpo.gc.ca (250) 756-7328



Description

This fishing survey uses bottom trawl gear to provide relative abundance indices for commonly caught species, distributional and occurrence data for all other species, and detailed biological data from groundfish species. These data are incorporated into stock assessments, status reports, and research publications. Each year, approximately 125 randomly selected locations are fished.



Map 1. Study area.

Objectives

1. Collect detailed species composition data from each set;
2. Collect detailed size and sex composition for all species;
3. Collect ageing structures and tissue samples from selected species; and,
4. Collect environmental data including temperature, conductivity, and dissolved oxygen from recorders attached to the fishing gear.



Image 1. Juvenile Giant Blobsculpin (*Psychrolutes phrictus*).

Collaborators

- Canadian Groundfish Research and Conservation Society

FOR MORE INFORMATION



Contact the Lead Scientist at Malcolm.Wyeth@dfo-mpo.gc.ca



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Shrimp Assessment Survey Chatham Sound

10

North
Coast

Dates: September 9 – October 1, 2022
Recurrence: Annually, since 1998
Locations: Chatham Sound
Vessel: CCGS Neocaligus
Lead scientist: Rick Ferguson (250) 756-7195
Rick.Ferguson@dfo-mpo.gc.ca

CCGS Neocaligus

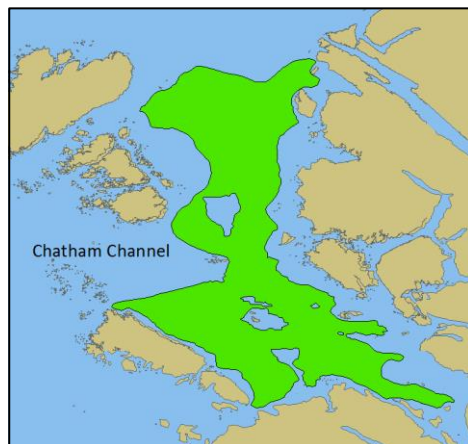


Description

Shrimp assessment surveys estimate the abundance of shrimp stocks (Smooth and Spiny Pink shrimp, and Sidesripe shrimp) in select Shrimp Management Areas. The results from these surveys are used to track long-term trends in abundance of shrimp stocks and to set annual quotas for the commercial shrimp trawl fishery.

Objectives

1. Conduct fishery independent surveys of shrimp grounds using bottom trawl gear to determine stock status of Pink and Sidesripe shrimp in Shrimp Management Areas PRD (PFMA 4 – Chatham Sound);
2. Maintain Pink shrimp and Sidesripe shrimp abundance index time series for monitoring trends in abundance; and,
3. Collect species distribution and abundance information on other fish and invertebrate species.



Map 1. Study area.



Image 1. Sidesripe Shrimp (Pandalopsis Dispar).

Collaborators

- Canadian Coast Guard

FOR MORE INFORMATION



[Pacific Region Shrimp Trawl Fishery](#)



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Dates: April 28 – May 18, 2022
Recurrence: Every 5 years, since 1978
Locations: Hecate Strait and Queen Charlotte Sound
Vessel: CCGS Vector
Lead scientist: Erin Herder (250) 756-7114
Erin.Herder@dfo-mpo.gc.ca



Description

Northern Abalone Index Sites Survey in Hecate Strait and Queen Charlotte Sound. Northern Abalone (*Haliotis kamtschatkana*) are listed as Endangered under the *Species at Risk Act* and the survey results will be used in the assessment of Northern Abalone in British Columbia.

Objectives

1. SCUBA dive survey of Northern Abalone index sites to collect information on density, size, recruitment, genetics, and habitat.



Collaborators (to be confirmed)

- Heiltsuk Nation
- Gitga'at Nation
- Kitasoo / Xai'xais First Nations
- Canadian Coast Guard



Image 1. Northern Abalone (*Haliotis kamtschatkana*).

FOR MORE INFORMATION



[Research Document 2021/001](#)





Northern Resident Killer Whale Annual Census

12

North
Coast

Dates: May 1 – August 31, 2022
Recurrence: Annually, since 1973
Locations: Johnstone Strait and Sound, Hecate Strait, Dixon Entrance, Chatham Sound
Vessel: M/V Roller Bay
Lead scientist: Thomas Doniol-Valcroze (250) 729-8375
Thomas.Doniol-Valcroze@dfo-mpo.gc.ca



Description

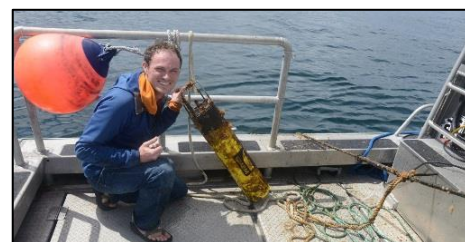
The Cetacean Research Program has been conducting an annual census of the Northern Resident Killer Whale (NRKW) population since 1973, making it one of the longest time series of data for any marine mammal. This information is important to monitor changes in abundance, population structure and life-history parameters.

Objectives

1. Using visual and acoustic methods, locate NRKW and collect photo-identifications of all members of group present;
2. Deploy and recover acoustic devices;
3. Collect prey samples from sharing events during encounters where whales are foraging;
4. Document each animal in the population; and
5. Document new offspring since previous year's census and identify the mother.



Map 1. Study area.



Images 1. Recovering acoustic recorder.

Collaborators

- Gitga'at Nation
- Canadian Coast Guard
- Parks Canada
- University of British Columbia
- Coastal and Ocean Resources
- Bay Cetology
- Cetacealab
- OrcaLab
- North Coast Cetacean Society
- Ocean Wise Conservation Alliance

FOR MORE INFORMATION



[Science Response 2021/030](#)



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Dates: April 1, 2022 – March 31, 2023
Recurrence: Annually, since 2017
Locations: Port of Prince Rupert, Chatham Sound, Skeena River Estuary
Vessels: CCGS Vector and CCGS Tully
Lead scientists: Paul Covert (250) 363-6765
Paul.Covert@dfo-mpo.gc.ca



Description

The Coastal Environmental Baseline Program collects comprehensive data about the marine ecosystem for the Port of Prince Rupert, for example, water circulation patterns, sub-tidal habitat and species distribution, and phytoplankton community composition and distribution.

Objectives

1. Characterize weekly, monthly, and seasonal ecosystem changes;
 - a) Measure physical and chemical water properties;
 - b) Characterize inter-tidal and sub-tidal habitats; and
 - c) Record abundance and distribution of invertebrate and vertebrate marine biota.
2. Provide high-quality, open-data to all Canadians to inform science-based decision making.



Map 1. Study area.



Image 1. Water sampling in Chatham Sound.

Collaborators

- Lax K'waalams, Metlakatla, Kitkatla/Gitxaala, Kitselas, and Kitsumkalum Nations
- Canadian Coast Guard
- Environment and Climate Change Canada
- Prince Rupert Port Authority
- Coastal and Ocean Resources (ShoreZone)
- Ocean Wise Conservation Association
 - North Coast Cetacean Research Institute
 - PollutionTracker

FOR MORE INFORMATION



[Coastal Environmental Baseline Program](#) and [Port of Prince Rupert pilot site](#)





Dates: May 18 – June 15, 2022
Recurrence: Annually, since 2016
Locations: Queen Charlotte Sound
Vessel: CCGS Vector
Lead scientists: Tammy Norgard and Sarah Dudas
Tammy.Norgard@dfo-mpo.gc.ca (250) 616-9278
Sarah.Dudas@dfo-mpo.gc.ca (250) 327-3501



Description

This collaborative survey will assess deep water and intertidal habitats and species from the Central Coast of British Columbia. Findings will support marine conservation initiatives and contribute to long-term monitoring.

Objectives

1. Conduct deep water surveys to assess the abundance of coral and sponges; rockfish habitat; and biological communities;
2. Survey benthic habitat and species;
3. Conduct intertidal fish and invertebrate surveys including aquatic invasive species using standard and novel technologies such as environmental DNA and passive acoustics; and
4. Conduct community outreach activities during and/or after the surveys.

Collaborators

- Heiltsuk Nation
- Kitasoo/Xai'Xais First Nations
- Central Coast Indigenous Resource Alliance
- Canadian Coast Guard



Map 1. Study area.



Image 1. Beach Seine.

FOR MORE INFORMATION



Contact Lead Scientists Tammy.Norgard@dfo-mpo.gc.ca or Sarah.Dudas@dfo-po.gc.ca





Dates: June, August, September, December 2022
Recurrence: Annually, since 2017
Location: Clayoquot Sound
Vessel: AMD Sturgeon Bay
Lead scientist: Theraesa Coyle (236) 334-2528
Theraesa.Coyle@dfo-mpo.gc.ca

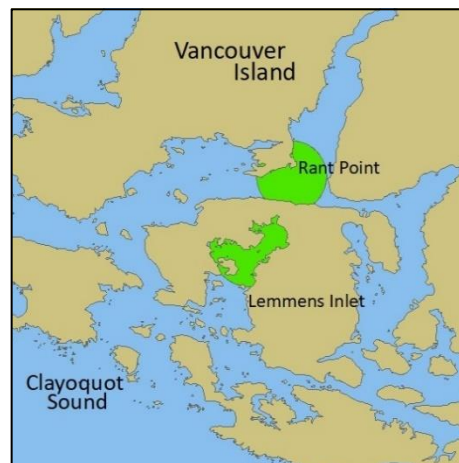


Description

This national Aquaculture Monitoring Program aims to detect, monitor and model chemical and biological inputs from aquaculture activities in the far-field marine environment. The program helps inform policy and regulatory development and decision making to evaluate the spatio-temporal characteristics of the zone directly influenced by finfish and shellfish aquaculture.

Objectives

1. Collect benthic sediment samples to test for drugs, pesticides, trace metals, sulphides, organic content and sediment grain size;
2. Collect water samples to measure chlorophyll and organic matter;
3. Deploy oceanographic instruments to measure currents, turbidity, temperature, salinity, oxygen and chlorophyll;
4. Collect plankton tows near shellfish farm to collect zooplankton specimens; and
5. Inform oceanographic model development.



Map 1. Study areas.



Image 1. Deploying a Van Veen Grab for benthic sampling.

FOR MORE INFORMATION



Contact the Lead Scientist at Theraesa.Coyle@dfo-mpo.gc.ca





Dates: April 1 – October 31, 2022
Recurrence: Annually, year two of two (2021 - 2022)
Location: Broughton Archipelago
Vessels: Small inshore boats
Lead scientist: Kristi Miller-Saunders (250) 756-7155
Kristi.Saunders@dfo-mpo.gc.ca

Description

Monthly water and fish sampling from Broughton Archipelago fish farms to assess the associations between pathogens in fish on farms and in the surrounding water column. First Nations trainees working at the DFO genomics laboratory will employ molecular profiling of the samples. This project is in support of the establishment of the first Indigenous genomics laboratory in Canada at the Okanagan Nations Alliance hatchery in Penticton.

Objectives

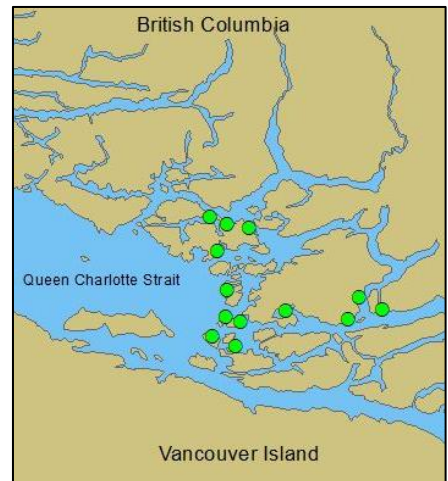
1. Provide genomics training for technology transfer of infectious agent profiling technologies to First Nations;
2. Determine whether non-invasive environmental DNA profiling can detect shifting infectious agents associated with disease development on farms, and
3. Provide scientific data to support First Nations decision making pertaining to risks to wild salmon posed by Broughton tenures.

Collaborators

- 'Namgis, Mamalilikulla, and Kwikwasut'inuxw Haxwa'mis First Nations
- Okanagan Nation Alliance
- Mowi ASA and Cermaq Canada



Image 1. Atlantic Salmon on ice prior to dissection.



Map 1. Study locations.

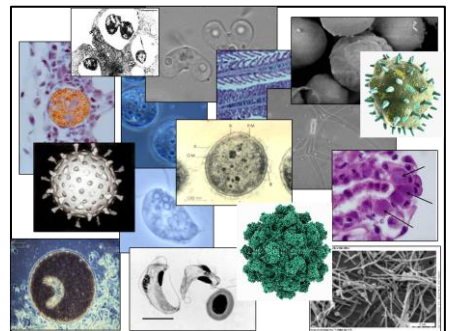


Image 2. Multi-agent profiles of viruses, bacteria and fungal pathogens will be monitored in water and fish tissue samples.

FOR MORE INFORMATION



Contact the Lead Scientist at Kristi.Saunders@dfo-mpo.gc.ca





Dates: May 1 – June 30, 2022
Recurrence: Annually, year eight of eight (2015 - 2022)
Locations: Discovery passage, Okisollo channel
Vessels: M/V Pallasii, rigid inflatable boats
Lead scientist: Stéphane Gauthier (250) 363-6587
Stephane.Gauthier@dfo-mpo.gc.ca



Description

Monitoring and research of juvenile Pacific salmon out-migration through the Discovery Islands area and assessment of interactions with aquaculture facilities.

Objectives

1. Monitor wild juvenile salmon migration through the area using moored inverted echosounders mounted on the bottom of the channel; and
2. Inspect sites and instruments on a regular basis to ensure proper data collection, and collect visual information on presence and status of wild juvenile salmon in the area.

Collaborators

- Mowi ASA
- Cermaq Canada



Map 1. Study locations in Okisollo channel, between Quadra and Sonora Islands.



Image 1. Acoustic mooring before deployment.

FOR MORE INFORMATION



[State of the Pacific Ocean](#)



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Dates: April 1 – December 16, 2022
Recurrence: Annually, since 2020
Location: Strait of Georgia, West Coast Vancouver Island
Vessels: Small boats operated by citizen scientists
Lead scientist: Andrew Ross (250) 363-6800
Andrew.Ross@dfo-mpo.gc.ca

Description

The goal of this project is to increase understanding of the dynamics and drivers of harmful algal blooms and associated biotoxins that can impact wild and farmed salmon and endangered marine mammals in British Columbia coastal waters.

Objectives

1. Collect sea water and environmental data (temperature, salinity, oxygen, nutrients) bi-weekly at up to 12 locations, including salmon farms and critical habitat for fish and marine mammals;
2. Filter sea water and analyze filters and filtered seawater for up to 26 biotoxins;
3. Identify and measure the amounts of harmful algae and the biotoxins that they produce;
4. Monitor seasonal and annual trends in the abundance of harmful algae and biotoxins; and
5. Compare with temperature and other factors to help predict when toxic algal blooms may occur.

Collaborators

- Pacific Salmon Foundation
 - Citizen Science Program
- Grieg Seafood BC Ltd.
- Cermaq Canada



Image 1. Sampling from a Citizen Science vessel.



Map 1. Study locations.



Image 2. Filtering sea water for biotoxin analysis.

FOR MORE INFORMATION



[Citizen Science Program](#) and [Collaboration with British Columbia Salmon Farmers](#)





Dates: April 1, 2022 – March 31, 2023
Recurrence: Annually, year two of two (2021 - 2022)
Locations: Strait of Georgia (Deep Bay, Fanny Bay, Denman Island)
Vessels: M/V Atrevida, local work boats
Lead scientists: Chris Pearce (250) 756-3352
Chris.Pearce@dfo-mpo.gc.ca



M/V Atrevida

Description

Field trials to investigate whether initial culture of Pacific oysters in the intertidal zone may improve resilience to summer mortality when moved to deep-water (*i.e.*, suspended) culture sites, and whether the intertidal zone can serve as a temporary refuge from summer mortality for deep-water cultured oysters. Findings will support the development of practical mitigation techniques for the shellfish industry.

Objectives

1. Track mortality, reproductive status, and condition index in oysters at intertidal and deep-water sites at three farm locations;
2. Monitor physical conditions at all sites; and
3. Carry out laboratory-challenge experiments to compare resiliencies to summer-mortality stressors.

Collaborators

- Vancouver Island University
 - Centre for Shellfish Research
 - Deep Bay Marine Field Station
- Taylor Shellfish Canada



Map 1. Study locations.



Image 1. Culture of Pacific oysters in the intertidal zone.

FOR MORE INFORMATION



[Aquaculture Collaborative Research and Development Program](#)



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Canada

Canada



Northern Resident Killer Whale Rubbing Beach Study

20

South
Coast

Dates: July 1 – September 5, 2022
Recurrence: Annually, year four of four (2019 - 2022)
Location: Johnstone Strait
Vessels: S/V Nahwitti Ranger (BC Parks); Zodiac to access to RBMBER rubbing beaches
Lead scientist: Sheila J Thornton (604) 364-5917
Sheila.Thornton@dfo-mpo.gc.ca



S/V Nahwitti Ranger

Description

Northern Resident Killer Whales rub on smooth pebble beaches along the coast. This project evaluates the benefits of [Robson Bight Michael Bigg Ecological Reserve \(RBMBER\)](#) in reducing physical and acoustic disturbance to whales when undertaking this important social behaviour.

Hydrophones near the rubbing beaches record the ambient noise environment and rubbing behaviour of the whales. Data collected from an observation station records the distance of vessels to the rubbing beach and the corresponding whale behaviour.



Map 1. RBMBER study area with observation station (red circle) and hydrophone locations (green circles).

Objectives

1. Quantify rubbing beach use and bout length on beaches inside and outside the reserve; and
2. Assess vessel presence, distance from the beach, and the ambient acoustic environment on the beaches to evaluate the level of protection provided by the ecological reserve.

Collaborators

- Province of British Columbia (BC Parks)
- Cetus Research & Conservation Society / Straitwatch
- Simon Fraser University



Image 1. Observation cliff station, 'Eagle Eye', overlooking RBMBER.

FOR MORE INFORMATION



Contact the Lead Scientist at Sheila.Thornton@dfo-mpo.gc.ca



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Canada



Dates: June 29 – July 9, Oct 12 – 17, 2022
Recurrence: Annually, year five of six (2018 - 2023)
Locations: Swiftsure Bank, Juan de Fuca Strait, Haro Strait, Boundary Pass, Strait of Georgia
Vessels: CCGS Vector and charter vessel
Lead scientist: Svein Vagle (250) 363-6339
Svein.Vagle@dfo-mpo.gc.ca



Description

Monitor the underwater noise in Southern Resident Killer Whale (SRKW) critical habitats to establish baselines, track changes, and evaluate impacts of human-generated noise on SRKW. Small moorings equipped with hydrophone systems sampling the noise field continuously represent the backbone of this ongoing study.

Objectives

1. Recover, service and re-deploy eight hydrophone moorings;
2. Collect water property data;
3. Perform sound propagation studies;
4. Collect bird information; and
5. Monitor marine mammals.

Collaborators

- Canadian Coast Guard
- Dalhousie University



Map 1. Study locations.



Image 1. Recovering a mooring from the Vector.

