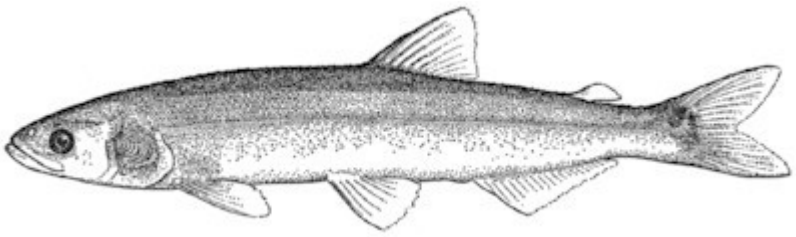
PACIFIC REGION

INTEGRATED FISHERIES MANAGEMENT PLAN

JANUARY 1 - DECEMBER 31, 2023

EULACHON
FRASER RIVER



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A more comprehensive list of contacts can be found online at:
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NATIONAL ON-LINE LICENSING SYSTEM (NOLS)

https://fishing-peche.dfo-mpo.gc.ca
E-mail: fishing-peche@dfo-mpo.gc.ca
(Please include your name and the DFO Region in which you are located.)
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Fax: 613-990-1866
TTY: 1-800-465-7735

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GLOSSARY AND LIST OF ACRONYMS

Abundance	A measure of quantity, such as for a fish stock or population, describing the number of individuals or a biomass level.
AFS	Aboriginal Fisheries Strategy
Area and Subarea	Defined in Section 2 of the Pacific Fishery Management Area Regulations. A map of Pacific Fishery Management Areas is available on the Department's Internet site at: http://www.pac.dfo-mpo.gc.ca/fm-gp/maps-cartes/areas-secteurs/index-eng.htm
Biomass	Total weight of all individuals in a stock or a population.
Bycatch	The unintentional catch of one species when the target is another.
Committee on the Status of Endangered Wildlife in Canada (COSEWIC)	Committee of experts that assess and designate which wild species are in some danger of disappearing from Canada.
Communal Licence	A licence issued to Indigenous organizations under Section 4 of the Aboriginal Communal Fishing Licences Regulations, pursuant to the Fisheries Act, to carry on fishing and related activities.
CSAS	Canadian Science Advisory Secretariat chaired by DFO and including other federal and provincial government agency representatives and external participants (formerly PSARC).
Ecosystem-Based Management	Taking into account of species interactions and the interdependencies between species and their habitats when making resource management decisions.
Fishing Effort (Effort)	Quantity of effort using a given fishing gear over a given period of time.
Fishing Mortality	Death caused by fishing, often symbolized by the mathematical symbol F.
Food, Social and Ceremonial (FSC)	A fishery conducted by Indigenous groups for food, social and ceremonial purposes.

Indigenous Knowledge	There is no universal definition of Indigenous knowledge, and the composition of Indigenous knowledge is for Indigenous peoples to determine. Indigenous knowledge is intricately tied to Indigenous worldviews and ways of life, and is a complex and dynamic product of the unique cultures, languages, governance systems and histories of the Indigenous peoples of the specific area. The term Indigenous knowledge may not be universally used, and other terms such as Indigenous Knowledge Systems, Traditional Knowledge, Traditional Ecological Knowledge, or Aboriginal Traditional Knowledge, which all convey similar concepts, may be used instead. When working with Inuit, the term Inuit Qaujimajatuqangit (IQ) is more likely to be used than Indigenous knowledge. Similarly, when working with Métis knowledge holders, the term Métis Traditional Knowledge is more likely to be used than Indigenous knowledge. Knowledge-holders are the only people who can truly define Indigenous knowledge for their communities. The term Indigenous knowledge is used throughout this document in line with the terminology in the *Fisheries Act*.
Intertidal	The area of the ocean shoreline located between the highest high water and lowest low water tidal levels.
Landing	Quantity of a species caught and landed. Harvested animals transferred from a vessel to land.
lb	Imperial pound(s), which is equal to 0.45359237 kg.
Natural Mortality	Mortality due to natural causes, symbolized by the mathematical symbol M.
Pelagic	Living in the surface or middle depths of the sea.
Population	Group of individuals of the same species, forming a breeding unit, and sharing a habitat.
Precautionary Approach	Set of agreed cost-effective measures and actions, including future courses of action, which ensures prudent foresight, reduces or avoids risk to the resource, the environment, and the people, to the extent possible, taking explicitly into account existing uncertainties and the potential consequences of being wrong.

Quota	Portion of the total allowable catch that a unit, such as vessel class, country, etc. is permitted to take from a stock in a given period of time.
Research Survey	Survey at sea, on a research vessel, allowing scientists to obtain information on the abundance and distribution of various species and/or collect oceanographic data. E.g.: bottom trawl survey, plankton survey, hydroacoustic survey, etc.
Spawner	Sexually mature individual.
Spawning Stock	Sexually mature individuals in a stock.
Species at Risk Act (SARA)	The Act is a federal government commitment to prevent wildlife species from becoming extinct and secure the necessary actions for their recovery. It provides the legal protection of wildlife species and the conservation of their biological diversity.
Stakeholders	Individuals or groups with an interest in a particular fishery or activity.
Stock	Describes a population of individuals of one species found in a particular area, and is used as a unit for fisheries management.
Stock Assessment	Scientific evaluation of the status of a species belonging to a same stock within a particular area in a given time period. A stock assessment is the process of collecting, analyzing, and reporting demographic information to determine changes in the abundance of a fishery stock. In some cases, it includes evaluating the effects of fishing on a stock or population to predict the reactions of a stock to alternative management choices.
Substrate	The surface (often the ocean bottom) and its composition, in or on which animals live.
Sub tidal	A portion of the bottom of the ocean that is not exposed at low tide stages. The ocean bottom at elevations below low water or chart datum.
Ton	Short ton, 2000 lb., traditionally used as a unit of measure by fish harvesters in British Columbia.
Tonne	Metric tonne, which is 1000kg or 2204.6 lb.

Total Allowable Catch (TAC)	The amount of catch that may be taken from a stock, often determined by analytical procedures, to achieve management objectives.

FOREWORD

The purpose of this Integrated Fisheries Management Plan (IFMP) is to identify the main objectives and requirements for the Eulachon fishery in the Fraser River, as well as the management measures that will be used to achieve these objectives. This document also serves to communicate the basic information on the fishery and its management to Fisheries and Oceans Canada (DFO, the Department) staff, legislated co-management boards, Indigenous peoples, harvesters, and other interested parties. This IFMP provides a common understanding of the basic "rules" for the sustainable management of the fisheries resource.

This IFMP is not a legally binding instrument which can form the basis of a legal challenge. The IFMP can be modified at any time and does not fetter the Minister's discretionary powers set out in the *Fisheries Act*. The Minister can, for reasons of conservation or for any other valid reasons, modify any provision of the IFMP in accordance with the powers granted pursuant to the *Fisheries Act*.

Where DFO is responsible for implementing obligations under land claims agreements, the IFMP will be implemented in a manner consistent with these obligations. In the event that an IFMP is inconsistent with obligations under land claims agreements, the provisions of the land claims agreements will prevail to the extent of the inconsistency.

1. OVERVIEW

1.1. INTRODUCTION

This Integrated Fisheries Management Plan (IFMP) for Eulachon covers the period from January 1 to December 31, 2023 for the Fraser River area.

The IFMP provides a history and a broad context to the management of the Fraser River Eulachon stock, including issues related to conservation. Given the short life cycle of this species, and consecutive poor returns, there are conservation concerns with Fraser River Eulachon stocks, resulting in commercial and recreational fishery closures and minimal harvest for food, social and ceremonial (FSC) purposes. Long-term closures are required to allow for stock rebuilding.

1.2. HISTORY

Eulachon have historically been, and continue to be, important to Indigenous groups who harvest them for FSC purposes. The significance of the Indigenous fishery transcends the collection of fish biomass for consumption. Rather, the collection, rendering and subsequent distribution of Eulachon grease are an integral part of coastal Indigenous cultures. Eulachon are eaten fresh, or often smoked, dried, salted or made into grease. Eulachon grease is an important food source for Indigenous groups. It is widely bartered among Indigenous communities and is given as gifts in potlatch ceremonies. The harvest of Eulachon and trade of the rendered oil led to the “grease trails” trade routes. It is used in many traditional foods, to preserve fruit, as medicine and even to lubricate tools (Hay and McCarter, 2000). Central and North Coast Indigenous groups in British Columbia, as well as some Indigenous groups in Alaska, produce grease. However Indigenous groups south of Knight Inlet, including groups on the Fraser River, do not produce grease and instead focus on smoked and fresh Eulachon (Moody, 2008).

There was a minor recreational fishery for Eulachon in the Fraser River in the past; however, it has been closed since 2005.

Commercial harvest of Eulachon on the Fraser River began in the 1870s. The only other large commercial fishery of Eulachon in BC was on the Nass River and it ended in the 1940s. From 1903 to 1912, the Fraser River Eulachon fishery was the fifth largest commercial fishery in BC (Stacey, 1995). More recently, annual catches of Eulachon in the Fraser River from the 1980s to the mid-1990s averaged approximately 20 tonnes per year and peaked in 1996 with an estimated catch of at least 63 tonnes. Due to increasing catch and effort and low levels of abundance, the commercial fishery was closed in 1997. Limited entry licensing was introduced in 1998 with the introduction of the ZU Eulachon licence category. Since closing in 1997, the commercial Eulachon fishery on the Fraser River was only opened twice: in 2002 and 2004, and it has been closed ever since.

1.3. TYPE OF FISHERY AND PARTICIPANTS

Indigenous
Indigenous harvest for FSC purposes is authorized in the lower Fraser River through communal licences. Indigenous groups apply for separate communal licences for Eulachon that are issued on a case-by-case basis. Fishing is primarily by drift net (e.g. gillnet). The use of other gear types may be authorized in traditional fishing areas upon request. Any Indigenous groups interested in developing new harvest methods or restarting historic harvest methods will work with DFO staff to licence and monitor appropriately.

Recreational
The recreational fishery for Eulachon remains closed in all tidal waters and freshwater, including the Fraser River.

Commercial
The commercial Eulachon fishery remains closed in all tidal waters and freshwater, including the Fraser River.

1.4. LOCATION OF FISHERY

Indigenous
Indigenous harvest may occur in portions of the lower Fraser River.

1.5. FISHERY CHARACTERISTICS

Indigenous communal fishing times are collaboratively planned and conditions of licence may include: effort of gear, fishing times , number of fishing days in a week, and/or harvest target balances. For each communal licence, participants must report catches through their respective monitoring programs and report to DFO. A strict monitoring regime is in place: DFO monitors, Fishery Officers, or Indigenous monitors may observe all sets directly or have harvesters pick their nets in the presence of the monitors.

1.6. GOVERNANCE

Management of Fraser River Eulachon is directed by:

- The *Fisheries Act* and the regulations made thereunder.
    - Areas and Subareas, as described in the *Pacific Fishery Management Area Regulations (2007)*, are referenced in describing Eulachon Management Areas.
    - *Fishery (General) Regulations* (i.e. Conditions of Licence) and the *Pacific Fishery Regulations, 1993* (i.e. open times).
    - The *British Columbia Sport Fishing Regulations (1996).*
    - The *Aboriginal Communal Fishing Licences Regulations.*
- The *Oceans Act*.

These documents are available at: http://laws-lois.justice.gc.ca/eng/

1.7. SUSTAINABLE FISHERIES FRAMEWORK

The Sustainable Fisheries Framework (SFF) is a toolbox of policies to ensure that Canadian fisheries support conservation and sustainable use of resources.
These policies include:

- A Fishery Decision-Making Framework Incorporating the Precautionary Approach
    - Guidelines for Implementing the Fish Stocks Provisions in the *Fisheries Act*
    - Guidelines for writing rebuilding plans per the Fish Stocks Provisions and A Fishery-Decision-making Framework Incorporating the Precautionary Approach
- Fishery Monitoring Policy
    - Introduction to the procedural steps for implementing the Fishery Monitoring Policy
- Policy for Managing the Impacts of Fishing on Sensitive Benthic Areas
- Policy on Managing Bycatch
- Policy on New Fisheries for Forage Species

For more information on the Sustainable Fisheries Framework and its policies, visit: https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/overview-cadre-eng.htm

Sustainability Surveys for Fisheries: DFO annually tracks the performance of major fish stocks that it manages through the Sustainability Survey for Fisheries. Results of previous Sustainability Surveys are available at: http://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/survey-sondage/index-en.html

***Sustainable Fisheries Framework work plans*:** Each year, DFO develops a work plan and reports on priorities and targets regarding the sustainable management of Canada's marine resources. These work plans are available at: https://www.dfo-mpo.gc.ca/about-notre-sujet/publications/work-plan-travail/index-eng.html

Precautionary Approach Framework

The Sustainable Fisheries Framework policy suite includes a decision-making framework incorporating a precautionary approach to commercial, recreational, and food, social, and ceremonial fishing: http://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/precaution-eng.htm

The precautionary approach in fisheries management requires caution when scientific knowledge is uncertain. The absence of adequate scientific information should not result in postponed action or failure to take action to avoid the risk of serious harm to fish stocks or their ecosystem.

Applying the precautionary approach to fisheries management decisions entails establishing harvest strategies that:

- identify three stock status zones – Healthy, Cautious, and Critical – delineated by an upper stock reference point and a limit reference point;
- set the removal rate at which fish may be harvested within each stock status zone; and

- adjust the removal rate according to fish stock status (i.e. spawning stock biomass or another index/metric relevant to population productivity), based on pre-agreed decision rules.

The framework requires that a harvest strategy be incorporated into respective fisheries management plans to keep the removal rate moderate when the stock status is in the Healthy Zone, to promote rebuilding when stock status is low, and to ensure a low risk of serious or irreversible harm to the stock.

A key component of the *Precautionary Approach Framework* requires that when a stock has declined to the Critical Zone, a rebuilding plan must be in place with the aim of having a high probability of the stock growing out of the Critical Zone within a reasonable timeframe: http://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/precautionary-precaution-eng.htm

Fisheries Act: Fish Stock Provisions

Amendments to the *Fisheries Act* (Bill C-68) were passed into legislation in 2019 and include new authorities to amend the Fishery (General) Regulations and requirements to maintain major fish stocks at sustainable levels, and to develop and implement rebuilding plans for stocks that have declined to their critical zone. Amendments are available at: https://www.parl.ca/LegisInfo/en/bill/42-1/C-68

The associated regulatory amendment to prescribe major fish stocks and describe requirements for rebuilding plans was registered and came into force on April 3, 2022, and published in Canada Gazette, Part II. Available at: https://www.gazette.gc.ca/rp-pr/p2/2022/2022-04-13/html/sor-dors73-eng.html

Fishery Monitoring and Catch Reporting

DFO released the national *Fishery Monitoring Policy* in 2019, replacing the regional *Strategic Framework for Fisheries Monitoring and Catch Reporting* in the Pacific Fisheries (2012). The national policy seeks to provide dependable, timely and accessible fishery information through application of a common set of steps used to establish fishery monitoring requirements across fisheries. Available at: https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/fishery-monitoring-surveillance-des-peches-eng.htm

The previous Pacific *Strategic Framework for Fisheries Monitoring and Catch Reporting* is available at: https://www.pac.dfo-mpo.gc.ca/fm-gp/docs/framework-monitoring-cadre-surveillance-eng.html

To ensure consistent national application, further guidance is provided through in the *Introduction to the Procedural Steps of Implementing the Fishery Monitoring Policy*, available at: https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/fmp-implementation-psp-mise-en-oeuvre-eng.htm

Policy on Managing Bycatch

The *Policy on Managing Bycatch* supports sustainable fisheries management by minimizing the risk of fisheries causing serious or irreversible harm to bycatch species, and by accounting for total catch, including retained and non-retained bycatch. Available at: https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/bycatch-policy-prise-access-eng.htm
The *Guidance on Implementation of the Policy on Managing Bycatch* supports policy implementation: https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/bycatch-guide-prise-access-eng.htm

Policy on New Fisheries for Forage Species

While other new fisheries may be started under the *New and Emerging Fisheries Policy*, this policy outlines the special considerations for new fisheries on forage species, which must not threaten the conservation of other species that depend on the forage species for food. Available at: https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/forage-eng.htm

Ghost Gear Program

One of the biggest threats to oceans internationally is marine litter, and in particular, ghost fishing gear. Ghost gear refers to any fishing equipment or fishing-related litter that has been abandoned, lost or otherwise discarded and is some of the most harmful and deadly debris found in oceans. It is estimated that between 5% - 30% of harvestable fish stocks are impacted by ghost gear across the world, posing a major threat to human health and livelihoods as well as to global food security. Additionally, ghost gear can cause large-scale damage to marine ecosystems through habitat disturbance and causes direct harm to the welfare and conservation of marine animals via entanglement and/or ingestion.