FOR MORE INFORMATION



[Journal of Marine Science and Engineering](#) and [Marine Pollution Bulletin](#)





Dates: May 1 – November 30, 2022
Recurrence: Annually, year four of four (2019 - 2022)
Locations: Swiftsure Bank, Juan de Fuca Strait,
Strait of Georgia
Vessels: Guide vessels, DFO rigid inflatable boats
Lead scientist: Tanya Brown (250) 353-9211
Tanya.Brown@dfo-mpo.gc.ca



Description

Southern Resident Killer Whale (SRKW) face significant anthropogenic threats, including from high levels of endocrine disrupting contaminants. This study supports the recovery of this species at risk by evaluating contaminants found in SRKWs, their diet, and their habitat; by developing and applying new tools to prioritize contaminants of concern; and by delivering refined guidance.

Objectives

1. Determine which prey species and/or Chinook Salmon stocks are accumulating contaminants of concern in SRKW;
2. Use food web biomagnification models to report on current and future exposure and risk for the priority contaminant classes of concern; and
3. Determine and rank priority contaminants and their associated health effects in SRKW.

Collaborators

- Pacheedaht First Nation
- Environment and Climate Change Canada - DAS
- Ocean Wise Conservation Association
- Simon Fraser University



Map 1. Study locations.



Image 1. Sediment sampling.

FOR MORE INFORMATION



Contact the Lead Scientist at Tanya.Brown@dfo-mpo.gc.ca





Dates: April 1, 2022 – March 31, 2023
Recurrence: Annually, year three of three (2020-2022)
Locations: Carmanah Light Station and Active Pass (Galiano Island)
Vessel: R/V Richardson Point
Lead scientist: Harald Yurk (236) 330-2257
Harald.Yurk@dfo-mpo.gc.ca



Description

The Whale Detection and Collision Avoidance Initiative under the Ocean Protection Program aims to detect and track whales and vessels simultaneously to determine the risk of acoustic and physical disturbance—including ship strikes—and to support the development of timely alerts for mariners of whale presence and whale movements.

This project aims to test the effectiveness of thermal imaging technology in combination with Automatic Identification System (AIS) / RADAR receivers to automatically track whales and vessels.



Map 1. Study locations.

Objectives

1. Design and deploy tracking systems, i.e. infrared and video cameras, AIS signal receivers, and marine RADAR transmitters;
2. Monitor systems remotely;
3. Deploy underwater acoustic recording equipment to confirm whale presence in the area via alternate monitoring system; and
4. Conduct detection range measurements.

Collaborators

- Woods Hole Oceanographic Institution, U.S.
- University of Erlangen-Nuremberg, Germany
- WhaleSpotter Inc.

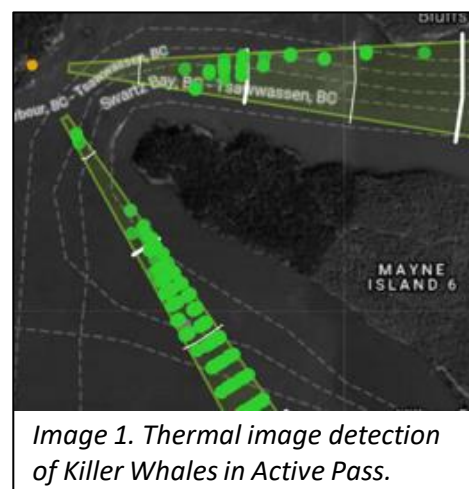


Image 1. Thermal image detection of Killer Whales in Active Pass.

FOR MORE INFORMATION



Contact the Lead Scientist at Harald.Yurk@dfo-mpo.gc.ca





Dates: September 1 – November 30, 2022
Recurrence: Annually, since 2021
Locations: Strait of Georgia, Gulf Islands

Vessel: M/V Manyberries
Lead scientist: Cathryn Murray (250) 363-3001
Cathryn.Murray@dfo-mpo.gc.ca



M/V Manyberries

Description

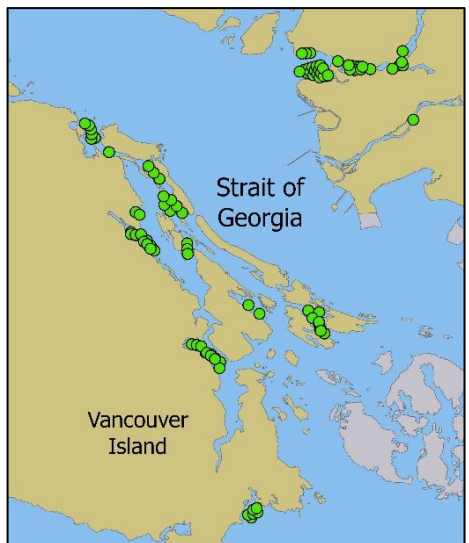
With the expansion of the shipping industry, ships are spending more time at anchorages and expanding to previously little used anchorage areas. Anchorages are often sited in soft sediment areas; which are understudied, high diversity ecosystems important for ecosystem function. This research aims to document changes in sediment and seafloor ecosystems in commercial anchorage through Remotely Operated Vehicle (ROV) surveys, multibeam bathymetry, and grab and core sampling.

Objectives

1. Investigate seabed disturbance from commercial anchoring activities across a gradient of anchorage use, duration, and frequency;
2. Quantify the extent of impact on sediment and seafloor species; and
3. Provide a baseline for change detection in these areas.

Collaborators

- Natural Resources Canada
- Transport Canada



Map 1. Study locations.



Image 1. ROV "Phantom HD2" used to survey the seafloor at anchorage sites.

FOR MORE INFORMATION



Contact the Lead Scientist at Cathryn.Murray@dfo-mpo.gc.ca





Dates: April 21 – May 1, Aug 25 – Sept 5, 2022
Recurrence: Annually, since 1979
Locations: West Coast Vancouver Is., Barkley Sound, Queen Charlotte Sound, Strait of Georgia
Vessel: CCGS John P. Tully
Lead scientist: John Nelson (236) 464-0186
John.Nelson@dfo-mpo.gc.ca



Description

This oceanographic survey—sometimes referred to as La Perouse—examines water properties and plankton to identify changing ocean conditions, and to inform understanding of abundance and survival of fish populations.

Objectives

1. Identify changes in species composition and abundance of plankton;
2. Understand the causes of these changes;
3. To the extent possible, forecast the consequences of these changes in plankton to marine food webs; and
4. Characterise and synthesise the large-scale changes to the marine ecosystems of British Columbia, including the development of sets of indicators of ecosystem status and trends useful for management.

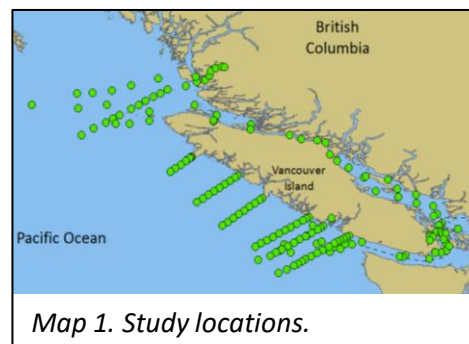


Image 1. "Bongo" nets used to sample the zooplankton.

Collaborators

- Canadian Coast Guard
- University of British Columbia
- University of Victoria
- Hakai Institute

FOR MORE INFORMATION



[State of the Pacific Ocean](#)





Dates: April 1, 2022 – March 31, 2023
Recurrence: Varied, since 2009
Locations: Queen Charlotte Strait, West Coast
Vancouver Island
Vessels: Local work boats
Lead scientists: Laura Bianucci and Peter Chandler
Laura.Bianucci@dfo-mpo.gc.ca (250) 363-6521
Peter.Chandler@dfo-mpo.gc.ca (236) 464-3338



Image 1. Weather station installed at remote site.

Description

Numerical models used to simulate coastal water circulation require the specification of a wind field to force the movement of the surface layer of the ocean, and the heat flux to balance the transfer of heat into and out of the ocean.

Models have been developed for the major aquaculture regions in British Columbia and a network of weather stations has been maintained to provide the wind forcing for these models.



Map 1. Study locations.

Objectives

1. Maintain the weather stations installed at remote locations that require manual downloading of stored data; and
2. Maintain the weather stations installed on fish farms that provide data via the internet.

Collaborators

- Grieg Seafood BC Ltd.
- Cermaq Canada
- Mowi ASA



Image 2. Weather station installed at fish farm.

FOR MORE INFORMATION



[Canadian Aquaculture R&D Review 2017](#)





Dates: May 2 – 16, August 9 – 24, 2022; Feb 4 – 20, 2023
Recurrence: Annually, since 1956
Location: Northeast Pacific
Vessel: CCGS John P. Tully
Lead scientist: Marie Robert (236) 464-2074
Marie.Robert@dfo-mpo.gc.ca



Description

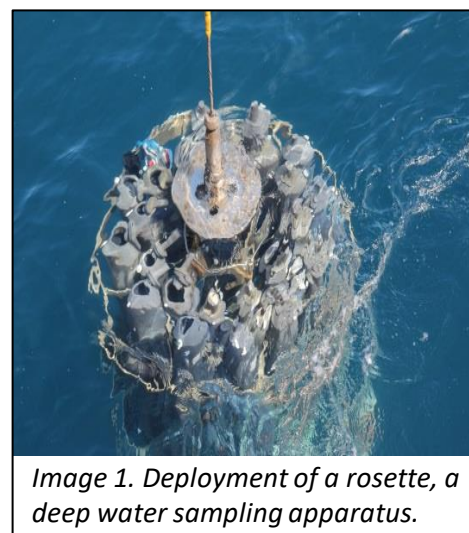
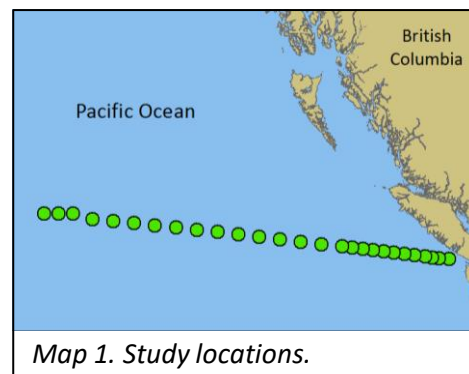
Line P—a long standing program that surveys a 1,700 km long section three times per year—is the longest time series of oceanographic data in the Northeast Pacific and Fisheries and Oceans Canada's furthest offshore reaching program on the west coast. Data collected since 1956 shows evidence of the impact of climate variability on ocean productivity.

Objectives

1. Collect water property data and samples for carbon, oxygen, pH, chlorophyll, pigments, nutrients, salinity, cesium, and dimethyl sulfide;
2. Collect zooplankton and phytoplankton samples;
3. Collect environmental DNA samples; and
4. Recover, service and deploy oceanographic moorings.

Collaborators

- Canadian Coast Guard
- National Oceanographic and Atmospheric Administration
- University of Washington, Victoria, British Columbia, and Memorial University of Newfoundland



FOR MORE INFORMATION



[State of the Pacific Ocean](#)





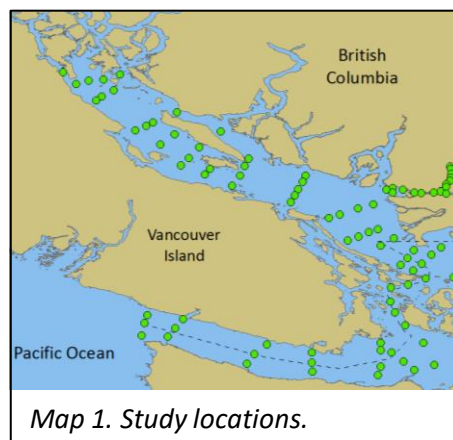
Dates: April 1 – 6, June 22 – 29, Oct 5 – 12, 2022
Recurrence: Annually, since 1999
Locations: Strait of Georgia, Juan de Fuca Strait
Vessels: CCGS John P. Tully and CCGS Vector
Lead scientist: Peter Chandler (236) 464-3338
Peter.Chandler@dfo-mpo.gc.ca



Description

A water properties survey first introduced in 1999 and carried out four times per year to collect oceanographic data in the Strait of Georgia and Juan de Fuca Strait (zooplankton, nutrients, dissolved oxygen, dissolved inorganic carbon, temperature, and salinity).

The information collected is used to monitor the seasonal cycle and year to year variability in the properties of the environment and their impact on the ecosystem, and to contribute to an archive of oceanographic information for the region upon which scientific advice can be based.

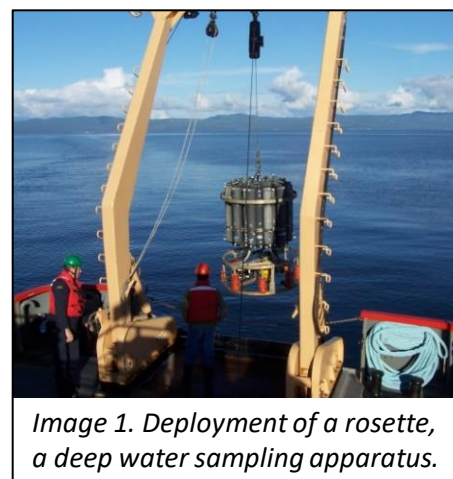


Objectives

1. Continue the time series of observations at over 80 stations monitoring the physical, chemical and biological characteristics of the region; and
2. Extend the survey into Burrard Inlet and Indian Arm and compare observations with previous surveys.

Collaborators

- Tsleil-Waututh Nation
- Canadian Coast Guard



FOR MORE INFORMATION



[State of the Pacific Ocean](#) and [Salish Sea Water Quality](#)





Dates: April 1, 2022 – March 31, 2023
Recurrence: Annually, since 2018
Locations: Burrard Inlet, Indian Arm, Fraser River
Vessels: R/V Doug Anderson and CCGS Vector
Lead scientist: Roy Hourston (250) 363-6586
Roy.Hourston@dfo-mpo.gc.ca



Description

Improving Drift Prediction and Nearshore Modelling is an initiative of the Oceans Protection Plan and involves collecting physical water property data to:

- Enhance environmental protection and marine safety applications (e.g., drift prediction for oil spills); and
- Enhance safety for navigation and related activities (hydrographic e-navigation).



Map 1. Study area.

Objectives

- Measure physical water properties such as temperature and salinity in Burrard Inlet, Indian Arm, and the Fraser River; and
- Deploy and recover surface current tracking drifters.

Collaborators

- Canadian Coast Guard
- Environment and Climate Change Canada



Image 1. Deployment of a current tracking drifter.

FOR MORE INFORMATION



[Oceans Protection Plan](#) and [Canadian Hydrographic Service](#)





Dates: June 15 – July 3, Sept 17 – Oct 7, 2022
Recurrence: Annually, since 1998
Locations: Johnstone Strait, Strait of Georgia, Juan de Fuca Strait, mainland inlets
Vessel: CCGS Sir John Franklin
Lead scientist: Chrys Neville (250) 756-7185
Chrys.Neville@dfo-mpo.gc.ca

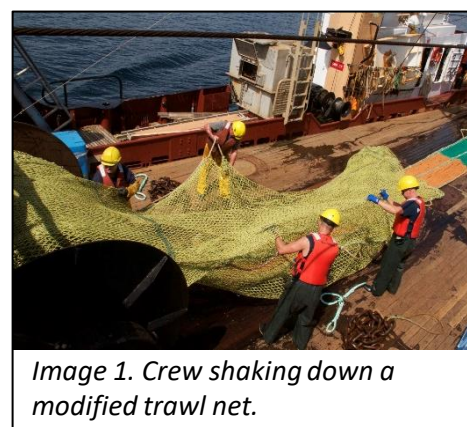
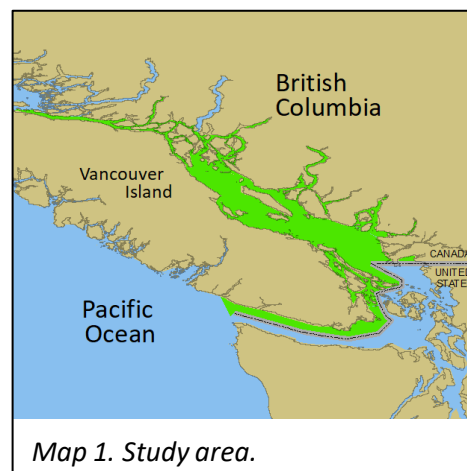


Description

Early summer and fall surveys examine the abundance, distribution and condition of juvenile Pacific salmon rearing in the inland waters of the Salish Sea in order to improve understanding of factors regulating their early marine survival.

Objectives

1. Improve understanding of factors regulating the early marine survival of Pacific salmon (early marine growth and energetics, interactions with salmon farms or other industry, changes in climate, etc.);
2. Determine the relationship between the growth and condition of juvenile salmon that rear in this area and their subsequent total marine survival;
3. Develop forecast methods to identify changes in trends of salmon production and/or provide early return forecasts for specific stock groups; and
4. Enumerate and sample all species collected in the surface 75m to improve our understanding of species interactions and competition, as well as changes in marine productivity driven by changes in ocean climate.



Collaborators

- Canadian Coast Guard

FOR MORE INFORMATION



[State of the Pacific Ocean](#)





Dates: October 8 – 23, 2022
Recurrence: Annually, since 1998
Location: West Coast Vancouver Island
Vessel: CCGS Franklin
Lead scientist: Jackie King (250) 756-7176
Jackie.King@dfo-mpo.gc.ca



Description

This survey will be used to estimate the condition and stock composition of Pacific salmon on the West Coast of Vancouver Island. Oceanographic sampling will allow us to relate salmon abundance and condition to physical sea conditions, and presence and quality of prey (zooplankton). This survey will align with First Nations microtrolling for juvenile Chinook within West Coast Vancouver Island inlets (fact sheet 32).



Map 1. Study locations.

Objectives

1. Determine the fall abundance, condition, distribution, and genetic stock composition of juvenile salmon, especially Chinook;
2. Collect physical oceanographic and zooplankton data to relate back to salmon ecology; and
3. Record biological information from all species caught, including other fish species, sharks (live release) and invertebrates (e.g. Jellyfish).

Collaborators

- Quatsino, Ka:'yu:'k't'h' / Che:k'tles7et'h', and Huu-ay-aht First Nations
- Uu-a-thluk Fisheries
- Ha'oom Fisheries Society
- Canadian Coast Guard



Image 1. Sorting juvenile salmon, juvenile Sablefish (*Anoplopoma fimbria*), and Jellyfish.

FOR MORE INFORMATION



[Canadian Data Report of Fisheries and Aquatic Sciences 1350](#)





Dates: April 1, 2022 – March 31, 2023
Recurrence: Annually, year three of three (2020-2022)
Locations: Port of San Juan, Barkley, Clayoquot, Nootka, Kyuquot, Quatsino Sounds
Vessels: Small inshore boats
Lead scientists: Kristi Miller-Saunders and Jesse Bokvist
Kristi.Saunders@dfo-mpo.gc.ca (250) 756-7155
Jesse.Bokvist@dfo-mpo.gc.ca (250) 327-8734

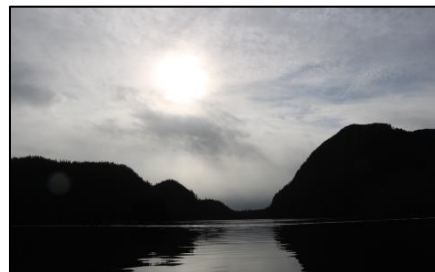


Image 1. Clayoquot Sound Inlet.

Description

Monthly micro-trolling for juvenile Pacific salmon during fall/winter in sounds off the West Coast of Vancouver Islands to study resident and non-resident salmon habitat utilization, assess molecular indices of health and condition, and risk of disease transmission.

Objectives

1. Improve understanding of salmon usage of early marine habitats along the West Coast Vancouver Island within all five major sounds via genetic stock identification (GSI); and
2. Assess infectious burden, stressors, health and condition using salmon Fit-Chips in order to identify habitats where fish are most compromised.