In support of international efforts to reduce marine litter, Canada signed the G7 Charlevoix Blueprint for Healthy Oceans, Seas and Resilient Coastal Communities. In addition to this commitment, Canada committed to the implementation of the Oceans Plastics Charter; and strengthened our domestic and international commitment to addressing marine litter by signing onto the Global Ghost Gear Initiative.

These commitments were further strengthened in the Canadian Council of Ministers of the Environment's Canada-Wide Action Plan on Zero Plastic Waste Phase 2 and DFO's recent Minister's Mandate Letters (2021 and 2022), emphasizing the importance of this work to Canadians.

For more information on the Ghost Gear program, visit: https://www.dfo-mpo.gc.ca/fisheries-peches/management-gestion/ghostgear-equipementfantome/index-eng.html

Conditions of Licence to Report Lost and Retrieved Gear
All commercial harvesters must report their lost and subsequently retrieved fishing gear. While the Department is taking a stewardship approach to ghost gear, and working with harvesters to reduce the effects of ghost fishing, the inclusion of the reporting requirement in conditions of licence does mean that not reporting lost and/or retrieved gear is now a chargeable offence.

Lost gear can be reported through the online Fishing Gear Reporting System, available at: https://www.dfo-mpo.gc.ca/fisheries-peches/commercial-commerciale/reporting-declaration-eng.html

The Ghost Gear Fund (Sustainable Fisheries Solutions and Retrieval Support Contributions Program)

From 2020-2022, the DFO Ghost Gear Fund has provided over $18 million in funding to projects falling under four pillars of activity:

- Abandoned, lost or otherwise discarded fishing gear (ALDFG) retrieval
- Responsible disposal
- Acquisition and piloting of currently available innovative technologies
- International leadership

To learn more about the DFO Ghost Gear Fund, go to: https://www.dfo-mpo.gc.ca/fisheries-peches/management-gestion/ghostgear-equipementfantome/program-programme/projects-projets-eng.html

1.8. NATIONAL FISHERY MONITORING POLICY

Robust fishery monitoring information is essential for stock assessment and to effectively implement management measures such as target and bycatch limits, quotas and closed areas. Fishery monitoring information is also needed to support the long-term sustainable use of fish resources for Food, Social, and Ceremonial and other Indigenous fisheries, commercial fisheries, recreational fisheries, and to support market access for Canadian fish products.

Following multi-sectoral consultations, DFO released the national Fishery Monitoring Policy in 2019, replacing the regional "Strategic Framework for Fisheries Monitoring and Catch Reporting in the Pacific Fisheries" (2012). The Fishery Monitoring Policy seeks to provide dependable, timely and accessible fishery information through application of a common set of procedural steps used to establish fishery monitoring requirements across fisheries. Policy principles include respecting Indigenous and Treaty rights, linkage of monitoring requirements to the degree of risk and complexity of fisheries, linkage of monitoring programs to fishery and policy objectives while accounting for cost-effectiveness and practicality of implementation, and shared accountability and responsibility between DFO, Indigenous groups and stakeholders.

To ensure consistent national application of the Fishery Monitoring Policy, further guidance is provided through the "Introduction to the Procedural Steps of Implementing the Fishery Monitoring Policy". Fisheries are first prioritized for assessment through collaboration with Indigenous groups and Stakeholders. Risk and data quality assessments are then conducted on priority stocks and associated fisheries and monitoring programs. Next, monitoring objectives are set in alignment with the Fishery Monitoring Policy, followed by specifying monitoring requirements and then monitoring programs are operationalized. Finally, a review and evaluation of the fishery monitoring programs against the monitoring objectives will be conducted and reported on.

The Fishery Monitoring Policy is part of DFO's Sustainable Fisheries Framework and is available at: https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/fishery-monitoring-surveillance-des-peches-eng.htm

The "Introduction to the Procedural Steps of Implementing the Fishery Monitoring Policy" is available at: https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/fmp-implementation-psp-mise-en-oeuvre-eng.htm

In cases where assessment of monitoring programs identifies a gap between the current and target level of monitoring, discussions will be held between DFO Indigenous groups and stakeholders to identify options to address the monitoring gap, and the feasibility of these options (e.g. cost, technical considerations, etc.). To support Fishery Monitoring Policy principles, a collaborative approach is required.

Where monitoring options are determined to be feasible, the monitoring and reporting regime will be revised to incorporate these options, providing resource managers with sufficient information to meet Fishery Monitoring Policy objectives. Where monitoring options are not feasible, alternative management approaches are required to reduce the risk posed by the fishery. If there is no gap between the current and target level of monitoring, the management approach will not require any change.

1.9. CONSULTATION

DFO has a broad mandate, with the authority to regulate and enforce activities, develop policy, provide services and manage programs. To help ensure that the Department's policies and programs are aligned with its vision and effectively address the interests and preferences of Canadians, DFO supports consultations that are transparent, accessible and accountable.

DFO Pacific Region undertakes consultations in order to improve departmental decision-making processes, promote understanding of fisheries, oceans and marine transport issues, and strengthen relationships.

The Fraser River population of Eulachon was assessed as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in May, 2011 (see section 3.5). Since 2011, the Department has sought the input of Indigenous peoples and stakeholders into the development of documents that support the *Species at Risk Act* (SARA) process to consider whether or not the Government should list this Designatable Unit (DU) as Endangered under SARA. Consultations on this SARA process occurred between August 30 and November 30, 2016. In fall 2020, the Department undertook a "check-in" period to ensure that viewpoints and information shared during 2016 consultations remain accurate and current. The Department will include any new information received during this period in its listing advice.

1.10. APPROVAL PROCESS

This plan is approved by the Regional Director General for the Pacific Region.

2. STOCK ASSESSMENT, SCIENCE AND TRADITIONAL KNOWLEDGE

2.1. BIOLOGICAL SYNOPSIS

Eulachon (also known as candlefish, or oolichan, and Swi:we (Halq'eméylem), or Swiẇ ə (Həṅ q'əmiṅ əm) belong to the family Osmeridae (smelts). The scientific name for Eulachon is *Thaleichthys pacificus*, a name derived from the Greek roots thaleia (rich), ichthys (fish), which refers to the high oil content found in these little fish, and pacificus (Pacific [Ocean]), which refers to where these fish live.

Within BC, Eulachon spawning has been confirmed in 25 rivers with a possible additional 15 rivers that have been identified as potentially supporting Eulachon spawning based on anecdotal information (McCarter and Hay 1999, Hay and McCarter, 2000, Moody 2008). All known spawning rivers experience increased spring runoffs known as freshets and most drain snow packs or glaciers. The major river systems where Eulachon return to spawn are the Fraser, Skeena, Nass, and Klinaklini.

Eulachon spawning is limited to the lower reaches of rivers, meaning they do not ascend upstream over sections of river with considerable slope and changes in elevation. In the Fraser River, the spawning season ranges from February to May (and possible early June), with peaks typically occurring in April and May (i.e. LFFA 2017, LFFA 2021, Casselman and Bettles 2020). During spawning, adhesive eggs, about 20,000 to 40,000 per female, attach to sand or pebbles and hatch in three to five weeks at ambient temperatures, usually between 3° and 10° Celsius. There is considerable uncertainty associated with how climate change may impact Eulachon life history and survival before, during and after spawning seasons.

There is evidence that Eulachon will hold and stage in low velocity areas of the river to conserve energy while migrating upstream or awaiting spawning opportunities. It has been reported that spawning substrates typically consist of silt, sand, gravel, and/or cobble and spawning depths can vary considerably (Plate 2009, Gustafson et al 2010, Casselman and Bettles 2020). Within the lower Fraser River, examples of mapped habitat and substrate type to link to staging and spawning areas near the Port Mann Bridge and Pattullo Bridge have been described in Plate (2009) and Casselman and Bettles (2020).

Eulachon are anadromous. Once hatched, larvae are rapidly flushed to estuarine or marine waters. It is believed that most live at sea for three years before returning to rivers to spawn. Based on interpreting growth rings in otoliths, age estimates of spawning Eulachon have ranged from two to seven years, with most adult fish reaching a length of 15 to 20 cm and weight of 40 to 60 grams. Large post-spawning mortalities occur and most, if not all, Eulachon are expected to die after spawning.

In BC, Eulachon may be found in waters of the offshore shelf around Dixon Entrance, Hecate Strait, Queen Charlotte Sound, and the West Coast of Vancouver Island (WCVI), and are commonly caught in bottom trawl gear at depths of 80 to 200 m. They have also been caught in

the summer at night in near surface waters (e.g. depths of 0 to 30m) off the WCVI using mid water trawl gear with euphausiids in their stomachs (DFO unpublished data, 2006-2019).

Long-term declines of spawning Eulachon have been observed in many rivers throughout their distribution from California to Alaska in the past 2 to 4 decades. The Fraser River population has been at low levels most years since 2004 although recent years have shown higher spawning numbers which may signal a positive trend.

2.2. ECOSYSTEM CONSIDERATIONS

Eulachon could potentially be affected by both human activities (fisheries and habitat pressures) and ecosystem pressures in both freshwater and the marine environments (Schweigert et al. 2012). In a 2012 Recovery Potential Assessment (Schweigert et al. 2012), "no single threat could be identified as most probable for the observed decline in abundances among DUs [designatable units] or in limiting recovery. However, mortality associated with coastwide changes in climate, fishing (direct and bycatch) and marine predation were considered to be greater than the changes in habitat or predation within spawning rivers."

Eulachon are prey for many species of fish, marine mammals and birds (see summaries by Gustafson et al. 2010 and Schweigert et al. 2012). In-river predators include White Sturgeon, Steller Sea Lions, Harbour Seals, and eagles. Spawning Eulachon and their eggs are known to be import diet components for adult and juvenile lower Fraser White Sturgeon (Echols and FRAP 1995), which has a COSEWIC assessment status of Threatened (COSEWIC 2012), and which like Eulachon, is a highly valued resource to First Nations. Salmon and Dolly Varden trout also have been reported to feed on Eulachon eggs or larvae (Marston et al. 2002, Gustafson et al. 2010). Marine predators include Spiny Dogfish, Pacific Cod, Pacific Hake, Walleye Pollock, Pacific Halibut, Sablefish, Arrowtooth Flounder, Pacific salmon, rockfish and many other species of fish, marine mammals and birds. Pacific Hake in particular have been implicated as important predators of Eulachon due to their spatial overlap and the common occurrence of Eulachon in their gut contents (McFarlane and Beamish 1985, Buckley and Livingston 1997, Pickard and Marmorek 2007). Pacific Hake biomass has been declining since 2017 (Johnson et al. 2021), which may have had a positive impact on Eulachon abundance. However, other marine predators such as some piscivorous rockfish have increased in recent years (DFO 2020a, DFO2020b), potentially offsetting a reduction in Pacific Hake predation.

Stomach contents of juvenile and maturing Eulachon have included euphausiids, phytoplankton; copepod eggs; copepods; mysids; shrimp, ostracods and barnacle larvae as well as juvenile fish such as Pacific Sand Lance (Hay 2002, Yang et al. 2006, Pearsall and Fargo 2007, Dealy and Hodes, 2019). Samples from nearshore and offshore caught eulachon suggest that the euphausiid *Thysanoessa spinifera* is their main prey along with other euphausiids, fish and invertebrates (e.g. Dealy and Hodes, 2019). Euphausiid biomass anomalies off the west coast of British Columbia have been positive since the mid-2000s (Galbraith and Young 2021) indicating potentially good feeding conditions for eulachon and other pelagic species.

Similar to many small forage fish, Eulachon can exhibit high variability in annual abundance. This variability been observed in research surveys throughout their range (Anderson and Piatt

1999, Mueter and Norcross 2002, Emmett and Brodeur 2000, Schweigert et al. 2012). It is likely that climate change effects on both marine and freshwater ecosystems contribute to the variability in population abundance. For example, negative correlations have been found between Fraser River Eulachon catches and warmer ocean temperatures off Vancouver Island (Hay et al. 1997). Similarly, the recent marine heat wave in 2014-2016 in the Gulf of Alaska was related to a drop in Eulachon biomass in Alaskan bottom trawl surveys (Ferriss and Zador 2021). The impacts of climate change and ocean warming in the southern parts of their range have been implicated in changes in Eulachon distribution and abundance as well (Emmett and Brodeur 2000). Ocean deoxygenation and acidification, associated with climate change, may also negatively impact Eulachon abundance and distribution (Schweigert et al. 2012). In general, the mechanisms for the impacts are not fully understood, however, the existing evidence indicates that warmer ocean conditions have a negative impact on eulachon abundance, thus it might be expected that future warming might further reduce Eulachon abundance in British Columbia, but this topic needs further study.

At this time there is no information available on the appropriate conservation limits for Eulachon based on ecosystem considerations. Research is ongoing to better understand ecosystem processes and the role Eulachon play in maintaining the integrity and functioning of the ecosystem.

2.3. INDIGENOUS KNOWLEDGE

The term Indigenous knowledge may not be universally used, and other terms such as Indigenous Knowledge Systems, Traditional Knowledge, Traditional Ecological Knowledge, or Aboriginal Traditional Knowledge, which all convey similar concepts, may be used instead.

In 2019, the *Fisheries Act* was amended to include provisions for the where the Minister may or shall consider provided Indigenous knowledge in making decisions pertaining to fisheries, fish and fish habitat. Section 61 of the act ensures this knowledge is protected and can only be provided with consent. There are also provisions under the *Species At Risk Act* (s.10.2, s.15.2, s.16, s.18.1) that support inclusion of Indigenous knowledge to inform the assessment and protection of species at risk. Likewise, the *Oceans Act* (s.42) allows the Minister to consider Indigenous knowledge in oceans related decisions.

The Government of Canada and the scientific community acknowledge the need incorporate Indigenous knowledge in meaningful and respectful ways. Work is underway at a National level to develop processes for how DFO receives Indigenous knowledge and applies it to inform decision making. Many outstanding questions remain on how to move forward in a way that respects, meaningfully incorporates, and protects the knowledge that may be shared with DFO, to mutual benefit. For example, how to engage knowledge holders, and how to ensure that the knowledge can be shared and considered in a mutually acceptable manner by both knowledge holders and the broader community of First Nations, stakeholders, managers, and policy makers involved in the fisheries. Given the diversity of knowledge and relationships, regional work will involve an iterative process in collaboration with First Nations, Indigenous groups and knowledge holders, to ensure appropriate inclusion and protection of the knowledge provided. The Department is committed to finding a way forward that respects the knowledge and the

knowledge holders, and upholds the Principles respecting the Government of Canada's relationship with Indigenous peoples, which are available online at: https://www.justice.gc.ca/eng/csj-sjc/principles-principes.html.

More information on the updates to the *Fisheries Act*: https://www.dfo-mpo.gc.ca/campaign-campagne/fisheries-act-loi-sur-les-peches/reconciliation-eng.html

See Sections 2.5, 34.1, and 61.2 in the *Fisheries Act* (2019): https://laws-lois.justice.gc.ca/eng/acts/f-14/.

Section 61.2 protections for Indigenous knowledge have also been included in the *Access to Information Act*, Schedule 2: https://laws-lois.justice.gc.ca/eng/acts/a-1/page-15.html#h-1230

2.4. STOCK ASSESSMENT

Data Sources

There is limited biological information available pre-season to reliably forecast Fraser River Eulachon spawner run size and guide management decisions regarding in river harvest level. A 2003 Canadian Scientific Advice Secretariat (CSAS) research document (Hay et al., 2003) identified four potential indicators of population abundance and 'response' points that could be used together to guide management decisions for Fraser River Eulachon: the spawning stock biomass (SSB), offshore biomass index, same year Columbia River catches, and New Westminster test fishery. However, with the low population levels, discontinuation of the New Westminster test fishery, and the closure of the commercial and recreational fisheries, the Hay et al. (2003) approach is no longer used to inform management decisions. The main data source used to determine FSC harvest levels is the Fraser River Eulachon Egg and Larval Survey, but other data that are also considered are listed below. The methodology for setting the FSC harvest level is described in Appendix 3.

Fraser River Eulachon Egg and Larval Survey

Annually, since 1995, a 7-week core sampling program that measures densities of Eulachon eggs and larvae has taken place in waters of the lower Fraser River to generate a relative index of spawning stock biomass (SBB). The 7-week core survey uses towed plankton nets to gather samples twice a week from mid-April to early June. The number of eggs and larvae gathered in each tow are counted to calculate density estimates. The density estimates are mathematically integrated with daily mean river discharge water flows to estimate total egg and larvae discharge rates and amounts. The total estimates are then related to an Eulachon fecundity estimate (eggs produced per female) to back calculate estimates of SSB by week, and weekly totals are summed across a survey season. The SSB index provides a relative estimate of how many tonnes of Eulachon successfully spawned by season (Table 1 and Figure 1). The Fraser River egg and larval survey has been conducted since 1995 to provide estimates of Eulachon SSB indices. Please refer to Hay et al., (2002) and McCarter and Hay (2003) for additional background on the survey methods and calculation of results. The previous year's SSB index is not an adequate predictor of the following year's return given that the age at which Eulachon sexually mature and spawn is highly uncertain and may vary depending on growth rates and other factors. Analyses of spawning Eulachon length distributions have indicated that age-3 may be a common age-at-

maturity for Fraser Eulachon but notable proportions of spawners can range from age-2 to at least age-5 (Hay and McCarter, 2000).

Since 2017, there has been exploratory sampling before the start of the core (standardized) 7-week survey period to monitor egg and larval outflow trends earlier in the season. During 2017-2019 and 2021-2022, there were 3 weeks of exploratory earlier sampling (10 weeks of sampling in total). In 2020, instead of 3 weeks, there were 2 weeks of exploratory sampling (a week of sample was lost due to delays related to COVID-19 operating restrictions). In 2021, exploratory sampling over the earlier weeks was only done once a week on dates of April 2, 8 and 15, instead of twice as was done in 2017-2022. The change in scheduling was done as an experimental trade-off to increasing sampling frequency to three times a week for three weeks over the last 3 weeks of May. The increased sampling in May was done to have more observations to better characterize variability over the typical peak spawning period. During the 2022 survey season, consistent biweekly sampling was again conducted to enable more comparable observations and trends between week periods. DFO is interested in continuing to support the additional 3 weeks of exploratory sampling in 2023 and is currently seeking funding to continue this work.

Proportions of the 2018-2022 egg and larval survey water samples also collected fine fibrous material which included a benthic diatom called Didymo (*Didymosphenia geminata*). This material tangles with Eulachon eggs and larvae and other objects collected in the nets, thus prolonging the laboratory work required to detect and count eggs and larvae in the samples. The material appears to be occurring in particularly large amounts during the river freshet outflow likely due to increased Didymo growth in upper watershed reaches due to climate change favouring growth conditions (Brahney et al 2021). In 2018 and 2019 there were considerable delays in processing the laboratory samples and all samples were counted wholly (no subsampling occurred). With the 2020-2022 samples, subsampling has been required to expedite laboratory efforts to adhere to time and cost constraints (see the DFO 2022 Fraser River Eulachon IFMP for information on a subsampling fraction analyses). The 2022 samples were not as heavily laden with the material as previous years, possibly due to the relatively low river water discharge trends observed most of the survey period and likely also due to massive watershed flushing that happened during the November 2021 flooding.

In 2022, densities and outflow estimates of Eulachon progeny from all sampling sites were relatively low and highly variable over the entire 10 week sampling period with minimal distinction of peak periods, although the greatest variability and largest mean densities by day were observed over the first two weeks (March 28-April 7) and last 4 weeks (May 5-June 2).

For more information on egg and larval survey results for 1995 to 2016, visit http://www.pac.dfo-mpo.gc.ca/science/species-especes/pelagic-pelagique/herring-hareng/herspawn/pages/river1-eng.html. For information on survey results after 2016, please contact Linnea Flostrand, Aquatic Science Biologist (linnea.flostrand@dfo-mpo.gc.ca).

Table 1: Fraser River Eulachon Spawning Stock Biomass (SSB) Index 1995 to 2022.
The standard 7-week sampling period in 2022 was from April 18 to June 5. Estimates from years with additional (earlier) exploratory sampling are shown in grey, representing ***10-week periods in 2017-2019, 2021 and 2022 and a **9-week period in 2020.

Year	South Arm (tonnes)	North Arm (tonnes)	Total (tonnes)
1995	257	45	302
1996	1,582	329	1911
1997	57	17	74
1998	107	29	136
1999	392	26	418
2000	76	54	130
2001	422	187	609
2002	354	141	494
2003	200	66	266
2004	24	9	33
2005	14	2	16
2006	24	5	29
2007	34	7	41
2008	8	2	10
2009	12	2	14
2010	4	<1	4
2011	19	12	31
2012	78	42	120
2013	59	41	100
2014	53	13	66
2015	185	132	317
2016	32	12	44
2017	29	6	35
***2017	32	7	39
2018	298	110	408
***2018	303	111	414
2019	70	38	108
***2019	75	39	114
2020	404	220	624
**2020	408	220	628
2021	64	77	141
***2021	77	79	156
2022	**7.9**	**2.2**	**10.1**
***2022	10.7	2.7	13.4

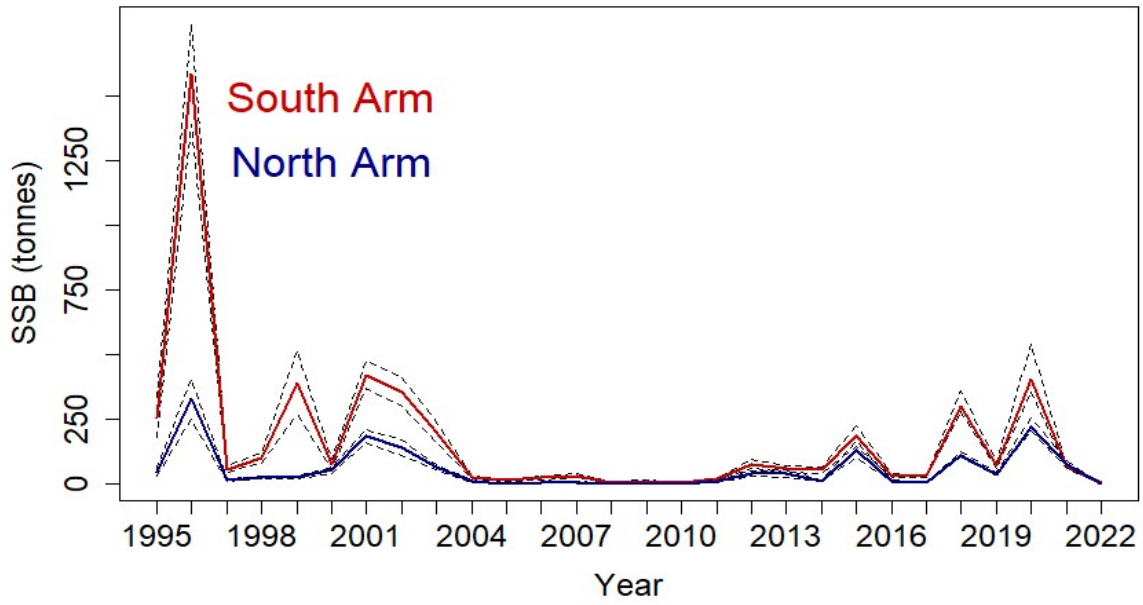

Figure 1: Spawning stock biomass (SSB) in tonnes for the South and North Arms of the Fraser River calculated from Fraser River Eulachon egg and larval survey data (1995-2022). Dashed lines are 95% credible intervals.

Fraser River (New Westminster) Test Fishery

The Fraser River test fishery was designed to provide an in-season index of Eulachon returns to the Fraser River. The test fishery was based on the cumulative catch of Eulachon fished daily at a fixed site (New Westminster), with specific gillnet gear, at a specific tide level and for a fixed time period. The test fishery was focussed on informing the commercial fishery and operated from 1995 to 2005 (with the exception of 1999), and was discontinued due to conservation concerns. The test fishery has not operated since 2006, and will not be conducted in 2023.

Table 2: Fraser River Test Fishery Final Catches for 1995 to 2005

Year	Final Catch (pieces)
1995	11,651
1996	42,071
1997	3,116
1998	2,052
1999	No Test Fishery
2000	12,991
2001	14,578
2002	14,754
2003	7,758
2004	12,433
2005	886
2006 - 2022	No Test Fishery

Fraser River (New Westminster) Gillnet Eulachon Assessment Survey, Lower Fraser Fishery Alliance (LFFA)

From a 2017 pilot until the 2022 season, the Lower Fraser Fishery Alliance (LFFA) has been annually conducting Eulachon gillnet survey efforts on the Fraser River. The survey methodology and location have been similar to those used in the 1995-2005 Fraser River (New Westminster) test fishery, with sampling approximately every second day. The LFFA methods were adjusted from the earlier test fishery methods to minimize mortality impacts by reducing fishing time and using a shorter gillnet panel. The gillnet survey (referred to as the LFFA Eulachon Assessment Survey) has been aimed at collecting information on Eulachon seasonal relative abundance and run timing, and biology (e.g. fish length, weight, sex, spawn condition). Samples from this survey have also been retained for collaborative efforts with DFO, such as for Eulachon studies pertaining to baseline spawner genetics; otolith ageing and isotope analyses; and eDNA trials. LFFA intends to continue the survey in future seasons (2023 and beyond) and is seeking funding to continue this work.

Offshore Small Mesh Multi-Species Bottom Trawl Survey

The offshore small mesh multi-species bottom trawl survey was designed to provide an index of offshore shrimp abundance but the survey also captures Eulachon (and a wide range of other species). The survey has been conducted by DFO off the west coast of Vancouver Island most years since 1973 over spring periods starting in late April or early May. Up until 2016, survey efforts included parts of the Queen Charlotte Sound. In 2022 the West Coast of Vancouver Island survey indicated a relatively high biomass of shrimp within PFMA 23, 123, 124, and 125 and shrimp stocks were found to be in the healthy zone. Recent and past survey information can be requested from Guy Parker, Shellfish Biologist (250-756-7163 / guy.parker@dfo-mpo.gc.ca .

Offshore Eulachon biomass index: In the past, information on Eulachon captures from the offshore small mesh multi-species survey was used to calculate an annual index of relative Eulachon biomass for the lower region of the WCVI (Areas 121, 23, 123, 124 and 125), however this was discontinued in 2013. It is important to note that this was an index of biomass and not a biomass estimate. Historically it was used to inform the Eulachon Action Level (EAL; i.e. the level of estimated Eulachon bycatch in the shrimp trawl fishery above which management actions may be implemented; see section 3.3). Eulachon caught in this survey include stocks from the Fraser River, the Columbia River, and other areas. The Recovery Potential Assessment of Eulachon in Canada (Schweigert et al., 2012) (see section 3.5) suggests that the marine trends (including the offshore biomass index) may be misleading and notes that further investigation is warranted. Data on the offshore biomass index prior to 2013 can be found in the 2021 Fraser River Eulachon IFMP.

Eulachon catch per unit effort (CPUE) data: Eulachon catch per unit effort (CPUE) and fish length sample information collected from the WCVI offshore small mesh multi-species survey is analysed to consider ecological trends (see Figures 2 and 3). Although not defined as one of the four indicators that could be used for managing Eulachon in Hay et al.'s 2003 work, CPUE trends may provide insight into the relative productivity of Eulachon year class strength related to past or future Columbia River and/or Fraser River spawners. However, observations should be considered cautiously due to ecological uncertainty and variability associated with Eulachon

stock structure and linkages to river spawning, size at age, and age at maturity; therefore further investigation is warranted (Schweigert et al., 2012; see section 3.5).

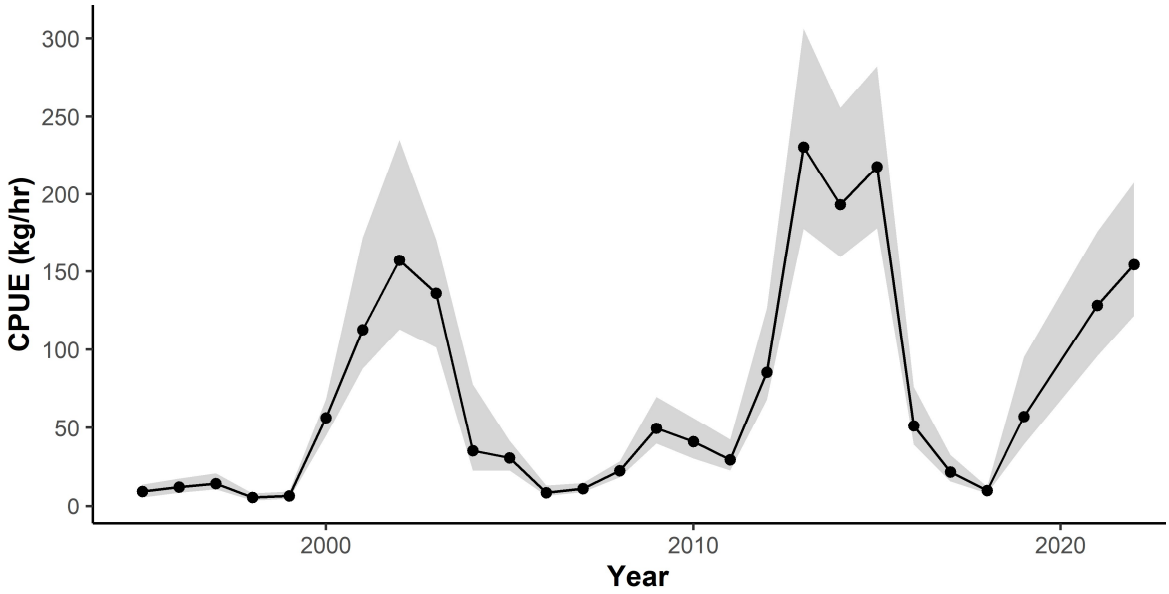

Figure 2: Eulachon mean catch per unit effort (CPUE; dots and lines) and 95% bootstrap confidence intervals (gray envelopes) from 1995-2022 West Coast Vancouver Island small mesh multi-species bottom trawl surveys, collectively and annually representing parts of Pacific Fishery Management Areas (PFMAs) 23, 123, 124, and 125. There are no 2020 observations because the 2020 survey was cancelled due to COVID-19 operating restrictions.

Eulachon length data: Length-frequency histograms tend to reveal multi-modal distributions with different age classes distinguished by different length ranges, i.e. generally younger fish are shorter and older fish are longer. Fish that are typically less than 5 cm standard length are generally estimated to be less than one year old and are not well represented in the samples. These fish may not yet be in the survey area off of WCVI at the time of the offshore small mesh multi-species survey and/or may be too small for the trawl net to reliably collect. Fish that are greater than 5cm and up to approximately 13 cm are generally estimated to be up to or slightly over one year old. However, there can be considerable variability due to factors such as: hatch dates within and between rivers and growth rates within and between seasons. Therefore, trends in length frequencies can vary between years with considerable overlap in length ranges between age groups, especially in fish older than one year (e.g. Figure 3). Length-frequency histograms for years prior to 2011 can be found at: http://www.pac.dfo-mpo.gc.ca/science/species-especes/pelagic-pelagique/herring-hareng/herspawn/pages/ocean1-eng.html

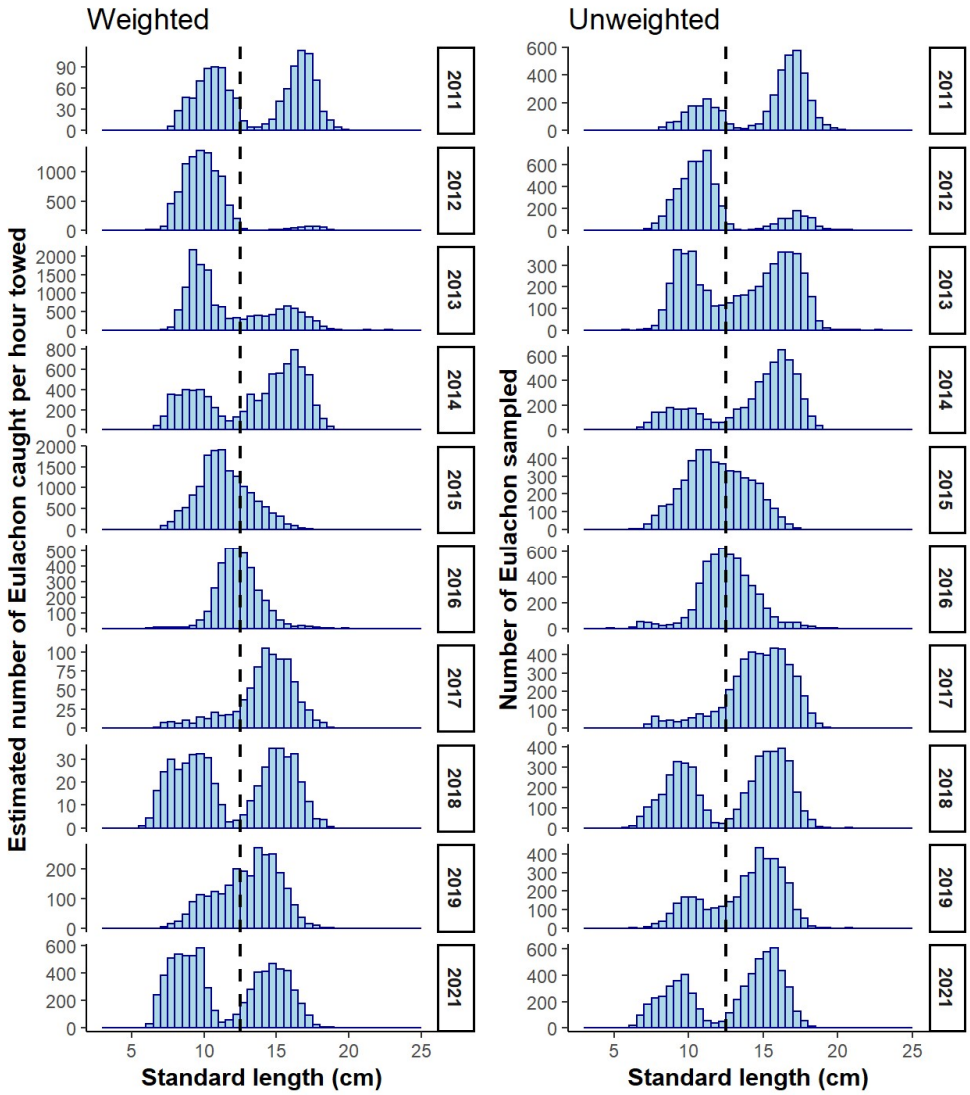

Figure 3: Eulachon standard length-frequency histograms (proportions by size bin) from 2011-2022 (Spring) west coast of Vancouver Island offshore small mesh bottom trawl surveys. There are no 2020 observations because the 2020 survey was cancelled due to COVID-19 operating restrictions.