Map 1. Study areas.

Collaborators

- Quatsino, Ka:'yu:'k't'h' / Che:k'tles7et'h', Nuchatlaht, Ehattesaht / Chinehkint, Mowachaht / Muchalaht, Tla-o-qui-aht, Ahousaht, Yuułu?it'ath, Huu-ay-aht, Pacheedaht Nations
- Maaqutusiis Hahoulthee Stewardship Society
- Nuu-cha-nulth Tribal Council, Uu-a-thluk Fisheries, and Ha'oom Fisheries Society
- Pacific Salmon Foundation
- British Columbia Conservation Foundation
- Cedar Coast Field Station
- Central Westcoast Forest Society
- University of British Columbia



Image 2. Micro-trolling gear prepared for sampling.

FOR MORE INFORMATION



Contact the Lead Scientist at Kristi.Saunders@dfo-mpo.gc.ca





Dates: June 1, 2022 – March 31, 2023
Recurrence: Annually, year two of two (2021-2022)
Location: West Coast Vancouver Island (San Juan River and Estuary)
Vessel: N/A
Lead scientists: Paul Grant (250) 217-5376
Paul.Grant@dfo-mpo.gc.ca



Image 1. Green Sturgeon (*Acipenser medirostris*).

Description

This survey will address knowledge gaps regarding the seasonal abundance, distribution and behaviour of Green Sturgeon (*Acipenser medirostris*) within the San Juan River and Estuary.

Findings will support conservation initiatives and contribute to long-term monitoring of Green Sturgeon, a Species of Special Concern under the *Species at Risk Act*.



Map 1. Study area.

Objectives

1. Conduct seasonal surveys within the San Juan River and estuary; and
2. Deploy acoustic arrays and monitor movement and habitat use of Green Sturgeon entering the San Juan Estuary.

Collaborators

- Pacheedaht First Nation



Image 2. San Juan River.

FOR MORE INFORMATION



Contact the Lead Scientist at Paul.Grant@dfo-mpo.gc.ca





Dates: August 3 – September 2, 2022
Recurrence: Annually – north in odd years, south in even years – since 2003
Locations: Johnstone Strait, Strait of Georgia
Vessel: CCGS Neocaligus
Lead scientist: Dana Haggarty (250) 327-4860
Dana.Haggarty@dfo-mpo.gc.ca

CCGS Neocaligus



Description

This fishing survey uses standardized longline hook gear to provide relative abundance indices for commonly caught species, distributional and occurrence data for all other species, and detailed biological data for inshore groundfish species. These data are incorporated into stock assessments, status reports, and research publications. Each year, approximately 70 randomly selected locations are fished, alternating between the northern (purple) and southern (green) regions.

Objectives

1. Collect detailed species composition data from each set;
2. Collect detailed size and sex composition for all species;
3. Collect ageing structures and tissue samples from inshore rockfish species and Lingcod; and
4. Collect environmental data using temperature-depth recorders attached to the fishing gear as well as vertical conductivity-temperature-depth recorder (CTD) casts.

Collaborators

- Canadian Coast Guard



Map 1. Study areas: north in purple, south in green.

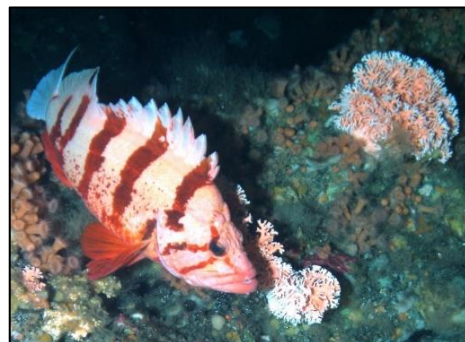


Image 1. A Tiger Rockfish (*Sebastes nigrocinctus*), one of the nearshore groundfish species caught on this survey.

FOR MORE INFORMATION



Contact the Lead Scientist at Dana.Haggarty@dfo-mpo.gc.ca





Hard Bottom Longline Hook Survey Outside Area

35

South
Coast

Dates: July 15 – September 15, 2022
Recurrence: Annually—south in even years, north in odd years—since 2006
Locations: West Coast of Vancouver Island, Queen Charlotte Sound, Hecate Strait, Dixon Entrance, Haida Gwaii
Vessels: Chartered commercial longline vessels
Lead scientist: Dana Haggarty (250) 327-4860
Dana.Haggarty@dfo-mpo.gc.ca



Image 1. A captured Yelloweye Rockfish (Sebastes ruberrimus).

Description

This fishing survey uses standardized longline fishing gear to provide relative abundance indices for commonly caught species, distributional and occurrence data for all other species, and detailed biological data for inshore groundfish species. These data are incorporated into stock assessments, status reports, and research publications. Each year, approximately 200 randomly selected locations are fished, alternating between the northern (purple) and southern (green) regions.



Map 1. Study areas: north in purple, south in green.

Objectives

1. Collect detailed species composition data from each set;
2. Collect detailed size and sex composition data as well as ageing structures and tissue samples from inshore rockfish species and Lingcod; and
3. Collect environmental data using temperature-depth recorders attached to the fishing gear.

Collaborators

- Pacific Halibut Management Association of BC



Image 2. A Yelloweye Rockfish hiding behind anemones.

FOR MORE INFORMATION



Contact the Lead Scientist at Dana.Haggarty@dfo-mpo.gc.ca



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Dates: May 13 – June 14, 2022
Recurrence: Every 2 years, since 2004
Location: West Coast Vancouver Island
Vessel: CCGS Sir John Franklin
Lead scientists: Malcolm Wyeth and Norm Olsen
Malcolm.Wyeth@dfo-mpo.gc.ca (778) 268-1184
Norm.Olsen@dfo-mpo.gc.ca (250) 756-7328



Description

This fishing survey uses bottom trawl gear to provide relative abundance indices for commonly caught species, distributional and occurrence data for all other species, and detailed biological data from groundfish species. These data are incorporated into stock assessments, status reports, and research publications. Each year, approximately 175 randomly selected locations are fished.

Objectives

1. Collect detailed species composition data from each set;
2. Collect detailed size and sex composition for all species;
3. Collect ageing structures and tissue samples from selected species; and
4. Collect environmental data including temperature, conductivity, and dissolved oxygen from recorders attached to the fishing gear.



Collaborators

- Canadian Coast Guard



Image 1. Green Sturgeon
(*Acipenser medirostris*).

FOR MORE INFORMATION



Contact the Lead Scientist at Malcom.Wyeth@dfo-mpo.gc.ca





Dates: July 4 – August 2, 2022
Recurrence: Annually, since 1998
Locations: West Coast Vancouver Island,
North West Coast of Vancouver Island
Vessel: CCGS Sir John Franklin
Lead scientists: Jackie King and Jennifer Boldt
Jackie.King@dfo-mpo.gc.ca (250) 756-7176
Jennifer.Boldt@dfo-mpo.gc.ca (250) 756-7110



Description

This survey is part of an integrated project designed to study the structure and function of the pelagic ecosystem on the Vancouver Island Continental Shelf (< 200 m bottom depth). The main goal of the survey is to understand factors affecting the distribution, abundance, and food web linkages of pelagic fish species, such as Pacific Herring and juvenile salmon. Stations from randomly selected blocks in each stratum (*Map 1*) will be sampled with a midwater trawl net towed at the surface or 15 m depth during daylight and night time hours.



Map 1. Study areas. Coloured zones are depth and ecosystem strata.

Objectives

1. Examine species distribution, composition, and abundance;
2. Collect biological and diet data, as well as biological samples; and
3. Examine the prey environment by sampling zooplankton (vertical bongo net hauls) and conducting oceanographic monitoring (temperature, salinity, fluorescence).



Image 1. Survey participants collecting biological data from fish.

Collaborators

- Canadian Coast Guard

FOR MORE INFORMATION



[Canadian Technical Report of Fisheries and Aquatic Sciences 3339](#)





Dates: February 22 – March 10, 2023
Recurrence: Every 1 to 5 years, since 1995
Locations: Strait of Georgia and Jervis, Toba, and Bute Inlets
Vessel: CCGS Sir John Franklin
Lead scientist: Stéphane Gauthier (250) 363-6587
Stephane.Gauthier@dfo-mpo.gc.ca



Description

Acoustic-trawl survey within the Salish Sea to assess the pelagic ecosystem. The survey particularly assess the distribution and abundance of local stocks of Pacific Hake and Walleye Pollock, as well as Pacific Herring and other pelagic species within the open water of the Strait of Georgia and Jervis, Toba, and Bute Inlets.

Objectives

1. Estimate the abundance and distribution of pelagic and demersal species using fisheries acoustics techniques;
2. Collect midwater trawl samples to verify species composition of acoustic marks, collect biological samples to estimate fish size and conditions, and collect oceanographic data to better understand distribution and movements; and
3. Collect information on forage fish species, such as krill and mesopelagic fishes (e.g. myctophids).



Map 1. Study locations.

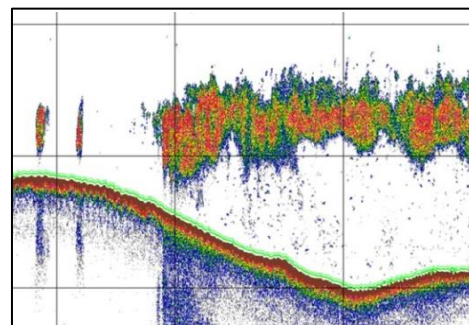


Image 1. Echogram of detected fish schools in the water column.

Collaborators

- Canadian Coast Guard
- National Oceanographic and Atmospheric Administration
 - National Marine Fisheries Service
- Pacific Salmon Foundation
- Canadian Groundfish Research and Conservation Society

FOR MORE INFORMATION

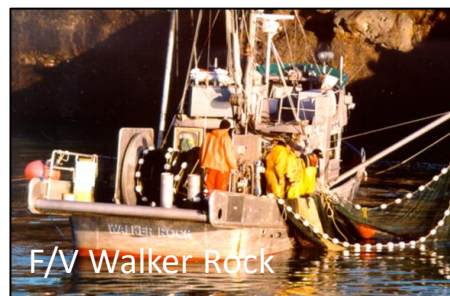


[State of the Pacific Ocean](#)





Dates: September 1 – 30, 2022
Recurrence: Annually, since 1992
Location: Strait of Georgia
Vessel: F/V Walker Rock
Lead scientists: Jennifer Boldt and Matt Thompson
Jennifer.Boldt@dfo-mpo.gc.ca (250) 756-7110
Matthew.Thompson@dfo-mpo.gc.ca (250) 756-7082



Description

This annual survey aims to improve understanding of Pacific Herring (*Clupea pallasii*) recruitment and distribution. Samples will be collected after dusk with a small purse seine at 48 stations along ten transects in the Strait of Georgia. Acoustic data will be collected along transects. Moored acoustic and optic devices will be deployed at selected locations throughout the year to monitor fish movement. This information informs stock assessment, state of the ocean reporting, and research publications.

Objectives

1. Estimate relative biomass of juvenile herring as an indicator of recruitment;
2. Collect biological data and estimate the relative condition of juvenile herring;
3. Examine the prey environment by sampling zooplankton and conducting oceanographic monitoring; and
4. Determine juvenile herring nearshore residence time and habitat use.

Collaborators

- Environment and Climate Change Canada
- Pacific Salmon Foundation
 - Salish Sea Marine Survival Project



Map 1. Study locations.



Image 1. Skipper alongside the purse seine net.

FOR MORE INFORMATION



[State of the Pacific Ocean](#)



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Canada



Dates: April 1 – October 31, 2022
Recurrence: Annually, year two of five (2020 - 2024)
Locations: West Strait of Georgia, Gulf Islands (e.g. Sydney Channel, Cordova Channel)
Vessels: Small inshore boat, rigid inflatable boats
Lead scientist: Stéphane Gauthier (250) 363-6587
Stephane.Gauthier@dfo-mpo.gc.ca



Description

Pacific Sand Lance (*Ammodytes hexapterus*) is an important forage fish species in British Columbia waters. It is a key prey for many predators, including marine birds and Chinook Salmon, and little is known about their population status. This pilot project focuses on the potential detection and monitoring of Pacific Sand Lance using fisheries acoustics technologies.

Objectives

1. Test the use of portable scientific echosounders to detect and discriminate Pacific Sand Lance schools from other fish echoes (such as those from Pacific Herring);
2. Test the use of moored autonomous echosounders to detect and monitor Pacific Sand Lance while they are foraging through the water column; and
3. Test the use of moored autonomous echosounder to detect and monitor Pacific Sand Lance as they are entering and exiting sand substrate.

Collaborators

- Environment and Climate Change Canada



Map 1. Study area.



Image 1. Acoustic mooring before deployment.

FOR MORE INFORMATION



[State of the Pacific Ocean](#)



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Canada



Dates: September 17 – October 4, 2022
Recurrence: Annually, since 2016
Locations: Queen Charlotte Sound, Johnstone Strait, Strait of Georgia
Vessel: CCGS Vector
Lead scientist: Janet Lohead (250) 756-7139
Janet.Lohead@dfo-mpo.gc.ca



Description

These multispecies benthic invertebrate SCUBA surveys collect size and abundance data on sea urchins, sea cucumbers, pycnopus sea stars and northern abalone (a species at risk), as well as benthic habitat data on algae and substrate.

The data are used for invertebrate stock assessments, habitat mapping, species distribution modeling, emergency response planning and Marine Protected Areas monitoring.



Map 1. Study area.

Objectives

1. Collect the data necessary to evaluate stock status relative to reference points for selected benthic invertebrate species; and
2. Collect long-term data to monitor benthic invertebrate populations and their habitats over time.

Collaborators

- T'soo-ke Nation
- Songhees Nation
- Scia'new First Nation
- Esquimalt Nation
- A-Tlegay Fisheries Society
- Canadian Coast Guard



Image 1. Divers collecting invertebrate, algae, and substrate data along a transect line.

FOR MORE INFORMATION



[Giant Red Sea Cucumber](#), [Red Sea Urchin](#) and [Northern Abalone](#)





Dates: September 7 – 17, 2022
Recurrence: Annually, since 2013
Locations: West Coast Vancouver Island
Vessel: CCGS Vector
Lead scientist: Joanne Lessard (250) 756-7139
Joanne.Lessard@dfo-mpo.gc.ca



Description

There is a general lack of data on shallow benthic habitats throughout the British Columbia coast. This Benthic Habitat Mapping survey will document substrate types and associated algae and marine invertebrate species in order to map benthic habitat along the nearshore region of the British Columbia coast. Data will feed directly into existing marine spatial initiatives and provide an ecosystem approach to dive fishery stock assessment.



Map 1. Study area.

Objectives

1. Collect qualitative data depth on shallow benthic habitat up to a 20-metre depth, including ~ 100 species of invertebrates, ~ 50 species of algae as well as other substrate information; and
2. Define and map biological communities and nearshore habitats.

Collaborators

- Canadian Coast Guard



Image 1. Divers collecting invertebrate, algae, and substrate data along a transect line.

FOR MORE INFORMATION



[Canadian Technical Report of Fisheries and Aquatic Sciences 3278](#)





Dates: September 6 – 19, 2022
Recurrence: One year only
Locations: Cobb, Brown Bear, Eickelberg, Vance and Warwick Seamounts
Vessel: CCGS John P. Tully
Lead scientist: Chris Rooper (250) 756-7050
Chris.Rooper@dfo-mpo.gc.ca



Description

This joint Canada-U.S. survey will deploy underwater cameras to examine the distribution of deep-sea corals, sponges, fishes and benthic invertebrates at four seamounts in international waters of the North Pacific. The study will contribute to our knowledge of seamount ecology and management of international fisheries.

Objectives

1. Survey the distribution of deep-sea corals and sponges using a random-stratified survey design and estimate the population abundance for dominant species;
2. Groundtruth model predictions of the distribution of deep-sea corals and sponges on seamounts in the eastern North Pacific Ocean;
3. Collect ancillary data on oceanography, environmental DNA and fish-invertebrate associations for seamount fauna.

Collaborators

- Canadian Coast Guard
- National Oceanographic & Atmospheric Administration
 - Alaska Fisheries Science Center
- North Pacific Fisheries Commission
- Russian Federal Research Institute of Fisheries and Oceanography
- Japan National Research Institute of Far Seas Fisheries

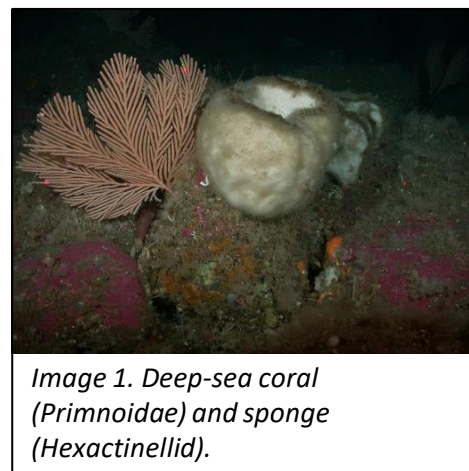


Image 1. Deep-sea coral (Primnoidae) and sponge (Hexactinellid).

FOR MORE INFORMATION



Contact the Lead Scientist at Chris.Rooper@dfo-mpo.gc.ca





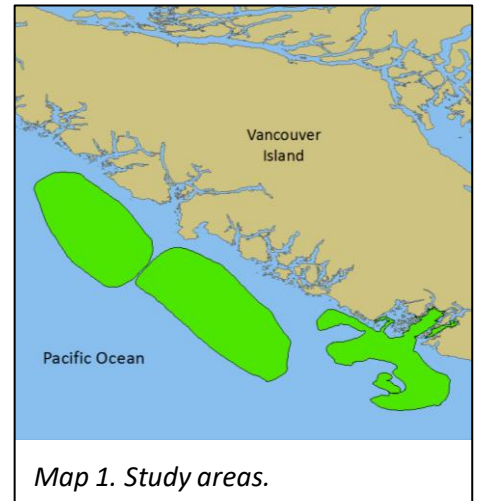
Dates: April 20 – May 12, 2022
Recurrence: Annually, since 1973
Location: West Coast Vancouver Island
Vessel: CCGS Sir John Franklin
Lead scientist: Andres Araujo (250) 327-3209
Andres.Araujo@dfo-mpo.gc.ca



Description

The West Coast Vancouver Island (WCVI) small-mesh multi-species survey was implemented in 1973 and now serves as one of the longest continuous bottom trawl time series for monitoring a diversity of fish and invertebrate species on the west coast of British Columbia.

Data gathered from this survey provide Pink shrimp stock status for management of the commercial shrimp trawl fishery; inform the annual State of the Oceans report, as well as inform stock assessments for groundfish and pelagic fish species.

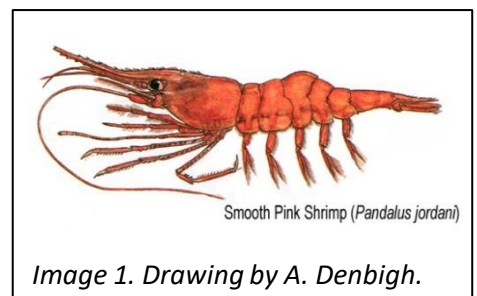


Objectives

1. Index the abundance of Pink shrimp off WCVI using a fishery-independent trawl survey; and
2. Multi-species indexing of other invertebrates, pelagic fish, and groundfish species.