Genetic Information:

Genetic information from river-caught Eulachon has been analysed to develop spawner baseline profiles to compare trends from spawners from different rivers and spawners from the same river across different years (e.g. Beachem et al. 2015; Sutherland et al. 2020). Tissue and genetic samples have been collected from adult Eulachon from rivers ranging from Northern California through Central Alaska. Eulachon baseline genetic studies show evidence of genetic isolation by distance between rivers within and between large scale regions: from Northern California up to and including the Fraser River; north of the Fraser River to southeast Alaska; and within the Gulf of Alaska (Beachem et al. 2015; Sutherland et al. 2020). There is strong interest by DFO to increase baseline genetic sample collection and analysis, across as many Eulachon spawning

rivers and seasons as possible, especially in rivers where no or few collections have been made to represent different years.

Tissue and genetic samples have also been collected from ocean-caught Eulachon, such as from trawl surveys or fisheries, and used in analyses to try to estimate the most likely river or area of origin based on genetic baseline markers. For example, Beachem et al. (2005) and Table 3 in Schweigert et al. (2012) report that for Eulachon collected from the west coast of Vancouver Island, analyses of genetic signals suggest that the majority of fish appear to be most similar to Columbia River, seconded by Fraser River baseline samples. Reliant on baseline genetic sample collection and analysis, there is interest to conduct future work to test the characterization of marine-caught Eulachon to spawning locations.

Other DFO Eulachon Science Initiatives

Scientific information compiled on the biology, distribution and fishery data of Fraser River Eulachon is documented in material related to: *Recovery Potential Assessment of Eulachon (Thaleichthys pacificus) in Canada* (Schweigert et al. 2012); the *Recovery Potential Assessment for Eulachon – Fraser River Designatable Unit* (DFO, 2015).

In recent years, DFO Science has been involved in several research projects to address knowledge gaps related to Eulachon ecology and non-lethal sampling methodologies. Examples of projects include:

1. The deployment of periodic bottom trawl surveys to determine Eulachon biological condition, distribution, migration patterns and timing between offshore rearing areas and inshore waters adjacent to Eulachon spawning rivers.
    a. South Coast (Fraser River pathway) Strait of Georgia, south of Nanaimo to the mouth of Juan de Fuca Strait, monthly from October 2017 to June 2018. Initial study findings are published and available online (Dealy and Hodes, 2019).
    b. North Coast, Chatham Sound (Skeena and Nass River pathways) monthly from late July/August to November 2018, and January to March 2019. Initial study findings are expected to be published in late 2019 or 2020.
2. A 2018 pilot project in collaboration with the LFFA in the Fraser River to assess whether acoustic technologies are an effective, non-lethal way to assess Eulachon returns.
3. Analysing otoliths (inner ear bones) for possible age determination through interpreting otolith growth patterns and, seeking methods to validate putative age information through micro chemistry (isotope analysis). Currently there is no validated aging technique for Eulachon.
4. Lower Fraser River Eulachon environmental DNA (eDNA) feasibility study to see if information from water samples collected and subjected to eDNA relative abundance analyses can be correlated with gillnet CPUE information from the LFFA Eulachon Assessment Survey, and/or observations from the Fraser Eulachon egg and larval survey. In partnership with LFFA, water samples for the study were collected on 16 gillnet survey dates from March 21- May 15, 2022.
5. Exploration of modeling methods for assessing and comparing abundance of Eulachon caught in offshore small mesh multi-species bottom trawl surveys, with a focus on the west coast of Vancouver Island survey areas and time series.

United States Eulachon – Status and observations

In the United States (U.S.), the Southern Distinct Population of Eulachon was federally listed as Threatened under the U.S. *Endangered Species Act* in March 18, 2010, and the *Recovery Plan for the Southern Distinct Population Segment of Eulachon (Thaleichthys pacificus)* was published in 2017 followed by a five-year review in 2022 (NMFS, 2017; NMFS, 2022; Gustafson et al. 2022).

Columbia River Egg and Larval Survey

Efforts to track and estimate annual estimates of relative abundance of Eulachon in the Columbia River via egg and larval survey observations within and between spawning seasons have been conducted and supported by Washington and Oregon Departments of Fish and Wildlife and the U.S. National Marine Fisheries Service most years from 2000 to 2020. Trends of annual estimates from these surveys show moderate levels for 2000-2003, very low levels across 2005-2010, severe increases occurring from 2010 to 2015, sharp decreases from 2015 to 2018 and a moderate increase from 2018 to 2019 (Gustafson el at 2016; Langness et al, 2018, O. Langness and R. Gufstafson pers comm 2019). For many of the years annual trends are similar to Fraser River Eulachon egg and larval survey trends but there are also divergent observations, such as for 2018 and 2019. In 2020, Columbia River Eulachon monitoring efforts were interrupted and/or cancelled from COVID-19 operating restrictions and results from the 2021 spawning season observations were not available at the time of writing this management plan.

Columbia River Egg and Larval Survey

Efforts to track and estimate annual estimates of relative abundance of Eulachon in the Columbia River watershed via egg and larval survey observations within and between spawning seasons have been conducted and supported by Washington and Oregon Departments of Fish and Wildlife and the U.S. National Marine Fisheries Service most years from 2000 to 2022. In general, Eulachon spawner abundance in the Columbia River watershed is at a much higher magnitude than levels seen in other Eulachon spawning rivers on the Pacific Coast.

Columbia River Eulachon Observations

There is a long time series of Eulachon catch landings for the Columbia River and its tributaries, stemming from the late 1890s to recent years, which show that landings generally exceeded 500 tonnes most years from 1915 to 1990 and exceeded 1,000 tonnes about a third of those years (Gustafson et al. 2022). Catch levels then declined drastically in the early 1990s from earlier levels in association with fishery regulations. Annual egg and larval survey efforts from 2000-2022 provide fishery independent information and spawning stock biomass (SSB) index estimates, although survey information for years 2004 and 2020 is lacking or limited, respectively.

A summary of Columbia River Eulachon biomass trends, based on survey estimates plus catch amounts follows (2000-2021 information from Gustafson et al. 2022; 2022 information from L. Heironimus pers comm 2022). The initial survey year in 2000 observed a low level of approximately 200 tonnes. Over 2001 to 2003, run size fluctuated at moderately lows levels around an average estimate of 2,700 tonnes. Over 2005 to 2010, run size fluctuated at low levels around an average estimate of 133 tonnes. Over 2011 to 2022, run size varied considerably increasing notably from approximately 1,500 tonnes in 2011 to approximately 7,000 tonnes in

2014, then gradually declining to a low level in 2018 (~ 168 tonnes). Over 2019-2021, moderately high levels were observed. In 2022, the highest level of biomass was detected in recent history (i.e. since the survey started) with an estimate of approximately 8,000 tonnes (L. Heironimus pers comm 2022).

The reasons for the contrast between Columbia River and Fraser River Eulachon observations are unclear. However, the Columbia River trends align more closely (by year and year lags) to CPUE relative abundance trends observed in the DFO west coast of Vancouver Island small mesh bottom trawl survey than do Fraser River Eulachon trends.

For more information on Columbia River Eulachon, please visit:
https://www.fisheries.noaa.gov/species/eulachon#conservation-management

2.5. RESEARCH

Scientific information compiled on the biology, distribution and fishery data of Fraser River Eulachon is documented in material related to: *Recovery Potential Assessment of Eulachon (Thaleichthys pacificus) in Canada* (Schweigert et al. 2012); the *Recovery Potential Assessment for Eulachon – Fraser River Designatable Unit* (DFO, 2015); the *Recovery Plan for the Southern Distinct Population Segment of Eulachon (Thaleichthys pacificus) and its 5-year review* (NMFS, 2022). In addition, ecological information associated with timing and magnitude of catch trends and biological sampling efforts are reported in *Monthly distribution and catch trends of Eulachon (Thaleichthys pacificus) from Juan de Fuca Strait to the Fraser River, British Columbia, October 2017 to June 2018* (Dealy and Hodes, 2019).

The 2011 CSAS research document (CSAS 2011/101) provides background information on Eulachon in support of a Recovery Potential Assessment (RPA) (see section 3.5). To view the CSAS paper, please visit the following site:
http://www.dfo-mpo.gc.ca/csas-sccs/Publications/ResDocs-DocRech/2011/2011_101-eng.html

To view the Recovery Potential Assessment (RPA) for the Fraser River Designatable Unit (DFO, 2015), please visit the following site:
http://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2015/2015_002-eng.html

To view the Recovery Potential Assessment (RPA) for Canada (Schweigert et al. 2012), please visit the following site:
http://www.dfo-mpo.gc.ca/csas-sccs/Publications/ResDocs-DocRech/2012/2012_098-eng.html

To view the U.S. 2017 Recovery Plan for the Southern Distinct Population Segment of Eulachon (NMFS, 2017) please visit the following site:
https://repository.library.noaa.gov/view/noaa/15989

To view the report on Monthly Distribution and Catch Trends of Eulachon from Juan de Fuca Strait to the Fraser River, British Columbia, October 2017 to June 2018 (Dealy and Hodes, 2019), please visit the following site: https://waves-vagues.dfo-mpo.gc.ca/Library/40811724.pdf

To view the report on Monthly Distribution and Catch Trends of Eulachon in Chatham Sound, British Columbia, July 2018 to March 2019 (Dealy and Hodes, 2021), please visit the following site: https://publications.gc.ca/collections/collection_2021/mpo-dfo/Fs97-4-3187-eng.pdf

3. MANAGEMENT ISSUES

The following sections highlight the on-going or longer-term management issues that are being addressed in this fishery.

3.1. LIMITED BIOLOGICAL INFORMATION

At present, there is limited biological information available for pre-season forecasting of spawner run size for Fraser River Eulachon.

The RPA (Schweigert et al. 2012) identifies several gaps in our knowledge of Eulachon biology and ecology, including limited information on ages, growth rates and mortality. The ability to identify genetic differences between populations, including the ability to identify the origins of fish in offshore mixed stock samples, would be useful for understanding the ecological roles of Eulachon and their responses to management actions, as well as the potential impacts from harvesting and habitat changes. Ongoing genetic analyses are being conducted to better characterize genetic variability of spawning fish within and between rivers. There is also uncertainty around the age of spawning, variability in annual growth rates, and degree to which Eulachon return to natal rivers. Based mostly on trends in fish length observations, it has been assumed that most fish live at sea for approximately three years or longer before returning to rivers to spawn. Effects of climate change on Eulachon ecology are also uncertain but improved understanding of habitat requirements for all life history stages and adult and juvenile prey requirements would help to inform integrated management in keeping with the principles of the DFO Sustainable Fisheries Framework.

Updated time series information of the biological indicators described in Hay et al. (2003) in relation to forecasting spawning stock strength to qualify fishery management decisions of Fraser River Eulachon collectively and individually appear to provide poor forecasting power for Fraser River Eulachon. DFO is seeking to better understand ecological information gaps and evaluate available data in order to move towards abundance-based methods for setting annual harvest levels.

3.2. FOOD, SOCIAL AND CEREMONIAL ACCESS

Indigenous peoples in the Lower Fraser Area have expressed the concern that their needs are not being met by their current level of access to Eulachon for FSC purposes. A review of the current FSC harvest level and the development of an abundance-based approach to determine harvest levels for future years have been requested by Indigenous peoples.

3.3. BYCATCH IN OTHER FISHERIES

Fraser River Eulachon are incidentally caught throughout BC in both shrimp trawl and groundfish trawl fisheries. A review of allowable bycatch and encounter protocols is requested by Indigenous peoples. There are concerns about bycatch levels in shrimp trawl and groundfish

trawl fisheries and the impacts this bycatch has to conservation targets and First Nations priority access to eulachon.

SHRIMP TRAWL FISHERY

Eulachon are not permitted to be retained in the shrimp trawl fishery; however, there may be incidental mortality from bycatch. Eulachon bycatch in the WCVI shrimp trawl fishery from 2006 to 2014, 2017 and 2018 was estimated to be 0.5 t or less. Higher shrimp landings resulted in Eulachon bycatch in 2015, 2016, 2019 and 2020 of 3.3, 14.6, 3.3 and 1.7 tonnes, respectively.

The Department has been working with the shrimp trawl industry to minimize Eulachon bycatch. The following management measures have been implemented in the WCVI shrimp trawl fishery to monitor and mitigate impacts of incidental catch of Eulachon:

1. In 2017/18 DFO implemented several new pilot initiatives to enhance Eulachon monitoring and support in-season management of the shrimp trawl fishery. For WCVI Pacific Fishery Management Areas (PFMAs) 124 and 125 the new initiatives included: (i) mandatory 100% at-sea observer coverage for all shrimp trawl fishing, (ii) a new non-transferable individual vessel Eulachon bycatch limit, (iii) a new individual vessel Eulachon bycatch overage adjustment, and (iv) mandatory dockside validation. At-sea observer requirements were also increased in WCVI PFMAs 21, 23, 121, and 123 to a minimum of 25% coverage rate. Eulachon bycatch monitoring will continue in the shrimp trawl fishery in 2023/24.

2. Mandatory bycatch reduction devices in shrimp trawl nets: A grid designed to reduce non-target fish species from entering the shrimp trawl net is mandatory for all shrimp trawlers. Specific details on grid spacing and deployment requirements are available in the Shrimp Trawl IFMP.

3. Commercial closure in Queen Charlotte Sound shrimp management area. No fishing has occurred within this area since 2000 because of concerns for Eulachon stocks in central coast rivers. Eulachon populations in BC are being considered for listing under the Species at Risk Act. Given the current SARA process and consultations, DFO is not considering any commercial harvest opportunities in QCSND during the 2022/23 season.

4. Eulachon Action Levels (EAL): An annual Eulachon bycatch action level is set for WCVI Shrimp Management Areas to encourage active shrimp trawl harvesters to adjust their gear to minimize Eulachon bycatch. In the event the estimate of Eulachon bycatch in a given WCVI area reaches the Eulachon Action Level, the commercial fishery will likely close. A precautionary approach has been taken to deal with Eulachon bycatch and the EAL has been reduced since 2011. The offshore Eulachon biomass index is no longer used to set the EAL. Since 2016/17, the EAL has been set at 4 t (reduced from 6 t in 2015/16).. The 4 t EAL is established for SMAs 121OFF, 23IN, 23OFF, 124OFF, and

125OFF combined. The EAL is further divided into two areas groups. If one of these two area groups does not open for commercial shrimp harvest, then that portion of the EAL may be allocated to the other area group. In addition, the Department has been working to reduce the time to receive observer data and implement closures when required.

Table 3: Eulachon Action Levels for West Coast Vancouver Island

Shrimp Management Area Group	Annual Eulachon Action Levels (EAL) (t)
124OFF and 125OFF	2.0
123OFF+121OFF and 23IN	2.0

The total EAL for the WCVI is 4 t. In-season Eulachon bycatch estimates for WCVI Shrimp Management Area (SMA) groups are based on data collected by at-sea observers, following the Pooled In-season (PI) method, defined by Hay (1999). The Eulachon to shrimp ratio from at-sea observations are applied to total estimated shrimp catch (hails) to generate an estimate of in-season Eulachon bycatch for WCVI. If estimated Eulachon bycatch meets or exceeds the EAL for the defined area, the area will be closed. The fishery has been closed due to the EAL being reached in 2000, 2016 and 2019. In 2016 the shrimp trawl fishery in shrimp management areas (SMA) 124OFF and 125OFF reached the EAL, resulting in a closure of the major offshore areas. SMA 23IN and 23OFF&21OFF remained open.

For further information on the shrimp trawl fishery, or for a copy of the current Shrimp Trawl Integrated Fisheries Management Plan, please contact Guy Parker, Resource Management Biologist (250-756-7163 / guy.parker@dfo-mpo.gc.ca) or Hong Tjhie, A/Non-Salmon Resource Manager (236-330-3240 / hong.tjhie@dfo-mpo.gc.ca).

5. In April 2018 the Department conducted consultations with First Nations and stakeholders on a proposed amendment to the Pacific Fisheries Regulations section 8(1) that would allow commercial shrimp trawl 'S' licenced vessels to use artificial lights (LEDs) on their fishing gear. Recent scientific research in the United States has indicated that the proper placement of LED lights on the trawl gear drastically reduces the amount of bycatch of several species, including Eulachon. In a 2015 study by Hannah et al., bycatch of Eulachon was reduced by approximately 90% by using the LED lights. In May 2019 a regulation amendment was approved for the Pacific Fisheries Regulations to allow the use of LED lights in the shrimp trawl fishery. Licence rules for the use and placement of the LEDs has been developed in the U.S. fisheries, and LED lights are required in the Oregon, Washington, and California shrimp trawl fisheries (ODFW, 2018) as part of their Eulachon Recovery Plan (NMFS, 2017). Following a recommendation by industry the use of LED lights was made mandatory in the shrimp trawl fishery in 2021/2022.

Groundfish Trawl Fishery

The Department continues to work with the groundfish trawl industry to ensure Eulachon avoidance by the fleet. The groundfish trawl fishery continues to be subject to one hundred (100)

per cent at-sea monitoring and one hundred (100) per cent dockside monitoring, individual vessel accountability for all catch (both retained and released), individual transferable quotas, and reallocation of these quotas between vessels and fisheries to cover catch of non-directed species.

The groundfish bottom trawl fishery has been subject to mandatory at-sea observer coverage for all fishing activities since 1996; however, in 2020, at-sea observer services were suspended to help protect the health of observers and fishers from the spread of COVID-19. Electronic Monitoring (EM) was implemented in April 2020 to ensure continued comprehensive and independent catch monitoring of the groundfish trawl fleet. Where an at-sea observer is not deployed to a vessel, one hundred (100) per cent at-sea monitoring shall be achieved through the use of an EM system, as described in Appendix 8 of the Groundfish Integrated Fisheries Management Plan. The EM program continues to be subject to ongoing adjustments and evaluation as an effective alternative to the At-Sea Observer Program.

Observer data indicate bycatch in the groundfish trawl fishery is typically low. Since 2007, Eulachon bycatch was estimated to be typically 0.7 tonnes or less, with the exception of four years: 2012 (1.8 tonnes), 2013 (1.8 tonnes), and 2014 (4.2 tonnes). Bycatch of Fraser River–bound Eulachon in the fishery was estimated to be 0.6 tonnes or less since 2007, with the exception of 2012 (1.2 tonnes), 2013 (0.8 tonnes), and 2014 (2.6 tonnes).

Current management measures in place for the groundfish trawl fishery include:

1. Groundfish trawl licences specifically prohibit the fishing for and retention of Eulachon.

2. The groundfish trawl fishery is subject to 100% at-sea monitoring and 100% dockside monitoring of catch.

3. DFO has implemented a minimum mesh size of 76 mm (approximately three inches) in any part of a bottom trawl or mid-water trawl net, including the cod-end, for all waters of the Pacific Ocean, except for specific areas where more restrictive rules are in place as outlined in the groundfish IFMP.

4. On April 2, 2012, DFO implemented a groundfish bottom trawl closure that “froze the bottom trawl footprint on the west coast of Canada” and implemented the industry agreed upon habitat conservation measures for protection of corals and sponges in the Pacific Region groundfish trawl fishery. A benefit for Eulachon of this closure was removal of current and future fishing activities in the shallow water habitat where Eulachon are known to be found.

5. DFO and the groundfish trawl industry will be developing encounter protocols for Eulachon that will require groundfish trawl harvesters to adjust their fishing activities when Eulachon are incidentally encountered. Encounter protocols are rapid-response procedures that could include bio sampling, enhanced monitoring and reporting requirements, immediate modification to vessel/fleet fishing activity and/or implementation of spatial/temporal closures.

For further information on the groundfish trawl fishery, or for a copy of the current Groundfish Integrated Fisheries Management Plan, please contact Deirdre Finn, Groundfish Trawl Coordinator (236-330-4139 / deirdre.finn@dfo-mpo.gc.ca).

3.4. OCEANS AND HABITAT CONSIDERATIONS

For the most up to date information, see website links, advisory board updates, and fisheries notices.

Oceans Act

The *Oceans Act* provides a foundation for an integrated and balanced national oceans policy framework supported by regional management and implementation strategies. The *Oceans Act* was amended in May 2019 to include interim protection measures, time limits for establishment, the precautionary principle, and to strengthen enforcement powers.

For more information on the *Oceans Act*, please visit the following site:
http://www.dfo-mpo.gc.ca/oceans/index-eng.html

Canada's Marine and Coastal Areas Conservation Mandate

To protect biodiversity and meet its marine conservation targets, Canada is establishing marine protected areas and other effective area-based conservation measures (OECMs), in consultation with First Nations, other levels of government, industry, non-governmental organizations, and the public.

More information is available online for:
Canada's marine conservation targets:
https://www.dfo-mpo.gc.ca/oceans/conservation/index-eng.html

Canada's marine protected and conserved areas:
https://www.dfo-mpo.gc.ca/oceans/conservation/areas-zones/index-eng.html

Marine refuges and fisheries management measures that qualify as OECMs:
https://www.dfo-mpo.gc.ca/oceans/oecm-amcepz/index-eng.html

Marine Protected and Conserved Areas

Canada uses a variety of legislative tools for marine conservation, depending on the lead federal department or agency and their coastal mandates. As goals, objectives, and management plans are finalized for these initiatives, DFO's management of fisheries will be adapted as appropriate, in consultation with interested parties through initiative-specific consultations and annual Integrated Fisheries Management processes. The implementation of spatial marine conservation initiatives is informed by considerations under the *Oceans Act, Fisheries Act* and the Sustainable Fisheries Policy suite, and mandate commitments to the Blue Economy Strategy and Reconciliation with First Nations.

For more information on Canada's marine conservation tools:

https://www.dfo-mpo.gc.ca/oceans/conservation/plan/index-eng.html

For more information see relevant legislation:
Marine refuges and other measures - *Fisheries Act*:
https://laws.justice.gc.ca/eng/acts/f-14/page-1.html

Marine Protected Areas - *Oceans Act*: https://laws-lois.justice.gc.ca/eng/acts/O-2.4/

National Wildlife Areas - *Canada Wildlife Act*:
https://laws.justice.gc.ca/eng/acts/w-9/page-1.html

National Marine Conservation Areas (Reserves): *National Marine Conservation Areas Act*:
https://laws.justice.gc.ca/eng/annualstatutes/2002_18/page-1.html

An overview map of federal marine conservation initiatives in Pacific region is provided in Figure 4, followed by a table outlining relevant details by initiative – both established and in progress. Many initiatives are types of marine protected areas (MPAs) or marine refuges (OECMs). See site-specific regulations and management plans for any restrictions on activities, or fisheries notices where applicable.

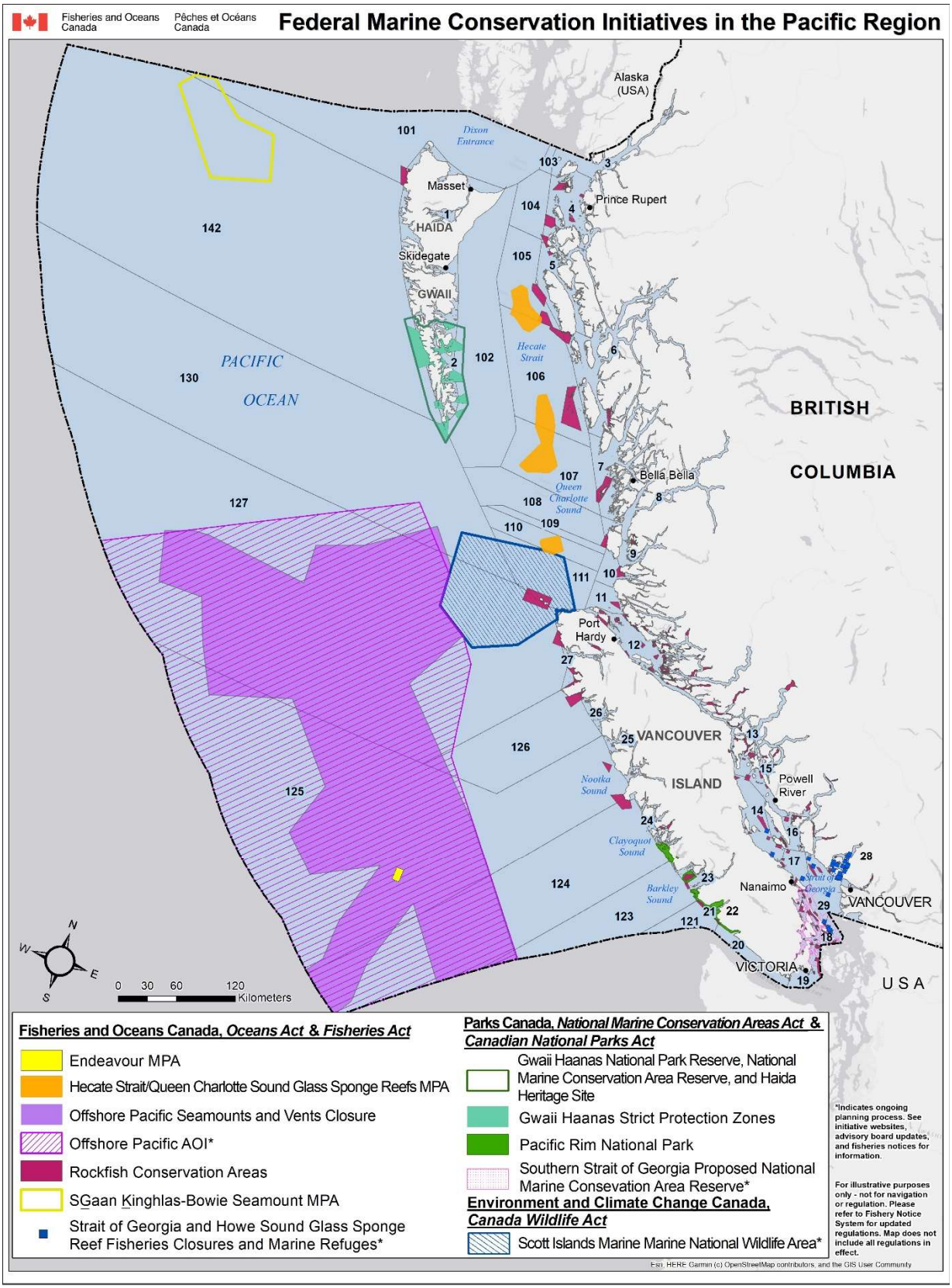

Figure 4: Pacific Fisheries Management Areas and Federal Marine Conservation Initiatives and Closures

Table 4: Overview of Federal Marine Conservation Initiatives in DFO Pacific Region (see Figure 4 map)

Name	Type	Lead	Weblinks	Contact	Fishery Considerations
Fisheries and Oceans Canada, *Ocean's Act* and *Fisheries Act*					
Endeavour Hydrothermal Vents MPA (EHV MPA)	MPA	DFO	http://www.dfo-mpo.gc.ca/oceans/mpa-zpm/endeavour/index-eng.html		See MPA regulations for details: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2003-87/ The EHV MPA is closed to all commercial and recreational fishing activities.
SGaan Kinghlas – Bowie Seamount MPA (SK-B MPA)	MPA	DFO & Council of Haida Nation	http://www.dfo-mpo.gc.ca/oceans/mpa-zpm/bowie-eng.html	Email: DFO.BowieMPA-ZPMBowie.MPO@dfo-mpo.gc.ca>	See MPA regulations for details: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2008-124/ The SK-B MPA is closed to all commercial fishing activities. The SK-B MPA is also closed to recreational and FSC bottom-contact fishing activities.
Hecate Strait and Queen Charlotte Sound Glass Sponge Reefs MPA (Hecate MPA)	MPA	DFO	http://www.dfo-mpo.gc.ca/oceans/mpa-zpm/hecate-charlotte/index-eng.html	Email: DFO.HSQCSMPA-ZPMDHBRC.MPO@dfo-mpo.gc.ca>	See MPA regulations for details: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2017-15/index.html In the Hecate MPA there are 3 different management zone types: **The entire MPA is closed to commercial bottom-contact fishing activities. Core Protection Zones (CPZ) are closed to anchoring and all fishing activities**. Vertical Adaptative Management Zones (VAMZs) and Adaptive Management Zones (AMZs) are closed to some commercial and recreational fishing activities.
Offshore Pacific Area of Interest & Fishery Closure*	Area of Interest for future MPA	DFO	https://www.dfo-mpo.gc.ca/oceans/oecm-amcepz/refuges/offshore-hauturiere-eng.html.		Specific details of the Offshore Pacific Seamounts and Vents Closure (Offshore Fishery Closure) can be found in the Fishery Notice FN1241 (2017). All bottom-contact commercial and recreational fishing activities are prohibited.
Strait of Georgia and Howe Sound Glass Sponge Reef Marine Refuges*	Marine Refuges	DFO	https://www.dfo-mpo.gc.ca/oceans/ceccsr-cerceef/closures-fermetures-eng.html		Specific details of the closures and restrictions on a site-by-site basis can be found in **Fisheries Notices FN0205** (2019), **FN0571** (2015), and **FN0039*** (2022). Prohibited commercial, recreational and Indigenous food, social and ceremonial (FSC) bottom-contact fishing activities include: • prawn and crab by trap • shrimp and groundfish by trawl

					• groundfish by hook and line • use of downrigger gear in recreational salmon trolling (in select sites via **Condition of Licence**). (Restrictions vary by site)
Rockfish Conservation Areas (RCAs)	RCAs	DFO	https://www.pac.dfo-mpo.gc.ca/fm-gp/maps-cartes/rca-acs/index-eng.html	DFO.RCA-ACS.MPO@dfo-mpo.gc.ca	There are 162 Rockfish Conservation Areas (RCAs) in British Columbia, covering roughly 4,350km^2 of the Canadian Pacific Coast. These areas are closed to a range of recreational and commercial fisheries to protect inshore rockfish and their habitat. On website, see individual RCAs by area for details.
Parks Canada, *National Marine Conservation Areas Act*					
Gwaii Haanas National Park Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site	NMCAR	Parks Canada	https://www.pc.gc.ca/en/pn-np/bc/gwaiihaanas	gwaiihaanas@pc.gc.ca	Refer to **Fishery Notice FN0536 (2019)**, released June 13, 2019 for a detailed description of the Strict Protection Zones. There is "no extraction or harvesting by anyone of the resources of the lands and non-tidal waters of the Archipelago for or in support of commercial enterprise" (s3.3). Contact the Gwaii Haanas administration office: 1-877-559-8818
Pacific Rim National Park Reserve	National park marine area	Parks Canada	https://www.pc.gc.ca/en/pn-np/bc/pacificrim	Pacrim.info@pc.gc.ca	Park regulations can be found at: https://laws-lois.justice.gc.ca/eng/acts/N-14.01/page-8.html#h-362395
Southern Strait of Georgia National Marine Conservation Area Reserve*	NMCAR	Parks Canada	https://www.pc.gc.ca/en/amnc-nmca/cnamnc-cnnmca/dgs-ssg	straitofgeorgianmca@pc.gc.ca	The most up to date information can be found at: https://www.pc.gc.ca/en/amnc-nmca/cnamnc-cnnmca/dgs-ssg/savoir-learn
Environment and Climate Change Canada, *Canada Wildlife Act*					
Scott Islands Marine National Wildlife Area*	mNWA	ECCC	https://www.canada.ca/en/environment-climate-change/services/national-wildlife-areas/locations/scott-islands-marine.html	DFO.ScottIslands-IlesScott_MPO@dfo-mpo.gc.ca	The Scott Islands Protected Marine Area Regulations can be found at: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2018-119/index.html
Indicates ongoing planning process. See initiative websites, advisory board updates, and fisheries notices for information.					

Marine Spatial Planning in Canada
Marine spatial planning aims to improve coordination across jurisdictions and activities in the marine space. It is a practical, internationally recognized process that enables the Government of Canada to plan and coordinate ocean activities in collaboration with provincial, territorial, and Indigenous governments. Marine spatial planning considers the range of human activities planned for a given marine area over time (such as fishing, cultural uses, conservation areas, energy development, etc.) to keep our oceans healthy and productive for generations to come.

For more information on marine spatial planning in Canada:
https://www.dfo-mpo.gc.ca/oceans/management-gestion/msp-psm/index-eng.html

Marine Spatial Planning North
The Northern Shelf Bioregion, which extends from the top of Vancouver Island and reaches north to the Canada - Alaska border, has a long history of marine spatial planning as highlighted below.

More information on marine spatial planning on Pacific's north coast can be found at:
https://www.dfo-mpo.gc.ca/oceans/publications/backgrounder-fiche/marinespatialplanning-planificationespacemarin/index-eng.html

Pacific North Coast Integrated Management Area (PNCIMA)
Endorsed in 2017, the Pacific North Coast Integrated Management Area (PNCIMA) plan was developed, in collaboration with the Province of British Columbia, First Nations and stakeholders to help coordinate various ocean management processes and to complement existing processes and tools, including IFMPs.