Collaborators

- Canadian Coast Guard



FOR MORE INFORMATION



[State of the Pacific Ocean](#)



Fisheries and Oceans
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Dates: June 7 – 26, 2022
Recurrence: Annually, since 1998
Location: Strait of Georgia
Vessel: CCGS Neocaligus
Lead scientist: Virginia Noble (250) 756-7368
Virginia.Noble@dfo-mpo.gc.ca



Description

Shrimp assessment surveys estimate the abundance of shrimp stocks (Smooth and Spiny Pink shrimp, and Sidestripe shrimp) in select areas. The results from these surveys are used to track long-term trends in abundance of shrimp stocks and to set annual quotas for the commercial shrimp trawl fishery.

Objectives

1. Conduct fishery independent surveys of shrimp grounds using bottom trawl gear to determine stock status of Pink and Sidestripe shrimp in Shrimp Management Areas Fraser, Comox, GSTE and Statistical Areas 16, 18, and 19;
2. Maintain Pink shrimp and Sidestripe shrimp abundance index time series for monitoring trends in abundance; and
3. Collect species distribution and abundance information on other fish and invertebrate species.

Collaborators

- Canadian Coast Guard



Map 1. Study areas.



Image 1. Sidestripe Shrimp (Pandalopsis Dispar).

FOR MORE INFORMATION



[Pacific Region Shrimp Trawl Fishery](#)



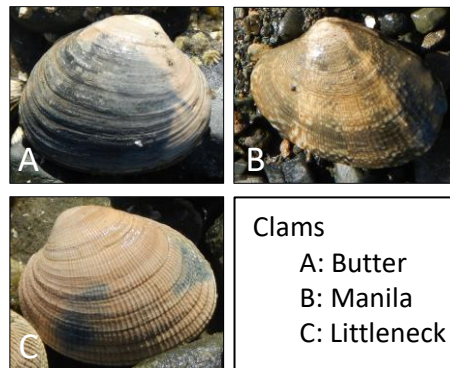
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Canada



Dates: April 18 – August 31, 2022
Recurrence: Annually, since 2021
Locations: West Coast Vancouver Island, Queen Charlotte Sound and Strait, Johnstone Strait, Strait of Georgia, Juan de Fuca Strait
Vessels: Various small craft vessels
Lead scientist: Dominique Bureau (250) 756-7114
Dominique.Bureau@dfo-mpo.gc.ca



Description

Under the revised *Fisheries Act*, intertidal clams (Butter, Littleneck and Manila) in the south coast of British Columbia require biological reference points to ensure they can be maintained at sustainable levels. These surveys collect data at select indicator beaches to establish biological reference points and measure clam abundance.

Objectives

1. Collect population dynamics data (for example, counts, weights, lengths, ages, etc.) at indicator beaches;
2. Establish a time series of abundance; and
3. In the next few years, develop limit reference points and monitor the abundance of clam stocks.

Collaborators

- K'ómoks and Ka:'yu:'k't'h'/Che:k'tles7et'h' First Nations
- Ahousaht and Toquaht Nations
- Nuchatlaht Tribe, Nuuchah-nulth Tribal Council, and Uu-a-thluk Fisheries
- A-Tlegay Fisheries Society



FOR MORE INFORMATION



[Pacific Region Intertidal Clam](#)





Dates: April 15 – September 30, 2022
Recurrence: Every few years, since 2010 / annually since 2017
Locations: Transfer Beach (Ladysmith), Swy-a-lana Lagoon (Nanaimo); Hillier Island, Harris Point, Joes Bay (Barkley Sound), and Port Eliza (Nootka Sound)
Lead scientist: Erin Herder (250) 756-7114
Erin.Herder@dfo-mpo.gc.ca



Image 1. Counting Olympia Oysters (*Ostrea lurida*).

Description

The Olympia Oyster (*Ostrea lurida*) is one of two oyster species found on the British Columbia coast. The only native oyster on the west coast of North America, the Olympia Oyster is listed under the federal *Species at Risk Act* as a species of Special Concern and is protected under the federal *Fisheries Act*.

The goal of the intertidal beach assessment survey is to monitor Olympia Oyster abundance at select index sites.



Map 1. Study locations.

Objectives

1. Index the relative abundance of Olympia Oysters using a standardized survey protocol.

Collaborators

- Snuneymuxw First Nation
- Stz'uminus First Nation
- Cowichan Tribes
- Toquaht Nation
- Parks Canada



Image 2. Measuring an Olympia Oyster (*Ostrea lurida*).

FOR MORE INFORMATION



Contact the Lead Scientist at Erin.Herder@dfo-mpo.gc.ca





Dates: June 13 – 17, October 10 – 15, 2022
Recurrence: One year only
Locations: Barkley Sound, Strait of Georgia
Vessel: N/A
Lead scientist: Sarah Dudas (250) 327-3501
Sarah.Dudas@dfo-mpo.gc.ca



Image 1. Measuring an Olympia Oyster (*Ostrea lurida*).

Description

Field surveys to test and validate an environmental DNA assay for Olympia oyster (*Ostrea lurida*) presence and abundance. Data will be used to establish and describe an environmental DNA test to measure Olympia Oyster abundance.

The Olympia Oyster is one of two oyster species found on the British Columbia coast. The only native oyster on the west coast of North America, the Olympia Oyster is listed under the federal *Species at Risk Act* as a species of Special Concern and is protected under the federal Fisheries Act.



Map 1. Study area.

Objectives

1. Collect water from sites with known Olympia oyster abundance of varying densities; and
2. Compare the environmental DNA signal with Olympia oyster densities and validate the accuracy of the assay test.

Collaborators

- University of Victoria



Image 2. Counting Olympia Oysters (*Ostrea lurida*).

FOR MORE INFORMATION



Contact the Lead Scientist at Sarah.Dudas@dfo-mpo.gc.ca





Dates: March 13 – 16, 2023
Recurrence: Every 1 to 3 years, since 1995
Location: Juan de Fuca Strait (Fulford Reef east of Victoria)
Vessel: R/V Palmira (24' DFO dive boat)
Lead scientist: Lyanne Curtis (778) 268-3374
Lyanne.Curtis@dfo-mpo.gc.ca



Description

This assessment survey aims to gather data at Green Sea Urchin (*Strongylocentrotus droebachiensis*) Index Sites in order to update the assessment models and stock status, and also to inform the Integrated Fishery Management Plan.

Objectives

1. Collect size distribution and abundance data for green sea urchins to assess stock status and to provide harvest options for the commercial fishery;
2. Gather quantitative description of habitat characteristics including substrate and algae;
3. Gather abundance data for other commercially harvested invertebrate species including Red Sea Urchins, Sea Cucumbers and Geoduck; and
4. Gather size and abundance data for Northern Abalone, a species listed under the *Species at Risk Act*.

Collaborators

- Songhees Nation
- Scia'new First Nation
- T'soo-ke Nation
- Pacific Urchin Harvester Association (PUHA)

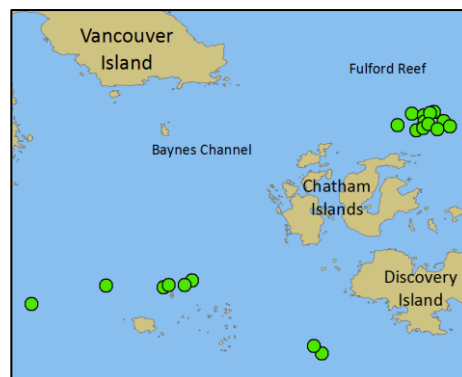


Figure 1. Map of study locations, east of Oak Bay (Victoria, BC).

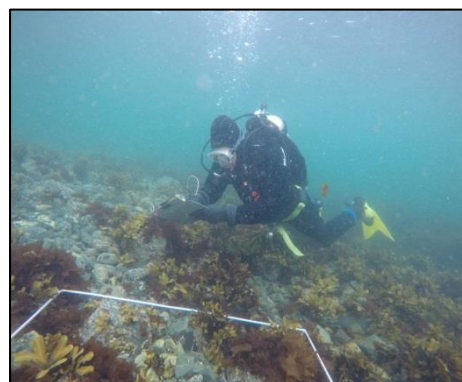


Image 1. DFO Biologist surveying quadrat for green sea urchins.

FOR MORE INFORMATION



[Science Response 2021/036](#)





Dates: May 3 – 9, July 18 – 25, 2022;
February 16 – 22, March 14 – 20, 2023
Recurrence: Annually, since 2015
Location: Strait of Georgia
Vessel: CCGS Neocaligus
Lead scientist: Kelly Young (250) 363-6502
Kelly.Young@dfo-mpo.gc.ca



Description

These surveys of biological and physical sampling at 28 stations throughout the Strait of Georgia aim to improve the understanding of plankton seasonal cycles and year-to-year variability within the Strait of Georgia. These surveys also provide baseline (prey field) data for fisheries research.

Objectives

1. Conduct full depth Conductivity, Temperature, and Depth (CTD) profile including oxygen and fluorometer;
2. Conduct full depth (10m off bottom to surface) zooplankton net tow (preserved in 10% buffered formalin for taxonomy); and
3. At selected stations, collect water samples for salinity, nutrients, and phytoplankton biomass and composition.

Collaborators

- Canadian Coast Guard
- University of British Columbia
- University of Victoria



Map 1. Study locations.



Image 1. Washing down a zooplankton net.

FOR MORE INFORMATION



[State of the Pacific Ocean](#)



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Canada



Harbour Seal Deployment of Satellite Telemetry Tags

51

South
Coast

Dates: March 1 – July 31, 2022
Recurrence: Annually, since 2019
Locations: Queen Charlotte Strait, Strait of Georgia, southern West Coast of Vancouver Island
Vessels: Small DFO vessels
Lead scientist: Strahan Tucker (250) 756-7188
Strahan.Tucker@dfo-mpo.gc.ca



Description

Harbour Seal population estimates generated from counts taken during aerial surveys need to be corrected for the proportion of animals in the water and not counted. A correction factor is developed by following the behavior of a sample of satellite-tagged seals. The last tags were deployed in the 1990's. This project will update correction factors by deploying satellite tags and tracking seal behavior over several months.

Objectives

1. Capture harbour seals with nets at seal haulouts;
2. Temporarily attach satellite tags (20 tags total) to fur of harbor seals; these tags will relay summaries of the wet-dry sensor during their deployment;
3. Recover satellite tags when shed during the annual fall moult;
4. Calculate correction; and
5. Using seal dives and movements, assess the amount of time seals spent foraging, and model foraging movements to reveal seal predation hotspots.



Map 1. Study locations.



Image 1. Harbour Seal (*Phoca vitulina*) seal with satellite instrument.

FOR MORE INFORMATION



[Science Advisory Report 2009/011](#)



Fisheries and Oceans
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Canada



Dates: April 1 – November 30, 2022
Recurrence: Annually, since 2015 (varying areas)
Locations: Queen Charlotte Strait, Strait of Georgia, southern West Coast of Vancouver Island
Vessels: Small DFO vessels
Lead scientist: Strahan Tucker (250) 756-7188
Strahan.Tucker@dfo-mpo.gc.ca



Description

Diets can be estimated from an analysis of scats through both hard-part (bones) identification and genetic DNA analysis, as well as from biochemical analysis of blubber and skin samples obtained through biopsying of live animals. This survey will collect biopsies and scats from Harbour Seals, Steller Sea Lions and California Sea Lions on a monthly basis from spring through fall at key locations and along salmon migratory pathways. The goal is to estimate competition between pinnipeds and Resident Killer Whales for salmon prey.



Map 1. Study locations.

Objectives

1. Approach select Harbour Seal and sea lion haulouts slowly by small vessel and obtain biopsy using a light-weight dart fired from a crossbow;
2. Carefully move animals off their haulouts in an orderly fashion and collect and freeze scats individually;
3. In the laboratory, separate hard parts from the scat matrix and extract the remaining material for DNA analysis; undertake stable isotope and fatty acid analysis of biopsy; and
4. Estimate the fish and invertebrate composition of the diet for each scat and each sample.



Image 1. Preparation of scat for hard part analysis.

FOR MORE INFORMATION



Contact the Lead Scientist at Strahan.Tucker@dfo-mpo.gc.ca





Dates: April 1, 2022 – March 31, 2023
Recurrence: One year only
Location: Seabird Rocks, Pacific Rim National Park
Vessel: N/A
Lead Scientist: Strahan Tucker (250) 756-7188
Strahan.Tucker@dfo-mpo.gc.ca



Description

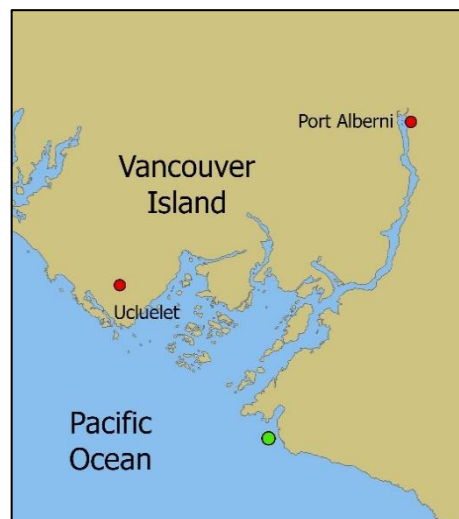
A one-year deployment of autonomous cameras at Seabird Rocks, Pacific Rim National Park Reserve, will collect photos to assess the daily variation in haulout numbers as well as to identify branded animals in support of an on-going NOAA-led Steller sea lion program. The photos will also capture the seasonal presence and abundance of California Sea Lions in British Columbia waters and gauge species interactions. Finally, the photos will be used to test and refine computer-automated counting software with mixed Steller and California Sea Lion species.

Objectives

1. Install cameras close to the existing navigation aid, with each camera facing a different angle to capture the entire haulout;
2. Retrieve the cameras one year after deployment and undertake image analysis;
3. Obtain daily counts of Steller and California Sea Lions; and
4. Generate a list of branded animals.

Collaborators

- Parks Canada
- North Pacific Wildlife Consulting



Map 1. Study location.



Image 1. Steller Sea Lion haulout.

FOR MORE INFORMATION



Contact the Lead Scientist at Strahan.Tucker@dfo-mpo.gc.ca





Dates: June 1 – September 15, 2022
Recurrence: Annually, since 2022
Locations: Johnstone Strait, Queen Charlotte Strait, Queen Charlotte Sound, Juan de Fuca Strait, Swiftsure / La Pouse Bank
Vessels: R/V Merlin, Great Northern, & Charley C.
Lead scientist: Sheila J Thornton (604) 364-5917
Sheila.Thornton@dfo-mpo.gc.ca



Image 1. Humpback Whale (*Megaptera novaeangliae*).

Description

Physiological biomarkers, body condition and metabolic rate of Humpback Whales (*Megaptera novaeangliae*) are measured to improve understanding of physiological processes and how they relate to nutritional and reproductive states of Humpback Whale. Breath samples are collected with drones, biopsies with a crossbow, and fecal with a fine-mesh nets. These samples allow for a comprehensive assessment of metabolic needs and reproductive state of the whales.



Map 1. Study areas.

Objectives

1. Collect breath, fecal, and biopsy samples from individuals for a comprehensive assessment of physiological parameters; and
2. Collect body and breath photos from a drone to evaluate body condition and estimate metabolic rate and energy needs.



Image 2. Drone launching from Zodiac.

FOR MORE INFORMATION



Contact the Lead Scientist at Sheila.Thornton@dfo-mpo.gc.ca





Dates: April 1, 2022 – March 31, 2023
Recurrence: Annually, year three of five (2020 - 2024)
Locations: Strait of Georgia, Juan de Fuca Strait, Swiftsure Bank
Vessel: M/V Manyberries
Lead scientists: Christie McMillan, Thomas D.-Valcroze
Christie.McMillan@dfo-mpo.gc.ca (236) 330-1435
Thomas.Doniol-Valcroze@dfo-mpo.gc.ca (250) 729-8375



M/V Manyberries

Description

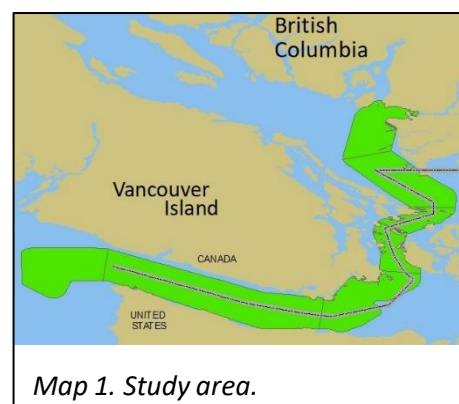
This project addresses data gaps on the seasonal abundance, distribution, and behaviour of whales, dolphins, and porpoises in the southern Salish Sea and Swiftsure Bank. Data collected will lead to an improved understanding of vessel strike risk to these populations.

Objectives

1. Collect abundance and distribution data through monthly boat-based cetacean surveys;
2. Deploy and recover data-logging tags on Humpback Whales to gain insight into dive behaviour and habitat use;
3. Deploy and recover passive acoustic recorders to supplement visual survey efforts and inform porpoise distribution and habitat use; and
4. Obtain photo-identification data and genetic samples from Humpback Whales.

Collaborators

- Cascadia Research Collective
- University of Victoria



Map 1. Study area.



Image 1. Humpback Whale (*Megaptera novaeangliae*) with data-logging tag.

FOR MORE INFORMATION



Contact Christie.McMillan@dfo-mpo.gc.ca or Thomas.Doniol-Valcroze@dfo-mpo.gc.ca





Dates: July 1 to August 31, 2022, and opportunistically throughout the year

Recurrence: Annually, year five of five (2018 - 2022)

Locations: Gulf Islands, Fraser River mouth, Juan de Fuca Strait, Swiftsure / La Perouse Bank

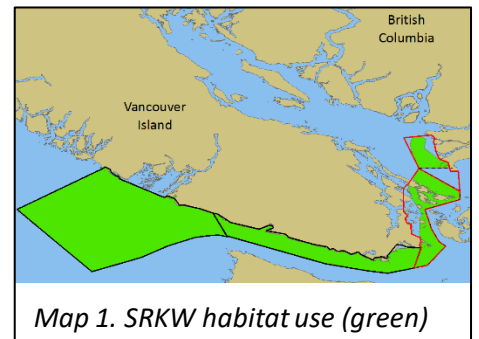
Vessels: Zodiac Hurricanes (7 m)

Lead scientist: Sheila J Thornton (604) 364-5917
Sheila.Thornton@dfo-mpo.gc.ca



Description

Behavioural assessment of Southern Resident Killer Whales (SRKW) individuals to improve understanding of habitat use patterns and identify key foraging areas. Prey sampling, fecal sampling, breath sampling, and drone imaging inform foraging efficiency, prey selection and physiological parameters.



Objectives

1. Using visual and acoustic methods to locate SRKW, identify behavioural state and collect photo-identifications of individuals encountered;
2. Collect prey samples from sharing events during encounters where whales are foraging;
3. Collect information on vessel presence in the vicinity of whales;
4. Collect fecal and breath samples from SRKW; and
5. Collect overhead images of the whales using drones.

Collaborators

- National Oceanic and Atmospheric Administration
- Ocean Wise Conservation Association
 - Coastal Ocean Research Institute



Images 1 and 2. Field crew on SRKW habitat use project.