The PNCIMA Plan is available online at: https://www.dfo-mpo.gc.ca/oceans/management-gestion/pncima-zgicnp-eng.html

Northern Shelf Bioregion Marine Protected Area Network Planning Process
The Government of Canada, the Province of BC and First Nations are working together to develop a planned approach for a Network of marine protected areas for the Northern Shelf Bioregion. The planning process is being developed under the policy direction outlined in the National Framework for Canada's Network of MPAs, the Canada-British Columbia MPA Network Strategy, and is informed by previously developed First Nation marine plans and the BC Marine Planning Process.

More information on the MPA Network planning process is available at:
http://www.mpanetwork.ca

Marine Spatial Planning Southern BC
As part of a national marine spatial planning (MSP) initiative, DFO in collaboration with the Province of BC, federal departments (Transport Canada, Natural Resources Canada, Environment and Climate Change Canada, Parks Canada and others), Indigenous groups, and stakeholders are amidst 'early planning' efforts in the Strait of Georgia and Southern Shelf bioregions (Southern BC planning area). Early Planning is focused on gathering information and

setting the stage for working collaboratively. Marine spatial planning is a collaborative process that brings federal and provincial governments, indigenous communities as well as organizations, and stakeholders together to coordinate how we collectively use marine spaces to achieve ecological, cultural, social, and economic objectives. Key deliverables for the Southern BC MSP process include the Canada Marine Planning Atlas (Pacific), and a Framework (or guide) that gathers information from the 'early planning' phases to inform future planning phases.

More information on marine spatial planning can be found at:
https://www.dfo-mpo.gc.ca/oceans/management-gestion/msp-psm/index-eng.html

3.5. SPECIES AT RISK ACT (SARA)

The *Species at Risk Act (*SARA) came into force in 2003. The purposes of the *Act* are "to prevent wildlife species from being extirpated or becoming extinct, and to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity and to manage species of special concern to prevent them from becoming endangered or threatened."

SARA contains several prohibitions to protect species listed on Schedule 1 of SARA. Under sections 32 and 33 of SARA, it is an offence to: 1) kill, harm, harass, capture or take an individual of a wildlife species listed as extirpated, endangered or threatened under SARA; 2) possess, collect, buy, sell or trade an individual (or any part or derivative of such an individual) of a wildlife species listed as extirpated, endangered or threatened under SARA); and 3) damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered or threatened species, or that is listed as an extirpated species if a recovery strategy has recommended its reintroduction into the wild in Canada. These prohibitions apply unless a person is authorized, by a permit, license or other similar document issued in accordance with SARA, to engage in an activity affecting the listed species or the residences of its individuals. Species listed as special concern are not included in these prohibitions. Section 58(1) contains provisions to prohibit the destruction of any part of the critical habitat of listed endangered or threatened species or of any listed extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada. Critical habitat is the habitat necessary for the survival or recovery of a listed wildlife species and is identified in the recovery strategy or an action plan for these species.

Please visit the Species at Risk Public Registry for the most up to date list of aquatic species that are currently listed under the Species at Risk Act, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status reports and associated recovery documents.

COSEWIC was formed in 1977 to provide Canadians with a single, scientifically sound classification of wildlife species at risk of extinction. COSEWIC began its assessments in 1978 and has met each year since then to review information collected to assess wildlife species. With the proclamation of SARA, COSEWIC has been established as an independent advisory panel responsible for identifying and assessing wildlife species considered to be in danger of disappearing in Canada. The assessments are carried out in accordance with section 15 of SARA,

which, among other provisions, requires COSEWIC to determine the status of species it considers and to identify existing and potential threats. This is the first step towards protecting wildlife species at risk. Subsequent steps include COSEWIC reporting its results to the Canadian government and the public, and the Minister of Environment and Climate Change's official response to the assessment results. Wildlife species that have been designated by COSEWIC may then qualify for legal protection and recovery under SARA.

Species designated by COSEWIC that are currently under consideration for listing under SARA that may be encountered in the Fraser River Eulachon fishery include:

- White Sturgeon
  - Lower Fraser River DU – Threatened
- Fraser Sockeye Salmon
  - Alouette-ES population – Special Concern
  - Bowron-ES population – Endangered
  - Coquitlam-ES population – Special Concern
  - Cultus-L population – Endangered Francois-Fraser-S population – Special Concern
  - Fraser-ES population - Endangered
  - Harrison D/S-L population – Special Concern
  - Harrison U/S-L population – Endangered
  - Kamloops-ES population – Special Concern
  - Lillooet-Harrison-L population – Special Concern
  - Nahatlatch-ES population – Special Concern
  - North Barriere-ES population – Threatened
  - Momich-ES population – Endangered
  - Quesnel-S population – Endangered
  - Seton-L population – Endangered
  - Takla-Trembleur-EStu population – Endangered
  - Takla-Trembleur-Stuart-S population - Endangered
  - Taseko-ES population – Endangered
  - Widgeon River-Type population – Threatened
- Coho Salmon – Interior Fraser population – Threatened
- Southern BC Chinook Salmon
  - Lower Fraser, Ocean, Fall population – Threatened
  - Lower Fraser Ocean Summer population – Endangered
  - Lower Fraser, Stream, Spring population – Special Concern
  - Lower Fraser, Stream, Summer (Upper Pitt) population – Endangered
  - Lower Fraser, Stream, Summer population – Threatened
  - Lower Thompson, Stream, Spring population - Endangered
  - Middle Fraser, Stream, Fall population – Endangered
  - Middle Fraser, Stream, Summer population - Threatened
  - Middle Fraser, Stream, Spring (MFR+GStr) population – Threatened
  - Middle Fraser, Stream, Spring population – Endangered
  - North Thompson, Stream, Spring population – Endangered
  - North Thompson, Stream, Summer population – Endangered
  - South Thompson, Stream, Summer 1.2 population – Endangered

- South Thompson, Stream, Summer 1.3 population - Endangered
- Upper Fraser, Steam, Spring population – Endangered

SARA Listing Process for Fraser River (and Central Pacific Coast) Eulachon

COSEWIC Assessment 2011: COSEWIC assessed Eulachon in BC as three Designatable Units (DU's), as follows: the Fraser River DU as Endangered, the Central Pacific Coast DU as Endangered, and the Nass/Skeena Rivers DU as Threatened (and it was subsequently reassessed as Special Concern in 2013).

SARA Listing Process: The COSEWIC assessment triggered the Government of Canada to consider listing these populations under SARA. A process to determine whether or not to list all three populations under SARA is underway, and a decision has not yet been made.

The regional listing process included the development of science advice, via a Recovery Potential Assessment for Eulachon (Schweigert et al. 2012), available at: http://www.dfo-mpo.gc.ca/csas-sccs/Publications/ResDocs-DocRech/2012/2012_098-eng.html; management scenarios that outline actions the Department can take in the event of, and of not, listing under SARA (completed in 2014); a socio-economic analysis weighing the costs and benefits of each scenario (completed in 2016); as well as consultation to seek input into whether or not to list these populations (completed 2011-2016, 2020).

In developing the SARA listing advice, the Governor in Council considers the following components for species assessed as Extirpated, Endangered or Threatened (such as the Fraser River and Central Pacific Coast populations of Eulachon):

- best scientific advice (e.g. Recovery Potential Assessments, COSEWIC Assessment);
- management scenarios;
- a Socio-Economic Analysis; and
- consultation with Indigenous peoples, Wildlife Management Boards affected stakeholders and the Canadian public.

Given the Nass/Skeena population was assessed as Special Concern, and the prohibitions would not apply, a simplified process occurred.

Recovery Potential Assessment (RPA): The RPA provides the Department's scientific advice in support of this SARA decision. Please see section 2.6 for further information.

Management Scenarios: Management scenarios were developed in consultation with Indigenous peoples and commercial sector representatives. Management scenarios outline actions the Department may take in the event that the Fraser River and/or Central Pacific Coast populations of Eulachon is listed under SARA, as well as those actions that will be taken under existing legislation (e.g. the *Fisheries Act*) in the event that Eulachon are not listed under SARA.

Socio-Economic Analysis*:* Federal policy (Cabinet Directive on Regulatory Management, 2012) requires an analysis of benefits and costs for regulatory decisions, such as whether or not to list a species under SARA. The Socio-Economic Analysis (SEA) of the management scenarios provides an estimate of the benefits and costs to Canadians of a SARA listing, as well as the distribution of these benefits and costs among stakeholders. The Canadian Cost-Benefit Analysis

(CBA) Guide (2007) provides the framework and methodology to be used for all regulatory changes, including SARA listings.

The SEA identifies, quantifies and monetizes, where possible, the incremental costs and benefits of the actions identified in the Management Scenarios. Where the impacts cannot be monetized or quantified, they are described in qualitative terms. The SEA also considers the potential social impacts of the scenarios, specifically examining measurable impacts such as employment and income impacts across affected parties and regions.

Listing Consultations: The Department has sought input since 2011 into the development of the RPA, Management Scenarios, and Socio-Economic Analysis for the Fraser River and Central Pacific Coast populations. An Indigenous technical review of the Socio-Economic Analysis was conducted in 2015.

In recognition of the cultural significance of Eulachon, an Indigenous specific consultation plan was developed in fall 2011. Initial consultations were conducted in February to June 2012 with Indigenous peoples throughout the coast to clarify the SARA process and create an opportunity for discussion on the topic.

Consultation with Indigenous peoples, Wildlife Management Boards, stakeholders, and interested members of the public on whether or not to list the Fraser River and/or Central Pacific Coast population as Endangered under SARA occurred August 30-November 30, 2016. The consultation process for the Nass/Skeena population occurred between 2013 and 2016. Input was sought online via a web-based survey, by phone, letter, email, webinars, and meetings. The Department's Recovery Potential Assessment, Management Scenarios, and Socio-Economic Analysis for the Fraser River and Central Pacific Coast populations of Eulachon were made available during this consultation period. In fall 2020, the Department undertook a "check-in" engagement to ensure that viewpoints and information shared during 2016 consultations remain accurate and current. The Department considers input received from Indigenous peoples, Wildlife Management Boards, affected stakeholders, and the Canadian public in the developing of listing advice. The listing process for all three populations of Eulachon is ongoing and no decision has yet been made regarding the addition of these populations to SARA Schedule 1.

3.6. WHALE, TURTLE AND BASKING SHARK INCIDENT AND SIGHT REPORTS

Marine Mammal Incident Reporting Hotline

The Department is responsible for assisting marine mammals and sea turtles in distress. If your vessel strikes a whale, or if you observe an entangled, sick, injured, distressed, or dead marine mammal in B.C. waters, please contact the B.C. Marine Mammal Response Network Incident Reporting Hotline immediately:

1-800-465-4336 OR VHF CHANNEL 16

What to report:

- Your name and contact information
- Date and time of incident
- Location: Latitude/Longitude coordinates, landmarks
- Species
- Animal alive/dead (animal condition)
- Nature of injury and supporting details (if possible)
- Pictures/Video taken

Best practices to reduce entanglement and reporting an incident: https://www.pac.dfo-mpo.gc.ca/fm-gp/mammals-mammiferes/whales-baleines/docs/entanglements-empetrements-pub-eng.html.

Marine Mammal Sighting Reporting

The Department appreciates your assistance in tracking the sightings of live cetaceans (whales, dolphins and porpoises), sea turtles and Basking Sharks. While there are many whale species found in Pacific Canadian waters, sightings of Basking Shark and Leatherback Sea Turtles are infrequent. The collection of sighting data is useful to scientists in determining population size and species distribution and aids in recovery efforts under the *Species at Risk Act* (SARA).

To report whale or turtle sightings contact the BC Cetacean Sighting Network:
Toll free: 1.866.I.SAW.ONE (1-866-472-9663)
Email: sightings@ocean.org
Website: http://wildwhales.org/
App: WhaleReport

To report basking shark sightings contact the Basking Shark Sightings Network:
Toll free: 1-877-50-SHARK (1-877-507-4275)
Email: sharks@dfo-mpo.gc.ca,
Website: www.pac.dfo-mpo.gc.ca/SharkSightings

Guides to distinguish between pinnipeds, emphasizing differences between Steller and California Sea Lions can be found here:
Website: https://wildwhales.org/wp-content/uploads/2020/08/BCCSN_IDGuide_Pinniped_email.pdf,

Between Sea and River Otters:
Website: https://wildwhales.org/wp-content/uploads/2020/05/BCCSN_IDGuide_Otters_vertical_4.pdf

3.7. GEAR IMPACTS

Under normal operating circumstances, there is minimal to no environmental impact from gear types used in the Eulachon fishery.

3.8. AQUACULTURE

On December 19, 2010, DFO assumed the role of lead federal department for sustainable management of aquaculture. Under the *Fisheries Act,* the *Pacific Aquaculture Regulations* and the *Aquaculture Activity Regulations* govern finfish, shellfish and freshwater aquaculture operations in BC. Cultivation of fish within the province requires a federal aquaculture licence issued by Fisheries and Oceans Canada. Approvals from other agencies may be required, depending upon the location and type of aquaculture activity proposed.

Pacific Aquaculture Regulations:
http://laws-lois.justice.gc.ca/eng/regulations/SOR-2010-270/FullText.html

Aquaculture Activity Regulations:
http://laws-lois.justice.gc.ca/eng/regulations/SOR-2015-177/page-1.html

Integrated Management of Aquaculture Plans (IMAPs) consistent with IFMPs, which are used to govern wild harvest fisheries, have been developed to provide an overview of the management framework for aquaculture. For further information refer to:
http://www.dfo-mpo.gc.ca/aquaculture/aquaculture-eng.htm.

4. OBJECTIVES

4.1. NATIONAL

Fisheries and Oceans Canada aims to:

- Meet conservation objectives and ensure healthy and productive fisheries and ecosystems;
- Base management decisions on the best available scientific information;
- Manage Indigenous fisheries for FSC purposes in a manner consistent with the Sparrow Decision (SCC 1990) and other relevant court decisions (*R v. Gladstone 1996 and Ahousaht*) and treaty obligations;
- Provide stability, transparency, and predictability in fisheries management and improved governance; and
- Foster shared stewardship.

4.2. PACIFIC REGION

The overall goal of Fisheries Management in the Pacific Region is the conservation of Canada's fisheries resources to ensure sustainable resource utilization and generate economic prosperity, accomplished through close collaboration with resource users and stakeholders based on shared stewardship consistent with treaty and Indigenous rights. Fisheries Management is responsible for management of the Indigenous, commercial and recreational fishing in the Pacific Ocean and creating the conditions for a vibrant and innovative aquaculture industry.

Fisheries Management will continue to develop and implement the Sustainable Fisheries Framework by integrating the precautionary and ecosystem approach frameworks into IFMPs with the goal of protecting vulnerable marine and freshwater ecosystems and vulnerable stocks from significant adverse impacts, and to help ensure long term sustainability and support economic prosperity.

In 1994, the Biological Objective Working Group of the Pacific Scientific Advice Review Committee (PSARC) identified three biological objectives for management of Pacific Region fish and invertebrate stocks (Rice et al, 1995):

- Ensure that subpopulations over as broad a geographical and ecological range as possible do not become biologically threatened (in the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) sense of "Threatened").
- Operationally, Objective 1 requires at least that management allow enough spawners to survive, after accounting for all sources of mortality (including all fisheries and natural mortality), to ensure production of enough progeny that they will, themselves, be able to replace themselves when mature.
- Fisheries may have collateral effects on other species, mediated by the ecological relationships of the target species. Fisheries should be managed in ways that do not violate the above objectives for ecologically related species, as well as target species.

The objectives remain relevant today, particularly in light of development of the national objectives around sustainable fisheries.

4.3. EULACHON RESOURCE MANAGEMENT

The objective of the current Eulachon fishery is to respond to conservation concerns with Fraser River Eulachon stocks and introduce measures to allow for stock rebuilding. Specific objectives are detailed below, and respective performance measures are further described in the management measures for the Indigenous, recreational and commercial fishing plans (Appendices 3, 4, and 5):

Recovery Target

A coast-wide recovery target for Eulachon is, at a minimum, to "promote the populations' recovery such that it can qualify as special concern within the COSEWIC assessment criteria", with an interim goal of observing "positive growth in Eulachon spawning in river systems throughout" the Designatable Unit ranges, and a long term goal of seeing the populations reach historic levels (Schweigert et al. 2012).

For the Fraser River population, COSEWIC assessed this population as endangered based on an observed population decline of greater than 50% over three generations (approximately 10 years for Eulachon). Recovery for Fraser River Eulachon "should be reflected in an increase in this index to historical levels." The first goal "would be a population increase that would exceed COSEWIC's criteria for endangered status, and bring the assessment down to a species of special concern," and "additional rebuilding would be required to bring the Fraser River [Designatable Unit] to a point where it was not at risk based on COSEWIC criteria" (Schweigert et al. 2012). In addition, "distribution targets for the population would include an expansion of sustained spawning ranging to the historical extent" (Schweigert et al. 2012).

Environmental and Ecological Conservation

To ensure conservation and protection of Eulachon stocks and their habitat, and manage for ecosystem impacts through the application of scientific management principles applied in a risk averse and precautionary manner based on the best scientific advice available.

Consultation Process

Conduct an open and transparent consultation process for discussions of harvest management issues related to Eulachon harvest. DFO currently does not have a consultative body related to harvest planning for this fishery, but is conducting extensive consultation with Indigenous peoples and stakeholders.

Indigenous Peoples

To ensure that, subject to conservation needs, first priority is accorded to Indigenous peoples for opportunities to harvest Eulachon for FSC purposes. Feedback from consultations sessions is relied on to measure the performance of providing priority to Indigenous peoples for opportunities to catch fish for FSC purposes.

Limited harvest opportunities will provide access to Indigenous peoples for FSC purposes while meeting conservations objectives. Maintaining harvest at low levels will increase the probability of rebuilding Fraser River Eulachon stocks. The Department will manage the Fraser Eulachon fisheries conservatively in 2023.

4.4. COMPLIANCE

Conservation and Protection (C&P) staff promote, monitor and enforce compliance with legislation, regulation and management measures to ensure conservation and sustainable use of fisheries resources, including Eulachon.

For more information see the Compliance Plan, Section 7.

5. ACCESS AND ALLOCATION

The Minister can, for reasons of conservation or for any other valid reasons, modify access, allocations, and sharing arrangements as outlined in this IFMP in accordance with the powers granted pursuant to the *Fisheries Act*.

5.1. INDIGENOUS

Indigenous harvest of Eulachon for FSC purposes may occur where authorized by a communal licence. The Department will provide Indigenous peoples with priority access to the resource for FSC purposes. FSC quotas may be determined through bilateral discussions between Indigenous peoples and the Department.

5.2. RECREATIONAL

Recreational harvest of Eulachon is closed coast wide in tidal waters and freshwater.

5.3. COMMERCIAL

The commercial harvest of Eulachon is a limited entry fishery. There are currently 16 party-based ZU licence eligibilities; however the fishery has been closed since 2004.

6. SHARED STEWARDSHIP ARRANGEMENTS

In the past, some co-operative work has been done coast-wide, including donations of time, money, vessels, gear, samples, and offshore surveys. These measures have contributed to our knowledge about Eulachon in the Pacific Region. Indigenous peoples and stakeholders have provided assistance in obtaining information on spawner distribution, in-season test fishery data, and survey data. Also, the commercial shrimp trawl industry provided survey assistance for the offshore index (WCVI and Queen Charlotte Sound).

The Department's Aboriginal Fisheries Strategy (AFS) (https://www.dfo-mpo.gc.ca/fisheries-peches/aboriginal-autochtones/afs-srapa-eng.html) has provided funds for Indigenous peoples to assist in the spawner distribution work and the egg and larval surveys including the egg and larval survey that provides the annual SSB estimate for the Fraser River area.

7. COMPLIANCE PLAN

DFO's Conservation and Protection (C&P) program is responsible for enforcing the *Fisheries Act*, pursuant regulations and related legislation. Enforcement activities are carried out by Fishery Officers across Canada who conduct patrols on land, at sea and in the air.

The Department promotes compliance with the law through a range of activities from education and awareness activities that encourage Canadians to protect fishery resources and habitats, patrol activities to detect violations, and major case management. These activities are further outlined in the C&P National Compliance Framework.

There are approximately 173 fishery officers stationed in the Pacific Region, which encompasses British Columbia and Yukon Territory. They are designated as "Fishery Officers" under Section 5 of the *Fisheries Act*. The *Fisheries Act* and the *Criminal Code of Canad*a are the primary pieces of legislation outlining the powers and responsibilities of Fishery Officers. Officers are designated under other Acts as well, such as the *Coastal Fisheries Protection Act* and *Species at Risk Act*.

Conservation and Protection Fishery Officers are supported by the National Fisheries Intelligence Service, whose staff provide intelligence analysis services and assist in identifying targets for enforcement action. A process to incorporate information of value to the intelligence cycle has been developed. This process allows Fishery Officers, Resource Managers and stock assessment staff to collect and submit this information on a timely basis.

Users of the resource have a responsibility to report violations. Any suspected or actual fisheries, wildlife or pollution violations can be quickly and discretely reported to the appropriate enforcement officer by using the toll free observe, record and report hotline. This toll free number is available 24 hours a day.

OBSERVE, RECORD AND REPORT 1-800-465-4DFO (1-800-465-4336) or DFO.ORR-ONS.MPO@dfo-mpo.gc.ca

Enforcement enquiries can also be directed to the local field offices during regular office hours.

7.1. MAIN PROGRAM ACTIVITIES

Priorities for 2023

Enforcement priorities and strategies for the 2023 Eulachon fisheries will be developed and coordinated with local C&P and Fisheries Management staff.

In-season and post-season reviews will be conducted to ensure the best approach and strategies are used in the management of this fishery.

C&P endeavors to work with First Nations groups to build relationships. Fishery guardians are integral to this process and are very important to the enforcement program. C&P conducts joint

patrols of First Nations fisheries and strives to complete enforcement protocols to better define the working relationship.

In-season

Fishery Officers will conduct directed and opportunistic patrols of the fishing area. Patrols during open and closed times will be conducted taking into consideration competing priorities and resources. Fishery Officers may also conduct general compliance inspections at various locations such as border crossings, air cargo locations, fish processing facilities or fishing supply and tackle stores where baitfish are sold.

Illegal fishing activity may be reported through the Observe, Report, and Record line at 1-800-465-4336 or DFO.ORR-ONS.MPO@dfo-mpo.gc.ca. Fishery Officers attempt to follow through on the reports as often as priorities, time and resources allow.

Table 5: Enforcement Issues and Strategies

Issue	Strategy
Gear and effort compliance during open time/area	Enforcement patrols will be conducted when opportunities exist.
Fishing during closed time/area	Enforcement patrols will be conducted when opportunities exist.
Purchase, sell, or possess any fish without a licence	Investigations will occur when violations are encountered or reported.

8. PERFORMANCE REVIEW

8.1. MANAGEMENT PLAN EVALUATION CRITERIA

National

Eulachon conservation objectives are met.
Reasonable effort has been made to provide harvest opportunities and still maintain conservation objectives.
Consultation and management processes are stable, transparent, and predictable.

Pacific Region

Both the commercial and recreational fisheries remain closed and Indigenous peoples may apply for harvest of small amounts of Fraser River Eulachon for FSC purposes that are considered on a case by case basis.

Eulachon Resource Management

Environmental and Ecological Conservation

- Conservation and protection of Eulachon stocks will be carried out by applying a conservative management regime in light of the limited biological information available for Fraser River Eulachon.
- Collect relevant information by geographic location and time period when possible.

Consultation

- Where possible, facilitate consensus building among stakeholders on issues related to the management of the fishery.

Indigenous Peoples

- DFO will consult with Indigenous peoples in order to determine their FSC requirements. Indigenous peoples will be authorized to fish for FSC purposes on a priority basis for small amounts for Fraser River Eulachon through use of a communal licence.

Commercial

- Maintain a precautionary closure of the fishery for population rebuilding in tidal waters and freshwater.

Recreational

- Maintain a precautionary closure of the fishery for population rebuilding in tidal waters and freshwater.

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APPENDIX 1: 2022 POST-SEASON REVIEW

Indigenous Fisheries: In 2022, Indigenous peoples' access to Eulachon for food, social and ceremonial (FSC) purposes was managed through communal Aboriginal fishing licences on the Fraser River. Harvest opportunities were provided on a case-by-case basis per Band up to the maximum harvest level target of 15,807 lb (7.17 t) total. The total Eulachon harvest in 2022 was 1,673 lb (0.76 t).

Recreational Fisheries: There were no recreational fisheries for Eulachon on the Fraser River in 2022.

Commercial Fisheries: There were no commercial fisheries for Eulachon on the Fraser River in 2022.

New Westminster Test Fishery: The New Westminster test fishery was not conducted in 2022.

LFFA Gillnet Survey Project: The New Westminster gillnet catch per unit effort survey was conducted in 2017 to 2022.

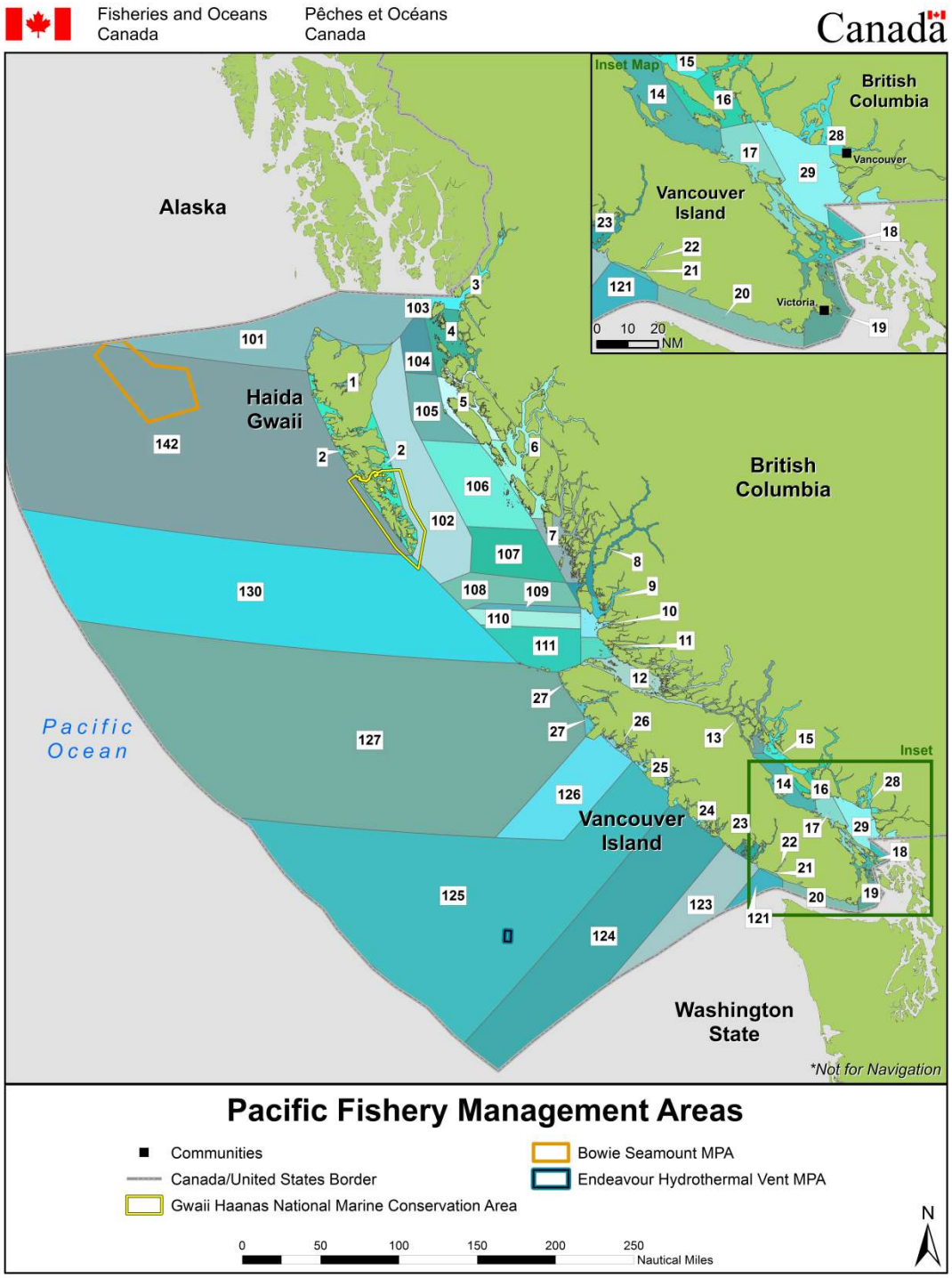
Egg and Eulachon Larval Survey: The survey was conducted again in 2022, over the standard 7-week period preceded by three additional weeks of sampling for a 10-week total period. The standard 7-week period in 2022 consisted of sampling from April 18 to June 2, 2022.

Number of Survey Weeks	Timing	South Arm SSB Index (tonnes)	North Arm SSB Index (tonnes)	Total SSB Index (tonnes)
7	April 18– June 2	7.9	2.2	10.1
10	March 28– June 2	10.7	2.7	13.4

In 2022, densities and outflow estimates of Eulachon progeny from all sampling sites were relatively low and highly variable over the entire 10 week sampling period with minimal distinction of peak periods, although the greatest variability and largest mean densities by day were observed over the first two weeks (March 28-April 7) and last 4 weeks (May 5-June 2).

For more information on the survey results for 1995 to 2016, visit http://www.pac.dfo-mpo.gc.ca/science/species-especes/pelagic-pelagique/herring-hareng/herspawn/pages/river1-eng.html. For information on survey results after 2017, please contact Linnea Flostrand, Aquatic Science Biologist / linnea.flostrand@dfo-mpo.gc.ca).

APPENDIX 2: MAP OF FISHING AREAS



APPENDIX 3: 2023 INDIGENOUS FISHING PLAN

The Department is committed to improving its relationship with Indigenous peoples. Indigenous fisheries play an important role in this relationship and, therefore, are an integral part of fisheries resource management in the Pacific Region. Through consultation, cooperative management and stewardship activities, DFO and Indigenous groups are working together to build strong, healthy relationships and a sustainable fishery.

Through the Aboriginal Fisheries Strategy, the Department seeks to negotiate with Indigenous groups regarding access for food, social and ceremonial (FSC) purposes. Subject to conservation, this access has priority over access for commercial and recreational harvest.

A maximum FSC harvest for Fraser River Eulachon of 15,035 pounds (lb) (6.82 tonnes (t)) will be permitted in 2023. This is a slight decrease from the 15,807 lb (7.17 t) limit in 2022, the 15,486 lb (7.02 t) limit in 2021, the 10,538 lb (4.78 t) limit in 2020, the 9,652 lb (4.38 t) limit in 2019, the 6,275 lb (2.85 t) limit in 2018, the 6,059 lb (2.75 t) limit in 2017, and the 3,445 lb (1.56 t) in limit in 2016 (see Table 1). From 2021-2022, a pilot licence for cast nets was also issued as an alternative gear type to provide further opportunities in the FSC fishery.

Since 2015 the method used to calculate the maximum harvest level has involved using a percentage of the average of Fraser Eulachon egg and larval survey Spawning Stock Biomass (SSB) index for a 2 to 3 Eulachon generation time span (i.e. assuming typically 3 years = 1 generation). In 2015, the maximum harvest level was set at 2% of the average of the previous 6 years (i.e. 2 generations) of SSB index values. In 2016, the method was revisited and instead the maximum harvest level was set at 2% of the average of the previous 9 years (i.e. 3 generations) of SSB index values. The longer time span was chosen in order to take into account year-to-year variation in SSB index values and Eulachon returns. Moreover, evaluating three generations or 10 years (whichever is greater) is the International Union for the Conservation of Nature (IUCN) criterion commonly used by the Committee of the Status of Endangered Wildlife in Canada (COSEWIC) for evaluating population trends. Two percent was chosen as a conservative harvest rate. Since 2017, 3.5% of the average of the previous 9 years has been used to calculate the maximum harvest level; this harvest level is still conservative and is intended to accommodate requests for an increased harvest to meet the FSC needs of Indigenous peoples.

Advice is being sought from DFO Science to inform coastwide abundance. In 2023, a harvest level of 3.5% of the average of the previous 9 years of the SSB index will be used.

Table 6: Recent Fraser River Eulachon Indigenous food, social and ceremonial fishery harvest level setting methodologies and maximum harvest levels.

Year	Harvest Rate	SSB index timespan used to calculate harvest level	Maximum harvest level (tonnes)	Maximum harvest level (pounds)
2014	NA	NA	0.36	800
2015	2%	Average of previous 6 years	1.12	2,469
2016	2%	Average of previous 9 years	1.56	3,445
2017	3.5%	Average of previous 9 years	2.75	6,059
2018	3.5%	Average of previous 9 years	2.85	6,275
2019	3.5%	Average of previous 9 years	4.38	9,652
2020	3.5%	Average of previous 9 years	4.78	10,538
2021	3.5%	Average of previous 9 years	7.02	15,486
2022	3.5%	Average of previous 9 years	7.17	15,807
2023	3.5%	Average of previous 9 years	6.82	15,035

This approach will provide access to Indigenous peoples for FSC purposes while supporting conservation and rebuilding objectives. Access to Fraser River Eulachon will be determined on a case-by-case basis through discussions with Indigenous groups and the DFO Fraser and Interior Area office staff. Specific fishing plans are developed through these consultations and fishing plan discussions.