FOR MORE INFORMATION



Science Advisory Reports [2017/011](#) and [2021/025](#), and [Research Document 2021/058](#)





Chinook Salmon-Killer Whale Interactions Tagging Operations

57

South
Coast

Dates: April 1 – September 1, 2022
Recurrence: Annually, year three of three (2020 - 2022)
Locations: Juan de Fuca Strait, Swiftsure Bank
Vessels: CCGS Franklin, CCGS Tully, charter vessel
Lead scientist: Cameron Freshwater (250) 756-7092
Cameron.Freshwater@dfo-mpo.gc.ca



Description

An initiative to deploy, service, and recover moorings with passive acoustic receivers that track Chinook Salmon movements and survival.

Data from this initiative will inform understanding of the interactions between different Chinook Salmon stocks and with Northern and Southern Resident Killer whales in identified critical habitat.

Objectives

1. Deploy and recover moorings with acoustic receivers;
2. Detect transmitters attached to tagged adult Chinook Salmon;
3. Estimate stock-specific residence time in designated killer whale critical habitat and salmon survival rates during return migrations; and
4. Improve understanding of fine scale Chinook Salmon behavior using depth data collected by tags.

Collaborators

- Canadian Coast Guard
- National Oceanographic & Atmospheric Administration
 - National Marine Fisheries Service
- University of British Columbia

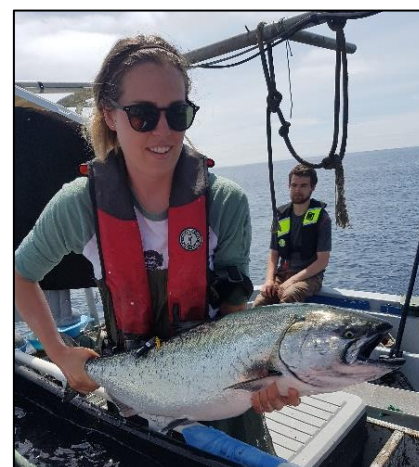


Image 1. Tagged Chinook Salmon (Oncorhynchus tshawytscha) prior to release.

FOR MORE INFORMATION



Contact the Lead Scientist at Cameron.Freshwater@dfo-mpo.gc.ca



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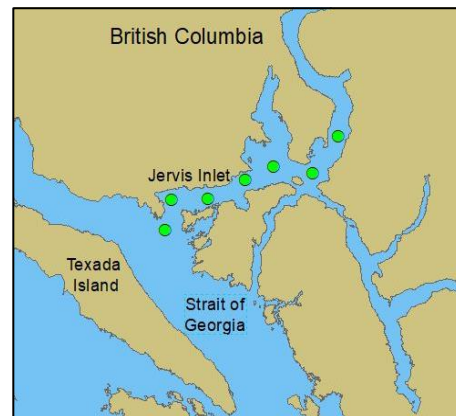


Dates: October 26 – November 6, 2022
Recurrence: Annually, since 2020
Location: Jervis Inlet
Vessel: CCGS Vector
Lead scientist: Terri Sutherland (604) 666-8537
Terri.Sutherland@dfo-mpo.gc.ca



Description

Harmful algal blooms (HABs) have been responsible for mass mortalities of cultured salmonids in British Columbia resulting in financial losses to the aquaculture industry. HABs kill fish through gill damage through toxin production or abrasion of algal spines. This study aims to improve understanding of the conditions that develop and mitigate harmful algal blooms.



Map 1. Study locations.

Objectives

1. Characterize the water-column surrounding aquaculture operations to support a high-technology early-warning HAB detection system and a mitigation system to prevent the mortality of cultured fish in the environment.

Collaborators

- Canadian Coast Guard
- Grieg Seafood BC Ltd.



FOR MORE INFORMATION



Contact the Lead Scientist at Terri.Sutherland@dfo-mpo.gc.ca





Dates: July 10 – 31, 2022
Recurrence: Annually, year one of three (2022 - 2024)
Location: Strait of Georgia
Vessel: R/V Sylvia
Lead scientist: Emily Rubidge (604) 666-8537
Emily.Rubidge@dfo-mpo.gc.ca



Description

This survey will test the utility of Baited Remote Underwater Video (BRUV) systems to detect fish and invertebrate communities at select eelgrass meadows and compare the BRUV results to environmental DNA results. Findings will support marine conservation initiatives and contribute to the development of non-invasive monitoring tools for Marine Protected Areas and other marine conservation areas.

Objectives

1. Test and develop BRUV methods for non-invasive Marine Protected Areas and biodiversity monitoring;
2. Evaluate the effectiveness of eelgrass restoration and compare fish diversity in restored and natural eelgrass meadows;
3. Use environmental DNA approaches as a biomonitoring tool to support and complement other environmental DNA projects; and
4. Support ongoing marine spatial planning initiatives in the Salish Sea.

Collaborators

- SeaChange Marine Conservation Society
- Comox Valley Project Watershed Society



Map 1. Study areas.



Image 1. Crew working with environmental DNA equipment and BRUV systems.

FOR MORE INFORMATION



Contact the Lead Scientist at Emily.Rubidge@dfo-mpo.gc.ca





Dates: August 15 – 28, 2022
Recurrence: Annually, since 2021
Location: Barkley Sound
Vessel: N/A
Lead scientists: Joanne Lessard (250) 714-3799
Joanne.Lessard@dfo-mpo.gc.ca



Description

This kelp monitoring project is part of a collaborative effort in British Columbia aimed at improving understanding the drivers of changes in kelp forests. This dive survey is designed to provide the under the surface data that cannot be collected by remote sensing and kayaks/boats.

Objectives

1. Identify annual changes in understory kelp bed extent;
2. Monitor annual changes in the density and abundance of algae, invertebrate and fish species associated with rocky reefs; and
3. Examine the influence of environmental variables on kelp density, diversity, and possibly productivity.

Collaborators

- Bamfield Marine Sciences Centre



Map 1. Study locations.



Image 1. Luscious kelp forest.

FOR MORE INFORMATION



[Marine Plan Partnership for the North Pacific Coast](#) & [Quadra Centre for Coastal Dialogue](#)





Dates: July 11 – 15, 2022
Recurrence: One year only
Locations: Gabriola Island
Vessel: N/A
Lead scientist: Sarah Dudas (250) 327-3501
Sarah.Dudas@dfo-mpo.gc.ca



Image 1. Intertidal zone.

Description

This survey uses Remotely Piloted Aircraft Systems (RPAS) in combination with traditional survey methods to assess habitat characteristics and biological communities at one or more intertidal beaches. Data will be used to establish RPAS protocols and to investigate the relationship between survey site environmental and biological characteristics.

Objectives

1. Conduct intertidal habitat and biodiversity surveys using two survey methods, RPAS and traditional methods (i.e. quadrats).
2. Test RPAS protocols and methods to optimize data collection during low tide.

Collaborators

- Snuneymuxw First Nation
- Royal Roads University



Map 1. Study area.



Image 2. Intertidal quadrat.

FOR MORE INFORMATION



Contact the Lead Scientist at Sarah.Dudas@dfo-mpo.gc.ca





Dates: May 1 – October 31, 2022
Recurrence: Annually, since 2007
Locations: Strait of Georgia, Juan de Fuca Strait,
West Coast Vancouver Is., Queen Charlotte
Sound & Queen Charlotte Strait, Haida Gwaii
Vessel: N/A
Lead scientist: Thomas Therriault (250) 713-5484
Thomas.Therriault@dfo-mpo.gc.ca

Description

The biofouling on commercial and recreational vessels by Aquatic Invasive Species (AIS) is a major contributor to their coast-wide spread. Through the rotational deployment of settlement plates at both new and long-term sites, this survey seeks to identify the current distribution of sessile AIS in British Columbia waters. Priority areas include the ports of Prince Rupert and Vancouver as they are potential invasion hot spots. Understanding their distribution supports the development of effective management strategies.

Objectives

1. Early detection of new AIS; and
2. Track changes over time in AIS and native sessile species to identify possible impacts of AIS or climate change.

Collaborators

- Council of the Haida Nation, Lax Kw'alaams, Metlakatla, Tsleil-Waututh, Musqueam, Tsawwassen, Squamish, Kitasoo / Xai'xais, Nuxalk, Heiltsuk, and Wuikinuxv Nations
- Coast Mountain College
- Nanaimo Port Authority
- Prince Rupert Port Authority
- Port of Vancouver



Image 1. Settlement plate with native and invasive species.



Map 1. Study locations.



Image 2. Identifying AIS specimens on a settlement plate.

FOR MORE INFORMATION



[State of the Pacific Ocean](#)



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Canada



Dates: April 1 – November 30, 2022
Recurrence: Annually, since 2005 (rotational)
Locations: Straits of Georgia & Juan de Fuca, West Coast Vancouver Is., Queen Charlotte Sd. and Strait, Hecate Strait, Haida Gwaii
Vessel: R/V Styela
Lead scientist: Thomas Therriault (250) 713-5484
Thomas.Therriault@dfo-mpo.gc.ca

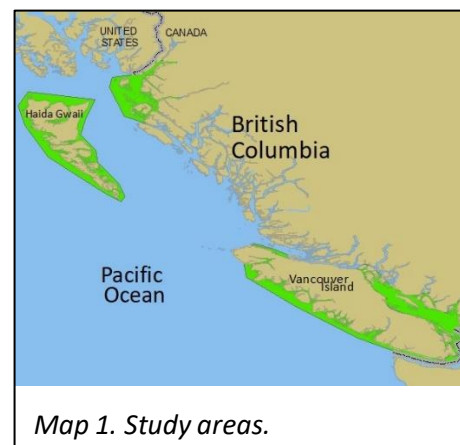


Description

This monitoring informs efforts to prevent the spread of the highly invasive European Green Crab throughout coastal British Columbia. Using folding Fukui fish traps deployed in the intertidal zone, crab populations are tracked, both at sites where European green crabs have become established and at new sites where they could establish in the future. This data will provide insights into the types of habitats and possible impacts of green crab.

Objectives

1. Use knowledge of green crab habitat preferences to improve early detection in the Salish Sea and the Central and North coasts;
2. Advise management/partners about the spread and potential impacts of European green crab.



Map 1. Study areas.



Image 1. Green Crabs (*Carcinus maenas*) caught using Fukui fish traps.

Collaborators

- Council of Haida Nation, Lax Kw'alaams Band, and Metlakatla First Nation
- Parks Canada
- Washington Department of Fish & Wildlife
- University of Washington
- Washington Sea Grant Crab Team
- Coast Mountain College
- Coastal Restoration Society
- Puget Sound Partnership
- Prince Rupert Port Authority

FOR MORE INFORMATION



[State of the Pacific Ocean](#)





Dates: June 1 – September 15, 2022
Recurrence: Annually, year five of five (2018 - 2022)
Location: Juan de Fuca Strait, Swiftsure / La Perouse Bank, Strait of Georgia, Johnstone Strait, Queen Charlotte St., Queen Charlotte Sd.
Vessels: R/V Merlin (7 m) and Charley C (7.5m)
Lead scientist: Tanya Brown (250) 353-9211
Tanya.Brown@dfo-mpo.gc.ca



Description

Southern Resident Killer Whale (SRKW) face significant anthropogenic threats, including from high levels of endocrine disrupting contaminants. This study supports the recovery of this species at risk by evaluating contaminants found in both SRKW and Northern Resident Killer Whales and assessing the contaminant-related health impacts on these two populations.

Objectives

1. Collect breath, fecal, and biopsy samples from individuals;
2. Collect data on body condition from drone imaging to correlate with physiological parameters;
3. Measure and prioritize over 300 contaminants from 6 contaminant classes in resident killer whales; and
4. Assess contaminant-related health impacts in the whales through changes at the protein, steroid hormone, and metabolome level.

Collaborators

- Raincoast Conservation Foundation
- Ocean Wise Conservation Association



Map 1. Study areas.

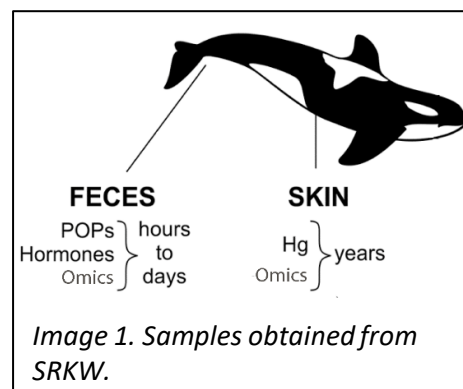


Image 1. Samples obtained from SRKW.

FOR MORE INFORMATION



Contact the Lead Scientist at Tanya.Brown@dfo-mpo.gc.ca





Dates: April 1 – October 7, 2022
Recurrence: Annually, since 1891
Locations: Kitimat Harbour, Queen Charlotte Strait,
East & West Coast Vancouver Is., Jervis
Inlet, Howe Sound, Juan de Fuca Strait
Vessels: CCGS Otter Bay, CSL Shoalseeker, CSL
Kalman L. Czotter
Lead scientist: Stacey Verrin (250) 363-6377
Stacey.Verrin@dfo-mpo.gc.ca



Description

Mapping of the seabed and collection of bathymetry to enhance navigation safety with periodic tide gauge servicing.

Objectives

1. Collect multibeam bathymetry to improve navigational charts and products and aid scientific research;
2. Detect and classify subsurface shipping hazards;
3. Deploy and service tide gauges to support bathymetric surveying and Canadian Hydrographic Services water levels network;
4. Collect acoustic data to determine seabed classification for navigation and scientific research; and
5. Capture laser scanner data for coastline delineation and shoreline features.

Collaborators

- WSÁNEĆ Leadership Council
- Natural Resources Canada (NRCAN)
 - Geological Survey of Canada
- Canadian Coast Guard
- Parks Canada
- Environment and Climate Change Canada



Map 1. Study locations.

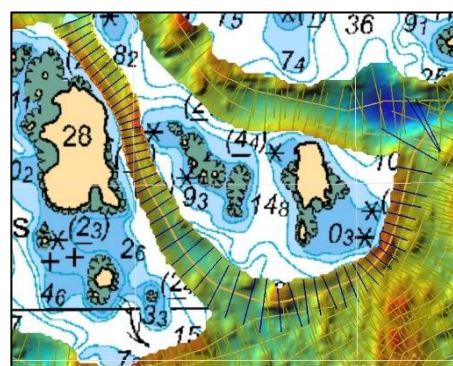


Image 1. Survey data capture, McMullin Group (Queens Sound).

FOR MORE INFORMATION



[Canadian Hydrographic Service non-navigational bathymetric data \(NONNA-10 and 100\)](#)





Dates: April 1, 2022 – March 31, 2023
Recurrence: Annually, since 1893
Locations: Various coastal locations in British Columbia
Vessel: N/A
Lead scientist: Stacey Verrin (250) 363-6377
Stacey.Verrin@dfo-mpo.gc.ca



Image 1. Campbell River permanent gauge station.

Description

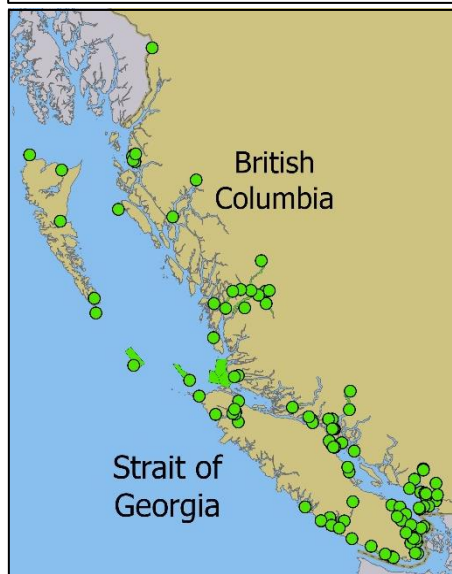
Installation and maintenance of temporary and permanent water level network and current meters in support of navigational safety, tsunami/storm surge response, and provision of real-time data to all clients.

Objectives

1. Service existing permanent water level network infrastructure equipment to provide tidal predictions, observations and forecasts and monitor tsunami and storm surge events. This information is used to create Canadian Tide Tables and is provided via Canadian Hydrographic Service web services;
2. Establish or reoccupy temporary tide gauges to support bathymetric surveying and Canadian Hydrographic Service water levels network, including the Continuous Vertical Datum (CVD) model; and
3. Deploy and service current meters in Prince Rupert, Masset, Kitimat, and Vancouver to support safety to navigational and dynamic hydrographic products.

Collaborators

- Coastal First Nation communities
- Transport Canada, Environment and Climate Change Canada, Natural Resources Canada
- Port of Vancouver, Prince Rupert Port Authority, other port authorities
- Municipalities, cities and property owners



Map 1. Locations of gauges.

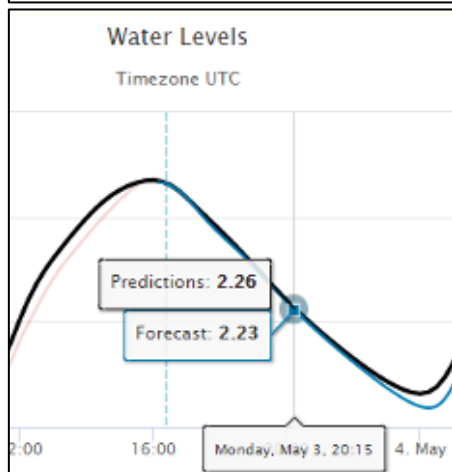


Image 2. [Water Level Tools](#).

FOR MORE INFORMATION



[Canadian Hydrographic Service – Tides, Currents and Water Levels](#)





Dates: July 12 – 25, 2022
Recurrence: Annually, since 1976
Locations: Johnstone Strait, Strait of Georgia, West Coast Vancouver Is., Queen Charlotte & Hecate Strait, Chatham Sd., Haida Gwaii
Vessel: CCGS John P. Tully
Lead scientist: David Spear (236) 464-2073
David.Spear@dfo-mpo.gc.ca

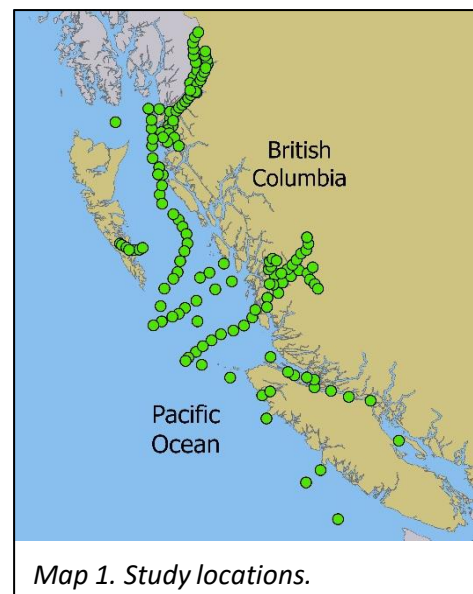


Description

This cruise is responsible for the deployment, recovery and servicing of oceanographic moorings, as well as collecting water samples. These moorings record tides, currents and water properties in support of long-term environmental monitoring programs.

Objectives

1. Recover, service and deploy oceanographic moorings;
2. Collect water property data and biogeochemical samples;
3. Collect zooplankton, phytoplankton, sediments, and environmental DNA samples; and
4. Deploy surface current tracking drifters.



Map 1. Study locations.

Collaborators

- Canadian Coast Guard
- Parks Canada / Council of the Haida Nation (Gwaii Haanas National Park Reserve)
- Skeena Fisheries Commission
- Environment and Climate Change Canada (Scott Islands National Wildlife Area)
- Hakai Institute
- Smithsonian Institute (Invasive Species)



Image 1. Mooring preparations.

FOR MORE INFORMATION



[State of the Pacific Ocean](#)





Dates: April 6 – 19, 2022
Recurrence: Annually, since 2022
Locations: Fisher, Dean & Burke Channels, North & South Bentinck Arms, Queen Charlotte Strait inlets, Strait of Georgia
Vessel: CCGS Vector
Lead scientist: Sophia Johannessen and David Spear
Sophia.Johannessen@dfo-mpo.gc.ca (250) 363-6616
David.Spear@dfo-mpo.gc.ca (250) 363-6581



Description:

Oceanographic monitoring of the British Columbia Coastal Inlets provides baseline measurements of physical and geochemical conditions in these areas. This information helps monitor the effects of climate change and other anthropogenic impacts on British Columbia's coastal waters. The cruise will cover one section of the coast each year.

Objectives

1. Collect water samples for analysis of nutrients, oxygen, organic carbon and suspended particles;
2. Measure temperature and salinity to determine circulation and mixing patterns in the inlets;
3. Collect sediment cores to determine rates of sedimentation and burial of organic carbon; and
4. Investigate long-term trends in primary production at the bottom of the food chain.

Collaborators

- Canadian Coast Guard



Map 1. Study locations.



Image 1. Deployment of sampling equipment.

FOR MORE INFORMATION



Contact Sophia.Johannessen@dfo-mpo.gc.ca or David.Spear@dfo-mpo.gc.ca





Dates: April 1, 2022 – March 31, 2023
Recurrence: Varied, since 1910s
Locations: Dixon Entrance, Hecate Strait, Queen Charlotte Sound, Strait of Georgia, Juan de Fuca Strait, West Coast Vancouver Island
Lead scientist: Peter Chandler (236) 464-3338
Peter.Chandler@dfo-mpo.gc.ca



Image 1. Lighthouse at Chrome Island.

Description

The British Columbia Shore Station Oceanographic Program collects daily sea surface temperature and salinity data at 12 shore stations on the coast of British Columbia. This is a long-term dataset with over 100 years of data from some stations. All shore stations are staffed by Fisheries and Oceans Canada, except Race Rocks and Amphitrite Point which are sampled by contracted observers.



Map 1. Study locations.

Objectives

1. Continue the time series of observations to use as an indicator of changes in the physical environment as part of Fisheries and Oceans Canada's State of the Ocean reporting; and
2. Continue the time series of observations in support of fisheries and ecosystems management programs, for example by estimating the northern diversion of returning Fraser River salmon, and monitoring hazardous algal blooms.



Image 2. Sampling water at Amphitrite Point.

FOR MORE INFORMATION



[State of the Pacific Ocean](#) and [Open Government Portal](#)





Dates: April 1, 2022 – March 31, 2023
Recurrence: Annually, since 2019
Locations: West Coast Vancouver Island and Queen Charlotte Sound
Vessels: Autonomous vehicles
Lead scientist: Tetjana Ross (250) 363-6438
Tetjana.Ross@dfo-mpo.gc.ca



Description:

Fisheries and Oceans Canada uses underwater glider technology to collect continuous, high-resolution data for ocean monitoring, prediction and other research purposes. Gliders can be operated without vessels and in all weather conditions. Data are collected continuously along three glider monitoring lines in collaboration with the Canadian-Pacific Robotic Ocean Observing Facility ([C-PROOF](#)) and are available in real-time.

Objectives

1. Improve understanding of understudied medium-scale flows and boundary currents along the coast of British Columbia;
2. Improve understanding of coastal currents and hypoxia in Queen Charlotte Sound; and
3. Fill in gaps in oceanographic monitoring during the stormy winter season.

Collaborators

- Universities of Victoria and British Columbia
- Hakai Institute
- International Year of the Salmon
- Tofino Coast Guard Station



Map 1. Study locations.



Image 1. Underwater photo of glider Mike sampling in Queen Charlotte Sound.

FOR MORE INFORMATION



[Current Glider Deployments](#) and [Hakai Glider Video](#)





Dates: August 13 – September 5, 2022
Recurrence: Every 1 to 2 years, since 1995
Locations: West Coast Vancouver Island, Queen Charlotte Strait and Sound, Hecate Strait, Dixon Entrance, Haida Gwaii
Vessels: CCGS Sir John Franklin, Bell M. Shimada
Lead scientist: Stéphane Gauthier (250) 363-6587
Stephane.Gauthier@dfo-mpo.gc.ca



Description

The fisheries acoustic trawl survey is the primary source of fishery-independent data informing the stock assessment of Pacific hake along the West Coast of Canada and the U.S. This stock is jointly managed by Canada and the U.S. under the international Pacific Hake / Whiting Treaty. The survey occurs coastwide in odd years and at a select locations only for research purpose in even years.

Objectives

1. Estimate the abundance and distribution of Pacific Hake along the West Coast using fisheries acoustics techniques;
2. Collect midwater trawl samples to verify species composition of acoustic marks, collect biological samples to estimate fish size and conditions, and collect oceanographic data to better understand distribution and movements;
3. Collect information on prey species, such as krill and mesopelagic fishes.

Collaborators

- Canadian Coast Guard
- National Oceanographic and Atmospheric Administration
 - National Marine Fisheries Service



Map 1. Study locations.

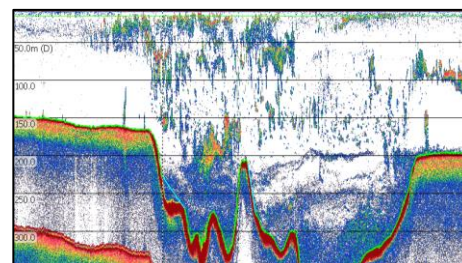


Image 1. Echogram of detected fish schools in the water column.

FOR MORE INFORMATION



[Pacific Hake / Whiting Treaty](#)



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Canada



Dates: October 1 – November 21, 2022
Recurrence: Annually, since 2003
Locations: West Coast of Vancouver Island, Queen Charlotte Sound, West Coast of Haida Gwaii, mainland inlets
Vessel: Chartered commercial trap vessel
Lead scientist: Malcolm Wyeth (778) 268-1184
Malcolm.Wyeth@dfo-mpo.gc.ca



Map 1. Study areas.

Description

This fishing survey uses standardized longline trap gear to capture Sablefish for tag and release and provide a stock abundance index. Detailed biological data are also collected from sablefish and selected rockfish species. Each year, approximately 90 randomly selected offshore locations as well as 20 specific sites in mainland inlets are fished.

These data provide annual estimates of harvestable biomass that inform the fishery and are incorporated into stock assessments, status reports, and research publications.

Objectives

1. Collect detailed species composition data from each set;
2. Tag and release sablefish from each set;
3. Collect detailed size and sex composition data as well as ageing structures and tissue samples from Sablefish and selected offshore rockfish species; and
4. Collect environmental and gear movement data using temperature-depth recorders attached to the fishing gear.



Image 1. Sablefish (*Anoplopoma fimbria*).

Collaborators

- Wild Canadian Sablefish Ltd

FOR MORE INFORMATION



Contact the Lead Scientist at Malcolm.Wyeth@dfo-mpo.gc.ca





Dates: February 15 – April 30, 2022
Recurrence: Annually, since 1972
Locations: Strait of Georgia, West Coast Vancouver Is.,
Queen Charlotte Sd, Dixon Entrance, Haida Gwaii
Vessels: Various seine vessels
Lead scientist: Jaclyn Cleary (250) 616-7009
Jaclyn.Cleary@dfo-mpo.gc.ca



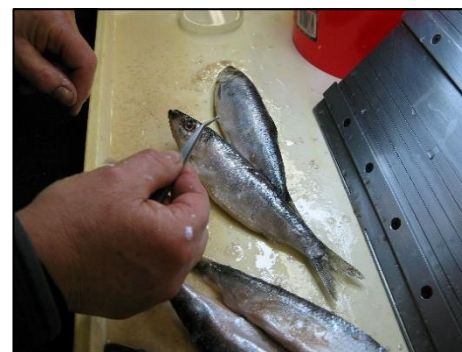
Seine vessel

Description

These surveys aim to collect biological samples from pre-spawning aggregations of Pacific Herring throughout the British Columbia coast. Monitoring of herring biology helps track changes in age and growth which informs stock status.

Objectives

1. Identify pre-spawning aggregations of herring in each stock area using vessel-based sounders;
2. Use a purse seine to hold herring and collect herring sample (~100 fish) using a hoop net; or use a cast net to sample herring in nearshore habitats;
3. Transport herring sample to laboratory where data on age, length, weight, sex, and maturity is gathered;
4. Use equations to estimate the size and age distribution of herring for each area; and
5. Provide data for stock assessment.

*Map 1. Study areas.**Image 1. Removing Pacific Herring (Clupea pallasii) scales for age sampling.*

Collaborators

- Kitsoo / Xai'xais and Heiltsuk Nations
- Nuchatlaht, Ehattesaht, Mowachaht-Muchalaht, Hesquiaht, Toquaht, and Huu-ay-aht Nations
- Nuuchah-nulth Tribal Council
- A-Tlegay Fisheries Society
- Herring Conservation and Research Society

FOR MORE INFORMATION



[2021 Pacific Herring Survey Data Summaries](#)





Dates: March 1 – April 30, 2022
Recurrence: Annually, since 1951
Locations: Strait of Georgia, West Coast Vancouver Is.,
Queen Charlotte Sd, Dixon Entrance, Haida Gwaii
Vessels/planes: Seine vessels, dive skiffs, float planes
Lead scientist: Jaclyn Cleary (250) 616-7009
Jaclyn.Cleary@dfo-mpo.gc.ca



Image 1. SCUBA divers measuring Herring spawn.

Description

Monitoring of Pacific Herring spawn (egg deposition) helps to track changes in stock abundance. These surveys aim to measure herring spawn on kelps and eelgrasses in intertidal / subtidal habitats using SCUBA surveys.

Objectives

1. Identify herring spawning activity from float planes and from small vessels (First Nation charters);
2. Confirm the presence of herring eggs and measure egg layers, substrate type, and coverage within quadrats placed along transects that are perpendicular to shore;
3. Calculate egg biomass for each spawn and from that use equations to estimate the number of adult spawners for each area; and
4. Map herring spawning and provide data for stock assessment.



Map 1. Study areas.



Image 2. Pacific Herring (Clupea pallasii) spawn.

Collaborators

- Council of Haida Nation, Kitasoo / Xai'xais, Heiltsuk, and Gwa'sala-'Nakwaxda'xw Nations
- Nuchatlaht, Ehattesaht, Mowachaht-Muchalaht, Hesquiaht, Toquaht, and Huu-ay-aht Nations
- Nuuchah-nulth Tribal Council
- A-Tlegay Fisheries Society; Musgamagw Dzawada'enuxw Tribal Council
- Herring Conservation and Research Society

FOR MORE INFORMATION

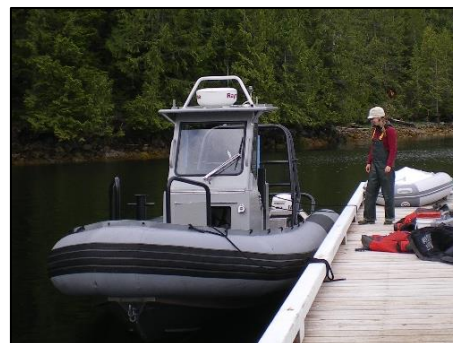


[2021 Pacific Herring Survey Data Summaries](#)





Dates: June 15 –22, 2022
Recurrence: Annually, since 2001
Locations: Central Coast, Queen Charlotte Sound and Strait, West Coast Vancouver Island
Vessels: 5.5-m welded aluminum or 6.5-m rigid hull inflatable boats
Lead scientists: Linda Nichol, Thomas Doniol-Valcroze
Linda.Nichol@dfo-mpo.gc.ca (250) 616-1706
Thomas.Doniol-Valcroze@dfo-mpo.gc.ca (250) 729-8375



Description

This Sea Otter assessment collects data to inform estimates of population abundance, growth and distribution in British Columbia. Annual surveys are conducted in a core index area (with a 40-year longitudinal time series). Additional areas in the occupied range will be surveyed for trends, abundance, and distribution.

Objectives

1. Conduct surveys of the Sea Otter population over the range using standardized approach with 2-3 observers and a boat driver;
2. Search complex areas with binoculars and obtain counts of the number of animals in rafts; and
3. Develop and improve the field methodology utilizing Unmanned Aerial Vehicle technology with the aim to improve efficiency of counting rafts.

Collaborators

- Vancouver Island University



Map 1. Study areas.

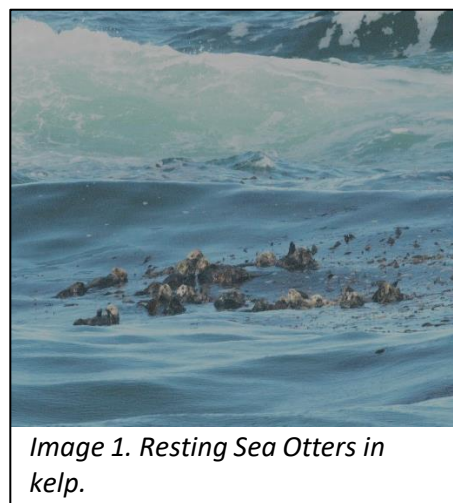


Image 1. Resting Sea Otters in kelp.

FOR MORE INFORMATION



[Science Advisory Report 2020/036](#)





Dates: June 28 – July 11, 2022
Recurrence: Annually, since 2002
Locations: West Coast Vancouver Island, West Coast Haida Gwaii
Vessel: CCGS Tully
Lead scientists: Thomas Doniol-Valcroze, Linda Nichol
Thomas.Doniol-Valcroze@dfo-mpo.gc.ca (250) 729-8375
Linda.Nichol@dfo-mpo.gc.ca (250) 729-8374



Description

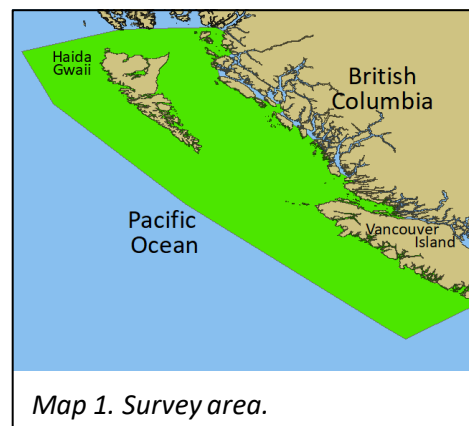
The Cetacean Research Program assesses population abundance and critical habitat of species-at-risk, including several species of large whales. Dedicated surveys have been conducted since 2002 to improve understanding of the distribution of cetaceans and their use of habitats such as sea mounts and troughs.

Objectives

1. Obtain data on distribution and abundance of cetacean species;
2. Deploy and recover acoustic recorders;
3. Increase the number of confirmed sightings of Sei Whales and North Pacific Right Whales;
4. Obtain photo-identification data on several species (e.g. killer whales, Fin Whales, North Pacific Right Whales); and
5. Obtain biopsy samples from several species (e.g. killer whales, Fin Whales, North Pacific Right Whales).

Collaborators

- Canadian Coast Guard
- Parks Canada



FOR MORE INFORMATION



[State of the Pacific Ocean](#)





Dates: June 1 – September 15, 2022
Recurrence: Annually, year five of five (2018 - 2022)
Locations: Johnstone Strait, Queen Charlotte Strait, Queen Charlotte Sound
Vessels: R/V Merlin (7 m) and Charley C (7.5m)
Lead scientist: Sheila J Thornton (604) 364-5917
Sheila.Thornton@dfo-mpo.gc.ca



Description

Physiological assessment of individual Northern Resident and Bigg's Killer Whales to improve our understanding of physiological parameters and how they relate to nutritional and reproductive state, and body condition. Prey sampling, fecal and breath sampling, biopsies and drone imaging inform foraging efficiency, prey selection and define physiological parameters of whales.

Objectives

1. Collect prey samples from sharing events during encounters where whales are foraging;
2. Collect breath, fecal, and biopsy samples from individuals;
3. Collect data on body condition from drone imaging to correlate with physiological parameters.
4. These data will build upon our understanding of foraging behaviour from previous tagging studies.



Map 1. Study areas.



Image 1. Killer Whale (*Orcinus orca*) with suction-cup tag.

Collaborators

- National Oceanic and Atmospheric Administration
- Ocean Wise Conservation Association
 - Coastal Ocean Research Institute

FOR MORE INFORMATION



[Fine scale foraging research](#)





Dates: June 7 – 27, 2022
Recurrence: Annually
Locations: West Coast of Vancouver Island and Haida Gwaii
Vessel: CCGS J. P. Tully
Lead scientist: Tammy Norgard (250) 616-9278
Tammy.Norgard@dfo-mpo.gc.ca



Description

Less than 25% of the Offshore Pacific Bioregion is partially or entirely mapped. This collaborative survey will collect bathymetric data of uncharted seamounts and the associated biological and oceanographic data. Baseline mapping is essential for the management and monitoring of Marine Protected Areas.

Objectives

1. Collect acoustic bathymetry to enable habitat modeling, mapping and verification of seamount locations and depths;
2. Survey the seafloor of seamounts using high-resolution video and still imagery to collect novel data on species and habitats of interest;
3. Revisit long-term monitoring sites;
4. Survey the biological and physical oceanography to improve understanding of the large-scale effects of seamounts on surrounding areas;
5. Test innovative methods for monitoring marine conservation areas; and
6. Livestream real-time deep-sea video and at-sea science communication to local and global audiences.

Collaborators

- Council of the Haida Nation
- Nuu-chah-nulth Tribal Council
- Canadian Coast Guard
- Ocean Networks Canada



Map 1. Study locations.

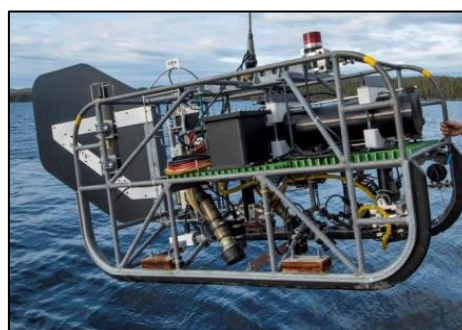


Image 1. The DFO Pacific deep-sea camera and sensor system that can dive to 2 km depth.

FOR MORE INFORMATION



Contact the Lead Scientist at Tammy.Norgard@dfo-mpo.gc.ca





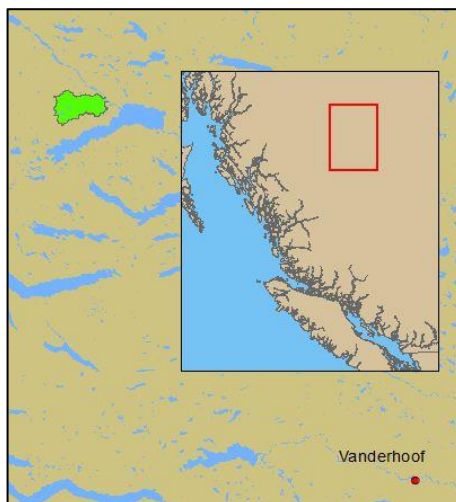
Dates: July 1 – August 30, 2022
Recurrence: Annually, since 2019
Location: Baptiste watershed (north west of Prince George)
Vessel: N/A
Lead scientist: Doug Braun (604) 703-9069
Douglas.Braun@dfo-mpo.gc.ca



Image 1. Aerial view of experimental harvest area.

Description

The Baptiste watershed is an important spawning grounds for Early Stuart Sockeye Salmon (*Oncorhynchus nerka*). This project builds on forest harvest experiments conducted in the Baptiste watershed as part of the Stuart-Takla Fish-Forestry Interaction Project (1990 - 2008) and will assess the long-term impacts of forest harvest practices on headwater stream temperatures. This will improve our understanding of the interaction between forest harvesting and aquatic habitats in interior British Columbia.



Map 1. Study area.

Objectives

1. Replicate previous network of stream temperature monitoring;
2. Quantify the long-term impacts of forestry on stream temperature; and
3. Evaluate the recovery of headwater stream temperatures following forest harvest.

Collaborators

- Simon Fraser University



Image 2. Study stream post harvest.

FOR MORE INFORMATION



Contact the Lead Scientist at Douglas.Braun@dfo-mpo.gc.ca





Dates: April 1 – November 30, 2022
Recurrence: Annually, since 2019
Location: North Thompson River Basin
Vessel: N/A
Lead scientist: Doug Braun (604) 703-9069
Douglas.Braun@dfo-mpo.gc.ca



Image 1. Identifying juvenile salmonids in the field.

Description

This project will assess relationships between terrestrial land use and stream habitat used by juvenile Coho Salmon (*Oncorhynchus kisutch*) for rearing. Over twenty streams will be studied throughout the North Thompson watershed. This work has been developed in conversation with Secwepemc Fisheries Commission and Simpcw First Nation.

Objectives

1. Survey habitat characteristics including water quality, large woody debris, gradient and canopy cover in each study watershed;
2. Monitor streamflow, air and water temperature;
3. Quantify the relationship between terrestrial land use (e.g., forestry and agriculture) and habitat characteristics; and
4. Develop targets for habitat indicators that can be used for planning and management.



Map 1. Study area.



Image 2. Surveying large woody debris.

Collaborators

- Simon Fraser University

FOR MORE INFORMATION



Contact the Lead Scientist at Douglas.Braun@dfo-mpo.gc.ca





Dates: August 15 – October 28, 2022
Recurrence: Annually, since 2021
Location: North Thompson River Basin
Vessel: N/A
Lead scientist: Emma Hodgson (604) 702-8394
Emma.Hodgson@dfo-mpo.gc.ca

Description

In British Columbia's Interior, many different land use activities involve the building of roads and associated stream crossings which may pose barriers to fish passage. This project, developed with the Secwepemc Fisheries Commission and Simpcw First Nation, aims to better understand the extent of potential habitat loss in the North Thompson by assessing culverts throughout the watershed and applying models to determine the extent of potential Coho Salmon (*Oncorhynchus kisutch*) habitat that is inaccessible due to barriers.

Objectives

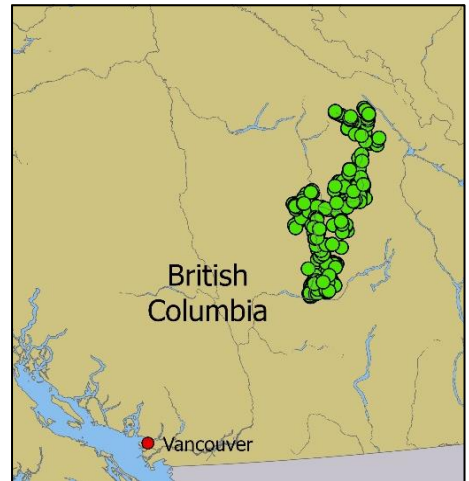
1. Assess culverts across the North Thompson watershed to determine which are barriers to fish passage;
2. Estimate at the watershed scale, the loss of potential fish habitat from barriers; and
3. Work with collaborators to identify priority culverts for proposed remediation.

Collaborators

- Secwepemc Fisheries Commission



Image 1. Perched culvert.



Map 1. Study locations.



Image 2. Staff in the field conducting measurements.

FOR MORE INFORMATION



Contact the Lead Scientist at Emma.Hodgson@dfo-mpo.gc.ca





Dates: October 2022
Recurrence: Annually, since 2014
Locations: West Basin, West Arm, North Arm and East Arm of Quesnel Lake
Vessel: R/V Elvis
Lead scientist: Svein Vagle (250) 363-6339
Svein.Vagle@dfo-mpo.gc.ca



Description

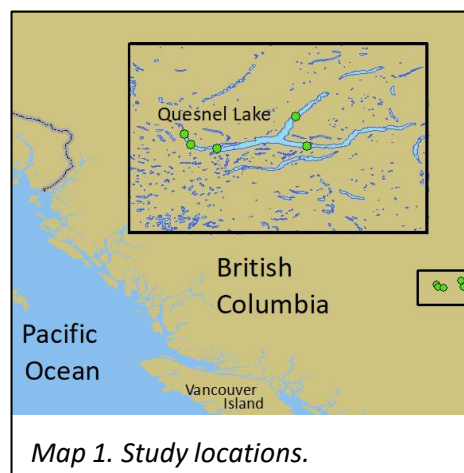
The 2014 breach of the Mount Polley mine tailings impoundment released 25 M m³ of tailings and water into the West Basin of Quesnel Lake, an important Sockeye Salmon nursery lake. Five moorings are maintained in the lake to monitor turbidity, temperatures, and currents in support of research on ecosystem recovery.

Objectives

1. Understand water movement in Quesnel Lake and its three arms;
2. Track sediment transport in the lake;
3. Understand the influence of autumn and spring lake turnover on sediment resuspension; and
4. Track year to year changes in sediment load and how these changes impact the ecosystem in the lake and the downstream Quesnel River, especially for Sockeye and Chinook Salmon.

Collaborators

- University of British Columbia
- University of Northern British Columbia



Map 1. Study locations.



Image 1. Project crew preparing to deploy a mooring.

FOR MORE INFORMATION



[Water Resources Research](#)



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Canada



Dates: April 1 – November 30, 2022
Recurrence: Annually, since 1997
Locations: Fraser River basin, including Stuart, Nechako, Quesnel, Chilcotin, Shuswap, Seton, Harrison, Chilliwack watersheds
Vessel: N/A
Lead scientist: David Patterson (604) 666-5671
David.Patterson@dfo-mpo.gc.ca



Image 1. Testing adult salmon on the Fraser River near Chilliwack.

Description:

Environmental conditions impact salmon migratory and reproductive success. This research on the migration biology of Pacific salmon under variable environmental conditions informs the science advice provided to fisheries and habitat managers.

Objectives

1. Assess biological condition of juvenile and adult Sockeye Salmon in relation to migration conditions in Fraser Basin;
2. Research the impact of migratory stress on salmon survival (e.g. water temperature, fishing interactions, high discharge);
3. Generate quantitative models to forecast in-season estimates of loss for Fraser Sockeye; and
4. Apply research on migratory stress and environmental conditions to describe post-season estimates of mortality and predict in-season estimates of loss for proactive fisheries management.

Collaborators

- Pacific Salmon Commission
- University of British Columbia
- Simon Fraser University
- Lower Fraser Fisheries Alliance and Upper Fraser Fisheries Conservation Alliance



Map 1. Study locations.



Image 2. Sockeye Salmon (Oncorhynchus nerka) at the Adam's River.

FOR MORE INFORMATION



[Environmental Watch Program](#)





Dates: April 1 – July 31, 2022
Recurrence: Annually, year two of three (2021 - 2023)
Location: Fraser River estuary
Vessels: Small rigid inflatable boats
Lead scientist: Tanya Brown (250) 353-9211
Tanya.Brown@dfo-mpo.gc.ca



Description

This project will identify and assess the effects of contaminants to Chinook Salmon in the Fraser River estuary. Findings will enable the development and implementation of effective controls to reduce the inputs of contaminants into the habitat of Fraser Chinook and endangered Southern Resident Killer Whales, thus contributing to the recovery of these two at risk species.

Objectives

1. Measure and prioritize over 400 contaminants from 13 contaminant classes in juvenile Chinook Salmon and their habitat (water, sediment, wastewater effluent); and
2. Assess contaminant-related health impacts in juvenile Chinook through changes at the gene, protein and metabolome level, and evaluate whole organism effects.

Collaborators

- Tsawwassen and Pacheedaht First Nations
- Environment and Climate Change Canada
- Metro Vancouver
- Simon Fraser University
- University of British Columbia
- Raincoast Conservation Foundation
- Ocean Wise Conservation Association



Map 1. Study locations.



*Image 2. Sampling juvenile Chinook Salmon (*Oncorhynchus tshawytscha*).*

FOR MORE INFORMATION



Contact the Lead Scientist at Tanya.Brown@dfo-mpo.gc.ca





Dates: May 1 – November 30, 2022
Recurrence: Annually, year two of four (2021-2024)
Locations: Metro Vancouver and Vancouver Island
Vessel: N/A
Lead scientist: Tanya Brown (250) 353-9211
Tanya.Brown@dfo-mpo.gc.ca



Description

Tire associated contaminants have recently been discovered to be the likely cause of toxic injury and death (40-90%) of adult Coho Salmon returning to urban and semi-urban waterways in Puget Sound, Washington, USA. This research will investigate the impacts of the recently discovered ubiquitous tire rubber antioxidant 6PPD-quinone (N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine) in British Columbia freshwater.

Objectives

1. Characterize the presence and associated risks of tire-derived contaminants in creeks close to semi-urban and urban areas that feed into British Columbia's salmon bearing rivers; and
2. Assess the impacts of tire-derived contaminants, including 6PPD-quinone, on the survival of Coho and Chinook salmon.



Map 1. Study locations.



Image 2. Sampling site.

Collaborators

- Musqueam, Tsleil-Waututh, and Tsawwassen First Nations
- Capital Regional District
- Byrne Creek and Northshore Streamkeepers
- Tynehead Hatchery
- World Fisheries Trust
- Tsolum River Restoration Society

FOR MORE INFORMATION



Contact the Lead Scientist at Tanya.Brown@dfo-mpo.gc.ca





Dates: September 1, 2022 – March 31, 2023
Recurrence: Annually, year one of three (2022 - 2024)
Locations: Lower and Middle Fraser Basin
Vessel: N/A
Lead scientist: Josephine Iacarella (236) 380-0955
Josephine.Iacarella@dfo-mpo.gc.ca

Description

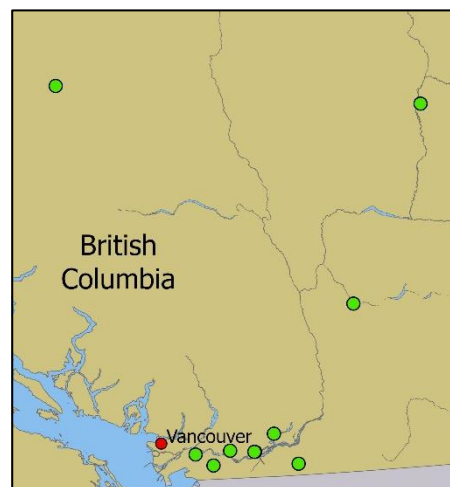
Successful management of critically declining Pacific salmon populations is severely hampered by the persistent lack of vital freshwater habitat use information. This research aims to develop and test environmental DNA (eDNA) methods to determine presence and relative abundance of Chinook and Coho Salmon in the Fraser River basin, and to assess critical habitat use for threatened and endangered populations across life cycle stages.

Objectives

1. Develop relationships between eDNA concentrations, adult and juvenile counts, and stream flow characteristics for a full cycle of life history stages;
2. Evaluate eDNA lab methodologies for abundance estimation;
3. Compare eDNA presence and relative abundance to environmental suitability and landscape stressors to identify priority areas for habitat restoration and conservation; and
4. Develop end-user guide for monitoring salmon in freshwater using eDNA.



Image 1. Sampling eDNA.



Map 1. Study locations.

FOR MORE INFORMATION



Contact the lead scientist at Josephine.Iacarella@dfo-mpo.gc.ca





Dates: April 1 – November 30, 2022
Recurrence: Annually, since 2020
Location: North Thompson River Basin
Vessel: N/A
Lead scientists: Doug Braun and Emma Hodgson
Douglas.Braun@dfo-mpo.gc.ca (604) 703-9069
Emma.Hodgson@dfo-mpo.gc.ca (604) 702-8394



Image 1. Minnow traps set to sample juvenile Coho Salmon.

Description

This project will assess the availability and productivity of tributary and wetland habitats for juvenile Coho Salmon (*Oncorhynchus kisutch*) in the North Thompson watershed. This work has been developed in conversation with Secwepemc Fisheries Commission and Simpcw First Nation.

Objectives

1. Estimate habitat availability and Coho Salmon productivity (population density, age composition, growth and condition) within tributary and off-channel systems;
2. Model the relationship between mainstem flow in the North Thompson and wetland habitat availability; and
3. Develop models of salmon productivity at the watershed scale.



Map 1. Study area.

Collaborators

- Simon Fraser University
- Wilfred Laurier University



*Image 2. Juvenile Coho Salmon (*Oncorhynchus kisutch*) with a yellow Visible Implant Elastomer (VIE) tag.*

FOR MORE INFORMATION



Contact Douglas.Braun@dfo-mpo.gc.ca or Emma.Hodgson@dfo-mpo.gc.ca





Dates: October 1 – December 31, 2022
Recurrence: Annually, since 2020
Location: North Thompson River Basin
Vessel: N/A
Lead scientist: Emma Hodgson (604) 702-8394
Emma.Hodgson@dfo-mpo.gc.ca

Description

Freshwater habitat quality and availability has been identified as a key factor in the decline of interior salmon populations. Understanding of distribution and movement within freshwater systems is limited for many of these populations. This research will identify important freshwater habitat for juvenile Coho Salmon (*Oncorhynchus kisutch*) during rearing and migration within the North Thompson watershed.

Objectives

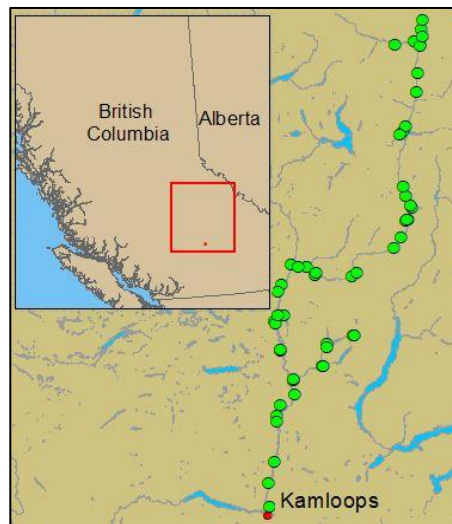
1. Analyze water samples and sculpin (*Cottus sp.*) otoliths for strontium isotopes and elemental concentrations;
2. Develop an isoscape (map of water chemistry using strontium isotopes) that can be used to discern distributions of Coho Salmon and other species (e.g., Chinook Salmon); and
3. Identify rearing and migratory patterns of juvenile Coho Salmon across years using otolith microchemistry from adults that have returned to spawn.

Collaborators

- Simon Fraser University
- University of Utah



Image 1. Confluence of study tributary and the Thompson River.



Map 1. Study locations.



Image 2. Collecting otoliths from Coho Salmon (Oncorhynchus kisutch).

FOR MORE INFORMATION

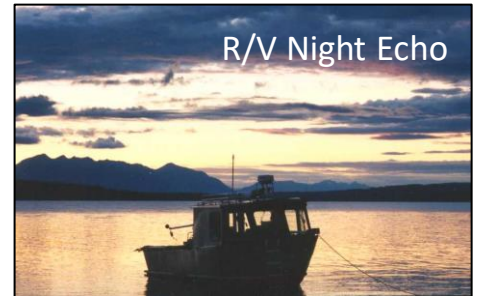


Contact the Lead Scientist at Emma.Hodgson@dfo-mpo.gc.ca





Dates: July 15 – November 15, 2022
Recurrence: Varied, since 1974
Locations: Cultus, Bowron, Fraser, Stuart, Trembleur, and Takla Lakes
Vessel: DFO R/V Night Echo
Lead scientist: Daniel Selbie (604) 824-4702
Daniel.Selbie@dfo-mpo.gc.ca



Description

Rotational surveys of juvenile Sockeye Salmon (*Oncorhynchus nerka*) abundance, diet, and condition in Fraser River nursery lake ecosystems. Data and outputs support the assessment and recovery of aquatic species at risk and fisheries forecasting and management decisions.

Objectives

1. Estimate abundances and densities of juvenile Sockeye Salmon populations in key nursery lake ecosystems;
2. Evaluate growth and survival during lake rearing life stages;
3. Evaluate juvenile Sockeye Salmon diets in relation to lake food webs; and
4. Evaluate juvenile Sockeye Salmon population condition and stock status.



FOR MORE INFORMATION



Contact the Lead Scientist at Daniel.Selbie@dfo-mpo.gc.ca





Dates: May 1, 2021 – November 30, 2022
Recurrence: Varied, since 1985
Locations: Cultus, Babine, Stuart, Trembleur, and Takla Lakes
Vessels: G.E. Hutchinson, K.R.S. Shortreed
Lead scientist: Daniel Selbie (604) 824-4702
Daniel.Selbie@dfo-mpo.gc.ca



Description

Limnological assessments of juvenile Sockeye Salmon (*Oncorhynchus nerka*) nursery lake food webs and productive capacity modeling. Data and outputs support fisheries productive capacity estimates.

Objectives

1. Evaluate Sockeye Salmon food webs in key nursery lake ecosystems;
2. Establish habitat and population-based ecosystem carrying capacities for juvenile Sockeye Salmon;
3. Define freshwater productive capacity limitations for Sockeye Salmon marine and freshwater fisheries;
4. Evaluate anthropogenic and natural habitat drivers on Sockeye Salmon important habitat and fisheries production; and
5. Model nursery lake ecosystem in relation to climate change and variability.



Map 1. Study locations.

Collaborators

- Lake Babine Nation
- Simon Fraser University
- University of Ottawa
- British Columbia Institute of Technology



Image 1. Limnological sampling for water chemistry and plankton.

FOR MORE INFORMATION



Contact the Lead Scientist at Daniel.Selbie@dfo-mpo.gc.ca





Dates: April 1, 2022 – March 31, 2023
Recurrence: Annually, since 1950
Locations: Fraser River basin, including Upper Fraser, Stuart, Nechako, Quesnel, Chilcotin, Thompson, Seton, Harrison, and Chilliwack watersheds
Lead scientist: David Patterson (604) 666-5671
David.Patterson@dfo-mpo.gc.ca



Image 1. Chilcotin river, a salmon migration corridor monitored for temperature.

Description

Monitoring and forecasting of water temperatures in salmon migratory corridors of the Fraser River helps inform fisheries and habitat management.

Objectives

1. Provide water temperature information on migratory conditions for Pacific salmon in Fraser River watershed;
2. Monitor water temperatures in select migratory corridors for Pacific salmon;
3. Analyze water temperature information in relation to changes associated climate and land-use activities; and
4. Forecast water temperatures to predict likelihood of exposure of adult Sockeye Salmon to adverse migration conditions; and input data into mortality models.

Collaborators

- Province of British Columbia
- Environment and Climate Change Canada
- Simon Fraser University



Map 1. Study locations.



Image 2. Real time water temperature logger installation on Stuart River.

FOR MORE INFORMATION



[Environmental Watch Program](#)





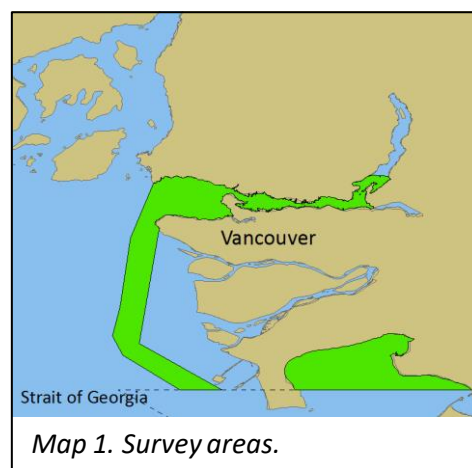
Dates: May 10 – 21, October 12 – 23, 2022
Recurrence: Annually – spring since 1991, fall since 1988.
Locations: Burrard Inlet, Strait of Georgia
Vessel: CCGS Neocaligus
Lead scientist: Brendan Aulhouse (250) 327-3209
Brendan.Aulhouse@dfo-mpo.gc.ca



Description

This project conducts pre- and post-commercial fishery Dungeness crab (*Cancer magister*) surveys in Crab Management Areas I (Fraser River delta) and J (Boundary Bay) to continue the long-term historic record of crab Catch Per Unit Effort (CPUE). The survey also collects data on population structure between years by documenting variability in moult times, breeding times, egg extrusion and release, mortality rates, and provides an accurate record of trap bycatch.

These surveys have been used to investigate the effects of soak duration, bait and trap type, escape port efficiency, and provide tissue samples for toxicological and genetic analyses.



Objectives

1. Collect pre- and post-fishery Dungeness crab biological information, including stock structure, sex ratios, shell condition, injuries, size, CPUE, tissue samples for DNA analysis, and distribution.

Collaborators

- Canadian Coast Guard



FOR MORE INFORMATION



[Pacific Region Crab Fishery](#) and [State of the Pacific Ocean](#)





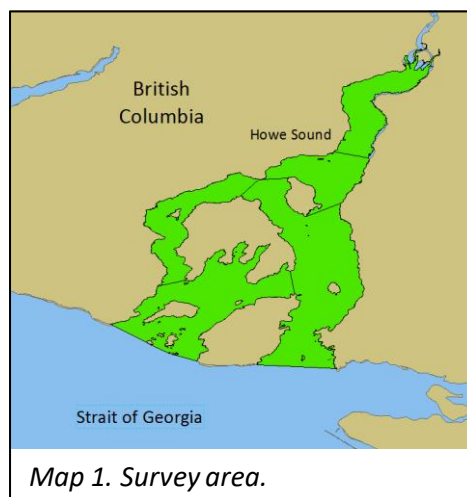
Dates: November 2 – 11, 2022; February 6 – 15, 2023
Recurrence: Annually, since 2001
Location: Howe Sound
Vessel: CCGS Neocaligus
Lead scientist: Andres Araujo (250) 327-3209
Andres.Araujo@dfo-mpo.gc.ca



Description

Prawn Assessment Trap Surveys provide estimates of key biological parameters (e.g. natural mortality, recruitment, spawner abundance) which are used in the development and refinement of the spawner escapement index for prawns.

This index forms the basis of the assessment and management of prawn stocks. The prawn survey in Howe Sound is an ongoing assessment program that provides data necessary to assess and manage all prawn stocks along the British Columbia coast.



Objectives

1. Collect detailed catch, size, and sex data for estimating recruitment parameters; and
2. Monitor stock response of escapement based thresholds.

Collaborators

- Canadian Coast Guard



Image 1. Spot Prawns (Pandalus platyceros).

FOR MORE INFORMATION



[Pacific Region Prawns](#)





Dates: August – September 2022
Recurrence: Annually, since 2012
Locations: Okanagan Lake, Okanagan River, and Vaseux Lake
Vessel: N/A
Lead scientist: Sean MacConnachie (250) 619--0220
Sean.MacConnachie@dfo-mpo.gc.ca



Description

This annual snorkel survey is undertaken to assess the relative abundance of Rocky Mountain Ridged Mussel—an Endangered species listed under the *Species at Risk Act*—throughout the Okanagan Valley at index sites.

Objectives

1. Undertake annual survey of key mussel beds;
2. Develop a long-term data series to inform future assessment by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) on abundance trends; and
3. Explore the range of Rocky Mountain Ridged Mussel throughout the Okanagan valley lakes to find additional mussel beds.

Collaborators

- Province of British Columbia
 - Forests, Lands, Natural Resource Operations and Rural Development
- Okanagan Basin Water Board



FOR MORE INFORMATION



Contact the Lead Scientist at Sean.MacConnachie@dfo-mpo.gc.ca





Dates: April 1, 2022 – March 31, 2023
Recurrence: Annually, since 2017
Locations: Howe Sound Entrance (Whytecliff Park), Burrard Inlet, Fraser River delta, Howe Sound entrance
Vessels: CCGS Vector
Lead scientist: Paul Covert (250) 363-6765
Paul.Covert@dfo-mpo.gc.ca



Description

The Coastal Environmental Baseline Program aims to collect comprehensive data about the marine ecosystem for the Port of Vancouver, for example, forage fish distribution, marine inorganic carbon cycles, and seasonal habitat variability.

Objectives

1. Characterize weekly, monthly, and seasonal ecosystem changes within Burrard Inlet:
 - a) Measure physical and chemical water properties in Burrard Inlet;
 - b) Characterize inter-tidal and sub-tidal habitats; and
 - c) Record abundance and distribution of invertebrate and vertebrate marine biota.
2. Provide high-quality, open-data to all Canadians to inform science-based decision making.

Collaborators

- Tsleil-Waututh Nation, Tsawwassen First Nation
- Canadian Coast Guard
- Environment and Climate Change Canada
- Coastal and Ocean Resources (ShoreZone)
- Ocean Wise Conservation Association
 - PollutionTracker



Map 1. Study area.



Image 1. Conducting beach surveys.

FOR MORE INFORMATION



[Coastal Environmental Baseline Program](#) and [Port of Vancouver pilot site](#)





Dates: April 1, 2022 – March 31, 2023
Recurrence: Ongoing, since 1975
Locations: British Columbia and Yukon
Lead scientist: Kathryn Fraser (250) 739-0542
Kathryn.Fraser@dfo-mpo.gc.ca



Image 1. Chinook (top) and Coho Salmon (bottom).

Coded Wire Tag (CWT) Fisheries Sampling provides fundamental information to:

- Understand how Chinook and Coho stocks migrate in the ocean;
- Estimate marine survival rates, exploitation rates, abundance, and productivity;
- Support different management decisions affecting long term viability of Chinook and Coho stocks and fisheries; and
- Evaluate hatchery strategies and contributions to fisheries.

A CWT is a microscopic fish tag that contains a unique code. CWTs are injected into snouts of juvenile salmon prior to ocean migration. The numeric code on a CWT can be precisely matched to a variety of information about the fish, such as hatchery, stock and stream origin, age, and other attributes. Most CWT projects tag juvenile salmon at hatchery facilities.

In Canada there are 14 Chinook CWT indicator stocks and 12 Coho CWT indicator stocks. The use of CWT indicator stocks allows for the tracking of stocks that represent naturally spawning wild populations through the life cycle of the fish, as they migrate to the ocean, distribute through the marine environment, are caught in fisheries, and return to spawn.



Map 1. CWT fisheries sampling occurs throughout Pacific Region.



Image 2. Individual tags are cut from a spool of wire and are 1.1 mm long.

FOR MORE INFORMATION



[Coded Wire Tag Program](#)





The CWT Program is a coordinated and standardized set of tagging and sampling projects at Canadian and U.S. hatcheries, in fisheries, and on spawning grounds. It is relied upon for Canadian stock and fishery assessments as well as by the Pacific Salmon Commission Technical Committees for bi-lateral modelling because salmon swim across international borders.

Objectives

- Sample 20% of the Chinook and Coho Salmon caught in British Columbia and Yukon commercial, recreational, and Indigenous fisheries; and
- Collect heads or snouts from fish that may contain CWTs, and collect associated catch monitoring data such as where, when, size, and how the fish was caught.

Collaborators

- First Nations
- Commercial and Recreational harvesters
- Marinas, tackle stores, fishing lodges, hatcheries, and First Nations communities who host Salmon Head Recovery Depots
- U.S. Pacific Salmon Treaty counterparts

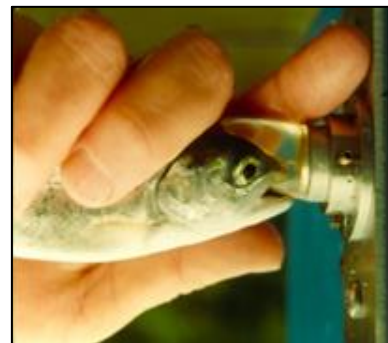


Image 3. CWT Tagging of juvenile salmon.

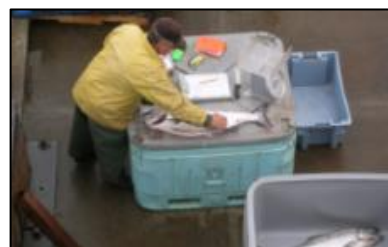


Image 4. CWT Sampling is a dockside monitoring program.



Image 5. Salmon Head Recovery Depot.

FOR MORE INFORMATION – Chinook and Coho Indicator Stocks

Yukon River	Marc Ross	(867) 393-6842	Marc.Ross@dfo-mpo.gc.ca
Transboundary	Bill Waugh	(867) 393-6764	Bill.Waugh@dfo-mpo.gc.ca
North Coast	Shaun Davies	(778) 884-6945	Shaun.Davies@dfo-mpo.gc.ca
South Coast	Erin Rechisky	(250) 756-7222	Erin.Rechisky@dfo-mpo.gc.ca
Fraser and Interior	Main office	(250) 851-4950	n/a





Dates: April 2020 – March 2021
Recurrence: Annually, since ~1905
Locations: British Columbia and Yukon
Lead scientist: Dawn Lewis (250) 756-7236
Dawn.Lewis@dfo-mpo.gc.ca

Description

DFO Science and Fisheries Management staff, often in collaboration with partners, deliver three types of monitoring programs to support area-based salmon stock assessment for five species in over 66 salmon management units and 409 conservation units in Pacific Region.

- 1. Population monitoring** programs collect information to estimate the abundance and/or condition of individuals within a population. Methods and techniques used range from basic visual surveys to application intensive mark-recapture or passage enumeration and associated biological sampling.
- 2. Catch monitoring** programs collect information to estimate the number of salmon caught, the number released, fishing effort, and the stock and age composition of the catch in order to evaluate harvest impacts on stocks. Catch, releases and fishing effort are estimated through a combination of harvester reporting and survey methods. Age and stock composition is estimated by sampling catch for scales, DNA, coded-wire tags and other unique stock identifiers, such as thermally marked otoliths.



Map 1. DFO administrative areas.



Image 1. Tagging Coho Salmon held in mesh holding pens.



Image 2. Chinook Salmon mark recapture population study.

FOR MORE INFORMATION



[Pacific Salmon Stock Assessment and Research](#)



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Canada

Description (cont'd)

3. Ecosystem monitoring programs collect information to monitor changes in the habitats salmon depend on and understand the effect of these changes on salmon populations. From basic water quality monitoring to comprehensive hydrology or food-web studies, the information generated by these programs is compiled annually to provide advice on the management of salmon populations.



Image 3. Nass River fish wheel operated by Nisga'a Fisheries.

By the Numbers*	Population Monitoring	Catch Monitoring	Ecosystem Monitoring	Total
Yukon - Transboundary Rivers	25	8	-	33
North Coast	43	9	2	54
South Coast	54	28	5	87
Fraser and Interior	65	7	1	73
Total	187	52	8	247

* Individual projects under each type of programs may monitor multiple salmon populations.

Collaborators

Collaborators participate by implementing basic monitoring programs, and by conducting or sponsoring more comprehensive stock or habitat assessments and evaluations.

- First Nations, Indigenous organizations
- Stewardship groups, watershed boards
- Harvest groups
- Universities
- Municipalities, province of British Columbia and Yukon territory.

FOR MORE INFORMATION

Yukon River	Marc Ross	(867) 393-6842	Marc.Ross@dfo-mpo.gc.ca
Transboundary	Bill Waugh	(867) 393-6764	Bill.Waugh@dfo-mpo.gc.ca
North Coast	Shaun Davies	(778) 884-6945	Shaun.Davies@dfo-mpo.gc.ca
South Coast	Erin Rechisky	(250) 756-7222	Erin.Rechisky@dfo-mpo.gc.ca
Fraser and Interior	Main office	(250) 851-4950	n/a



ANNEX C: Datasets published in 2021 – 2022

In 2021-2022, Pacific Science published 38 new datasets on the [Open Government Portal](#) and updated 18 datasets to reflect new data collected during the year.

Access these datasets by:

1. Visiting the [Open Government Portal](#)
2. Copying and pasting the name of the dataset in the search box
3. Clicking the “Find” button

Table 1: Datasets published by Pacific Science on Open Government Data (2021 — 2022)

Subject	Dataset Name
Aquatic ecosystems	<ul style="list-style-type: none"> • Important Areas for Birds in Pacific North Coast Integrated Management Area (<i>new</i>) • Important Areas for Cetaceans in Pacific North Coast Integrated Management Area (<i>new</i>) • Important Areas for Coral and Sponge in Pacific North Coast Integrated Management Area (<i>new</i>) • Important Areas for Fish in Pacific North Coast Integrated Management Area (<i>new</i>) • Important Areas for Geography in Pacific North Coast Integrated Management Area (<i>new</i>) • Important Areas for Invertebrates in Pacific North Coast Integrated Management Area (<i>new</i>) • Important Areas for Other Vertebrates in Pacific North Coast Integrated Management Area (<i>new</i>) • Important Areas for Birds in Strait of Georgia Ecoregion (<i>new</i>) • Important Areas for Cetaceans in Strait of Georgia Ecoregion (<i>new</i>) • Important Areas for Fish in the Strait of Georgia Ecoregion (<i>new</i>) • Important Areas for Geography in Strait of Georgia Ecoregion (<i>new</i>) • Important Areas for Invertebrates in Strait of Georgia Ecoregion (<i>new</i>) • Important Areas for Other Vertebrates in Strait of Georgia Ecoregion (<i>new</i>) • Important Areas for Birds in West Coast Vancouver Island Ecoregion (<i>new</i>) • Important Areas for Cetaceans in West Coast Vancouver Island Ecoregion (<i>new</i>) • Important Areas for Coral and Sponge in West Coast Vancouver Island Ecoregion (<i>new</i>)

Table 1 continued on the next page

Table 1 (continued): Datasets published by Pacific Science on Open Government Data (2021 — 2022)

Subject	Dataset Name
Aquatic ecosystems	<ul style="list-style-type: none"> • Important Areas for Fish in West Coast Vancouver Island Ecoregion (<i>new</i>) • Important Areas for Geography in West Coast Vancouver Island Ecoregion (<i>new</i>) • Important Areas for Invertebrates in West Coast Vancouver Island Ecoregion (<i>new</i>) • Important Areas for Other Vertebrates in West Coast Vancouver Island Ecoregion (<i>new</i>) • Seamounts of the Northeast Pacific Ocean (<i>updated</i>)
Field operations	<ul style="list-style-type: none"> • Fieldnotes: Pacific Science Field Operations (<i>updated</i>) – available soon! <ul style="list-style-type: none"> • FY 20-21 and FY 22-23
Oceanography monitoring	<ul style="list-style-type: none"> • Coastline Fetch Estimates for Pacific Canada (<i>new</i>) • Deep substrate model (100m) of the Pacific Canadian coast (<i>new</i>) • Line P Climatology (1956-2012) (<i>new</i>) • Monthly Satellite Chlorophyll-a Climatology of the Canadian Pacific Exclusive Economic Zone (2003-2020) - 1 km Resolution (<i>new</i>) • Monthly Satellite Sea Surface Temperature Climatology of the Canadian Pacific Exclusive Economic Zone (2003-2020) - 1 km Resolution (<i>new</i>) • Seasonal Climatologies of the Canadian Pacific Exclusive Economic Zone from British Columbia Continental Margin (BCCM) Model (1981-2010) (<i>new</i>) • Seasonal aragonite saturation state climatology of the Canadian Pacific Exclusive Economic Zone from BCCM model (1981-2010) (<i>new</i>) • Seasonal current speed climatology of the Canadian Pacific Exclusive Economic Zone from BCCM model (1981-2010) (<i>new</i>) • Seasonal dissolved inorganic carbon climatology of the Canadian Pacific Exclusive Economic Zone from BCCM model (1981-2010) (<i>new</i>) • Seasonal nitrate climatology of the Canadian Pacific Exclusive Economic Zone from BCCM model (1981-2010) (<i>new</i>) • Seasonal oxygen climatology of the Canadian Pacific Exclusive Economic Zone from BCCM model (1981-2010) (<i>new</i>) • Seasonal pH climatology of the Canadian Pacific Exclusive Economic Zone from BCCM model (1981-2010) (<i>new</i>) • Seasonal primary production climatology of the Canadian Pacific Exclusive Economic Zone from BCCM model (1981-2010) (<i>new</i>)
Table 1 continued on the next page	

Table 1 (continued): Datasets published by Pacific Science on Open Government Data (2021 — 2022)

Subject	Dataset Name
Oceanography monitoring	<ul style="list-style-type: none"> Seasonal salinity climatology of the Canadian Pacific Exclusive Economic Zone from BCCM model (1981-2010) (<i>new</i>) Seasonal temperature climatology of the Canadian Pacific Exclusive Economic Zone from BCCM model (1981-2010) (<i>new</i>) Seasonal total alkalinity climatology of the Canadian Pacific Exclusive Economic Zone from BCCM model (1981-2010) (<i>new</i>) Seasonal total phytoplankton climatology of the Canadian Pacific Exclusive Economic Zone from BCCM model (1981-2010) (<i>new</i>) Shallow substrate model (20m) of the Pacific Canadian coast (<i>new</i>) British Columbia Lightstation Sea-Surface Temperature and Salinity Data (Pacific), 1914-present (<i>updated</i>)
Pacific Salmon conservation	<ul style="list-style-type: none"> Chinook Salmon (<i>Oncorhynchus tshawytscha</i>) Conservation Units, Sites & Status (<i>updated</i>) Chum Salmon (<i>Oncorhynchus keta</i>) Conservation Units, Sites & Status (<i>updated</i>) Coho Salmon (<i>Oncorhynchus kisutch</i>) Conservation Units, Sites & Status (<i>updated</i>) Even Year Pink Salmon (<i>Oncorhynchus gorbuscha</i>) Conservation Units, Sites & Status (<i>updated</i>) Lake Type Sockeye Salmon (<i>Oncorhynchus nerka</i>) Conservation Units, Sites & Status (<i>updated</i>) NuSEDS-New Salmon Escapement Database System (<i>updated</i>) Odd Year Pink Salmon (<i>Oncorhynchus gorbuscha</i>) Conservation Units, Sites & Status (<i>updated</i>) Pacific Salmon Conservation Units, Sites & Status (<i>updated</i>) River Type Sockeye Salmon (<i>Oncorhynchus nerka</i>) Conservation Units, Sites & Status (<i>updated</i>) Southern British Columbia Chinook Salmon (<i>Oncorhynchus tshawytscha</i>) Conservation Units, Sites & Status (<i>updated</i>)
Plankton monitoring	<ul style="list-style-type: none"> Zooplankton Database (<i>updated</i>)
Stock assessment	<ul style="list-style-type: none"> British Columbia Spot Prawn (<i>Pandalus platyceros</i>) Spawner Index (SI) (<i>updated</i>) Herring Permanent Spawn Transects (<i>updated</i>) Pacific herring spawn index data (<i>updated</i>) Pacific Recreational Fishery Salmon Head Depots (<i>updated</i>)