DFO will continue to use management measures for communal licences, such as: gear restrictions, shorter opening times, and increased monitoring. These licence conditions are designed to ensure the total harvest target is not exceeded and to facilitate achievement of shared objectives between Indigenous people by allowing all Indigenous groups an opportunity to catch their harvest targets. Licence conditions may include some or all of the following conditions of licence:

- Gillnet length: Maximum of 100 m;
- Fishing time: To be determined in-season through respective Indigenous consultations;
- Soak time: To be determined in-season through respective Indigenous consultations;
- Consideration of selective gear types in traditional fishing areas, and;
- Enhanced monitoring program. Going forward, this will be informed by monitoring objectives set in alignment with the national Fishery Monitoring Policy (2019; replaced the regional Strategic Framework for Fishery Monitoring and Catch Reporting in Pacific Fisheries). More information is available in section 1.8.

Any Indigenous group interested in developing new harvest methods or restarting historic harvest methods will work with DFO staff to licence and monitor appropriately.

The Department will consider further management actions following the completion of the SARA listing process.

For additional information on DFO's Treaty and Aboriginal Fisheries programs, please visit: http://www.pac.dfo-mpo.gc.ca/abor-autoc/index-eng.html

APPENDIX 4: 2023 RECREATIONAL FISHING PLAN

DUE TO CONSERVATION CONCERNS, THE RECREATIONAL FISHERY IS CLOSED IN 2023.

Tidal Waters Sport Fishing Licence

The recreational harvest of various fish and invertebrate species in BC is regulated via the *British Columbia Sport Fishing Regulations*, 1996 made under the *Fisheries Act*. A DFO Tidal Waters Sport Fishing licence is required for the recreational harvest of all species of fish and marine invertebrates.

Tidal Waters Sport Fishing licences may be purchased for a 1 day, 3 day, or 5 day period, or as an annual licence, covering the period April 1 (or date of purchase, whichever is later) to March 31 the following year. The annual licence fee is not pro-rated for annual licences purchased mid-season. Fees depend on licence duration, age (senior, adult, juvenile) and residency status. Licences for juveniles (ages 15 and under) are free. Concessionary fees are not otherwise available. There were over 272,800 adult fishers participating in BC's tidal waters recreational fishery in 2021/22.

Alternatively licences may be purchased over the counter at Independent Access Providers (IAPs) in many areas (note that the IAP may charge an additional service fee).

Licences may be purchased online via the National Recreational Licensing System: http://www.pac.dfo-mpo.gc.ca/fm-gp/rec/licence-permis/application-eng.html.

A list of IAPs is available at: http://www.pac.dfo-mpo.gc.ca/fm-gp/rec/licence-permis/iap-fai-eng.html.

Online Regulations

The regulations for recreational fishing are provided online in the British Columbia Tidal Waters Sport Fishing Guide, which lists open and closed times, catch limits, size limits (where applicable), and open and closed areas.

Changes to regulations are issued in Fishery Notices which are posted online and sent to subscribers by email.

The printed Sport Fishing Guide booklet is no longer being produced or distributed to reduce costs and environmental impacts. The online Sport Fish Guide allows for in-season regulations to be accurately provided and ensures all the regulations are up to date. Staff at local DFO fishery offices can also provide regulatory information for an area of interest.

The British Columbia Tidal Waters Sport Fishing Guide is available at: http://www.pac.dfo-mpo.gc.ca/fm-gp/rec/index-eng.html

To view or subscribe to receive Fishery Notice notifications by email is available at: http://notices.dfo-mpo.gc.ca/fns-sap/index-eng.cfm

Local DFO fishery office contact information is available at:
Website: https://www.dfo-mpo.gc.ca/contact/regions/pacific-pacifique-eng.html
Phone: 604-666-0384
Email: info@dfo-mpo.gc.ca

Using Mobile Devices and the FishingBC App

The FishingBC App, developed by the Sport Fishing Institute of BC, can be downloaded to a mobile device to assist with having access to regulatory information for species, areas, fishing gear while out on the water (along with other functionalities).

Please note: the DFO Sport Fishing Guide website is the official site for regulatory information in the event of a discrepancy with the FishingBC App.

The FishingBC App may be downloaded at: http://www.fishingbcapp.ca/

The online DFO Sport Fishing Guide is available at:
https://www.pac.dfo-mpo.gc.ca/fm-gp/rec/index-eng.html

E-licences and Paper licences

At this time most fishers continue to use the traditional paper copy of their licence; however, an e-licence, which is an electronic/pdf copy of the licence, may be used on a mobile device but there are restrictions on its use.

Please consider these licensing requirements before a fishing trip:

- For all recreational tidal waters fishers that do not have an electronic copy of their licence on their mobile device, fishers must have a paper copy of their licence with proof of licence purchase to show to a fishery officer;
- For users of the FishingBC App or on any electronic device, a PDF copy of their licence on the device is acceptable and must be immediately presented to a fishery officer upon request. Please note catch recording requirements below;
- Immediately upon retention of Chinook, Halibut, or Lingcod, fishers must record these catches on their paper licence (preferred) or in their National Recreational Licensing System account (requires internet access).
- For all fishers retaining Chinook, Halibut, or Lingcod, even with an e-licence and catch details in the FishingBC App or in their mobile device, fishers must immediately record catch for these three species on their paper licence or in their National Recreational Licensing System Account and show these records to a fishery officer upon request.
    - a paper copy of their licence; or
    - their National Recreational Licensing System account (where internet access for their mobile device is available). Fisher may find it helpful to immediately take a screenshot of their catch records when they have internet access should they subsequently move out of cell range.

Supporting Sustainable Fisheries - Catch Reporting

The Sport Fishing Advisory Board (SFAB) is the primary consultative body for the recreational fishing community, and includes individual representatives from all geographic regions in BC as

well as delegates from a number of fishing and service provider organizations. The SFAB and the recreational fishing sector strongly support effective fishery monitoring and catch reporting programs in recreational fisheries. The SFAB has been working with DFO on initiatives to strengthen fishing monitoring and catch reporting in the recreational fishery for a number of years.

Recreational fishers are required as a condition of the Tidal Waters Sport Fishing Licence to report accurate information on their recreational fishing activity and catch upon request of DFO representatives including creel surveyors, fishery officers and fishery guardians and if selected to the online iREC reporting program (see below).

Internet Recreational Effort and Catch (iREC) Reporting program

The internet Recreational Effort and Catch (iREC) reporting program is an online program that has been collecting effort and catch information from Tidal Waters Sport Fishing licence holders since July 2012. All 2022/23 adult Tidal Water Recreational Fishing licences will be selected to iREC reporting program and randomly assigned to report for one month. Licence holders are required to report for only one month to limit the reporting burden. Information regarding completing the iREC report, including the month selected for reporting, the website at which to report, a unique iREC Access ID and reporting deadline are printed on each licence. Further, licence holders with a valid email address in the National Recreational Licencing system will receive emails reminding them to complete their iREC reports. Providing complete and accurate information to the iREC program when selected is a condition of licence (i.e. mandatory requirement).

The iREC reporting program is one of the sources used in developing DFO official catch and effort estimates. The iREC reporting program methodology was peer reviewed and published by the Canadian Science Advisory Secretariat (CSAS) in 2015. This program provides monthly estimates of effort for 6 fishing methods and catch for over 80 species of sport caught finfish and invertebrates in all Pacific Fishery Management Areas based on responses by Tidal Waters Sport Fishing Licence holders. The recreational fishing methods covered by the iREC reporting program include boat-based angling, angling from shore, shellfish trapping from boat and shore, beach collecting, and diving. iREC estimates are developed for methods and species not covered by the marine creel surveys, which cover only boat-based angling, and for months and areas not covered by marine creel surveys.

More information about the iREC reporting program is available at:
http://www.pac.dfo-mpo.gc.ca/fm-gp/rec/irec/index-eng.html

Internet Annual Recreational Catch (iARC) Reporting program

A separate online reporting program - the internet Annual Recreational Catch (iARC) reporting program – was held at the end of the season to collect the catch records of Chinook, Lingcod, and Halibut from Tidal Waters Sport Fishing Licence holders as written on their licence(s). This program ran for 8 years between 2014/15 and 2021/22. It provided information for Chinook, Lingcod and Halibut on annual quota, annual and monthly catch estimates, and Halibut length statistics.

More information about the iARC reporting program is available at:
http://www.pac.dfo-mpo.gc.ca/fm-gp/rec/irec/iarc-eng.html

APPENDIX 5: 2023 COMMERCIAL FISHING PLAN

DUE TO CONSERVATION CONCERNS, THE COMMERCIAL FISHERY IS CLOSED IN 2023.

The commercial Fraser River Eulachon fishery has limited entry licensing with sixteen licence eligibilities in ZU licence category, however for 2023 the fishery is closed. Since the fishery is closed, licence eligibility holders will not be required to designate a vessel or pay licence renewal fees. No action is required at this time to maintain 2023 licence eligibility

General Information on Licensing Service Changes – Effective since 2013

Fisheries and Oceans Canada (DFO) introduced the web-based National Online Licensing System (NOLS) in the spring of 2013. This web-based system replaces in-person counter service at Pacific Fishery Licensing Units. Fish harvesters/licence holders/vessel owners will now use the new online system to view, pay for and print their commercial fishing licences, licence conditions and/or receipts. Fish harvesters must log into the NOLS to register and activate their accounts using the DFO Passcode that has been mailed to them in order to pay the fees and request issuance of a licence.

With exception due to the Fraser Eulachon commercial fishery closure mentioned in the first paragraph above, licence renewal is mandatory on an annual basis prior to the expiry date of each fishery in order to maintain eligibility in the future, and licence eligibility will cease if not renewed annually.

Telephone:	1-877-535-7307	(ask for “Pacific Region”)
Fax:	604-666-5855	
Email:	fishing-peche@dfo-mpo.gc.ca	(specify “Pacific Region” in subject line)

Please be sure to visit the Pacific Region Licensing website and subscribe to fishery notices for updates on the National Online Licensing System and licensing services at: http://www.pac.dfo-mpo.gc.ca/fm-gp/licence-permis/index-eng.html.

Information on the new system may be found on the DFO internet site at: http://www.dfo-mpo.gc.ca/fm-gp/sdc-cps/licence-permis-eng.htm.

APPENDIX 6: FISHING VESSEL SAFETY

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1. OVERVIEW – FISHING VESSEL SAFETY

Vessel owners and masters have a duty to ensure the safety of their crew and vessel. Adherence to safety regulations and good practices by owners, masters and crew of fishing vessels will help save lives, prevent vessel damage and protect the environment. All fishing vessels must be in a seaworthy condition and maintained as required by Transport Canada (TC), WorkSafeBC, and other applicable agencies. Vessels subject to inspection should ensure that the certificate of inspection is valid for the area of intended operation.

In the federal government, responsibility for shipping, navigation, and vessel safety regulations and inspections lies with TC; emergency response with the Canadian Coast Guard (CCG) and DFO has responsibility for management of the fisheries resources. The Transportation Safety Board is an independent agency that advances transportation safety by investigating selected occurrences in the air, marine, pipeline and rail modes of transportation including fishing vessel occurrences. In BC, WorkSafeBC exercises jurisdiction over workplace health and safety and conducts inspections on commercial fishing vessels in order to ascertain compliance with the Workers Compensation Act (WCA) and the Occupational Health and Safety Regulation (OHSR).

Before departing on a voyage the owner, master, or operator must ensure that the fishing vessel is capable of and safe for the intended voyage and fishing operations. Critical factors for a safe voyage include the seaworthiness of the vessel, having the required personal protective and life-saving equipment in good working order, adequate number of properly trained crew , and knowledge of current and forecasted weather conditions. As safety requirements and guidelines may change, the vessel owner, crew, and other workers must be aware of the latest legislation, policies and guidelines prior to each trip.

There are many useful tools available for ensuring a safe voyage. These include:

- Education and training programs
- Marine emergency duties training
- Fish Safe – Stability Education Program & 1 Day Stability Workshop
- Fish Safe – SVOP (Subsidized rate for BC commercial fishers provided)
- Fish Safe – *Safest Catch* program – **FREE** for BC commercial fishers
- Fish Safe *Safe At Sea* DVD Series – Fish Safe

- Fish Safe Stability Handbook – *Safe at Sea* and *Safest Catch* – DVD Series
- Fish Safe *Safest Catch* Log Book
- Fish Safe *Safety Quiz*
- First Aid training
- Radio Operators Course (Subsidized rate for BC commercial fishers provided)
- Fishing Masters Certificate training
- Small Vessel Operators Certificate training

Publications:

- *Gearing Up for Safety* - WorkSafeBC
- https://tc.canada.ca/en/marine-transportation/marine-safety/tp-15393e-adequate-stability-safety-guidelines-fishing-vessels TP 15393E- Adequate stability and safety guidelines for fishing vessels
- TP 15392E - Guidelines for fishing vessel major modification or a change in activity. https://tc.canada.ca/en/marine-transportation/marine-safety/tp-15392e-guidelines-fishing-vessel-major-modification-change-activity
- Transport Canada Publication TP 10038 Small Fishing Vessel Safety Manual (can be obtained at Transport Canada Offices from their website at: http://www.tc.gc.ca/eng/marinesafety/tp-tp10038-menu-548.htm
- Amendments to the Small Fishing Vessel Inspection Regulations (can be obtained from: http://www.gazette.gc.ca/rp-pr/p2/2016/2016-07-13/html/sor-dors163-eng.php)
- Safety Issues Investigation into Fishing Safety in Canada report can be accessed: https://www.tsb.gc.ca/eng/rapports-reports/marine/etudes-studies/M09Z0001/M09Z0001.html

For further information see: https://tc.canada.ca/en/marine-transportation
www.fishsafebc.com
www.worksafebc.com
www.tsb.gc.ca/eng/rapports-reports/marine/index.html

2. IMPORTANT PRIORITIES FOR VESSEL SAFETY

There are three areas of fishing vessel safety that should be considered a priority. These are: vessel stability, emergency preparedness, and cold water immersion.

2.1. Fishing Vessel Stability

Vessel stability is paramount for safety. Care must be given to the stowage and securing of all cargo, skiffs, equipment, fuel containers and supplies, and to correct ballasting. Fish harvesters must be familiar with their vessel's centre of gravity, the effect of liquid free surfaces on stability (e.g. loose water or fish on deck), loading and unloading operations, watertight integrity and the vessel's freeboard. Know the limitations of your vessel; if you are unsure contact aa naval architect, marine surveyor or the local Transport Canada Marine Safety Office.

Fishing vessel owners are required to develop detailed instructions addressing the limits of stability for each of their vessels. These instructions must include detailed safe operation documentation kept on board the vessel.

In 2017, Transport Canada Marine Safety (TC) issued Ship Safety Bulletin (SSB) No. 03/2017 announcing the coming into force of the New Fishing Vessel Safety Regulations. The initial regulations were published in the Canada Gazette Part II on July 13, 2016 and came into force on July 13, 2017. The bulletin includes important information on changes to requirements for Written Safety Procedures, Safety Equipment and Vessel Stability.

As of July 13, 2017, new regulations pertaining to stability assessments to be performed by a competent person came into effect, as follows:

- A new fishing vessel that has a hull length of more than 9 m where the vessel construction was started or that a contract was signed for the construction after July 13, 2018;
- A fishing vessel more than 9 m and that has undergone a major modification or a change in activity that is likely to adversely affect its stability;
- A fishing vessel that is fitted with an anti-roll tank at any time;
- A fishing vessel more than 15 gross tonnage and used for catching herring or capelin during the period beginning on July 6, 1977 and ending on July 13, 2017
- For an existing fishing vessel that is not required to undergo a stability assessment, the owner shall be capable of demonstrating that their vessel has adequate stability to safely carry out the vessel's intended operations. Guidelines have been developed and are available online to help small fishing vessel owners and operators meet their regulatory requirements
- Two good resources can be found here: TP 15393 - TP 15393 - Adequate stability and safety guidelines for fishing vessels (2018)and TP 15392 – TP 15392 – Guidelines for fishing vessel major modification or a change in activity (2018)

Further, the new Regulation requires a "Stability Notice" to be developed after a stability assessment. This notice includes a simple diagrammatic of the vessel, its tanks and fish holds, or deck storage as the case may be. It is intended to assist fishing vessel crews in quickly determining the safe carriage limits of the vessel without having to reference a complicated Trim and Stability Book.

Additionally, Transport Canada published a Stability Questionnaire (SSB No. 04/2006) and Fishing Vessel Modifications Form (SSB No. 01/2008) which enable operators to identify the criteria which will trigger a stability assessment. Please contact the nearest Transport Canada office if you need to determine whether your vessel requires a stability assessment, or to receive guidance on obtaining competent assessor.

In 2019, TC provided an updated SSB 03/2019, which sets out a voluntary record of modifications for the benefit of owners/masters of any fishing vessels. For vessels of more than 15 gross tons, the record of modifications was to be reviewed by TC inspectors during regular inspections and entered on the vessel's inspection record. However, information gathered during the Transportation Safety Board's (TSB) Safety Issues Investigation into the fishing industry showed minimal recording of vessel modifications prior to this date.

The TSB has investigated several fishing vessel accidents since 2005 and found a variety of factors that effected the vessel's stability were identified as contributing factors in vessels capsizing, such as with: M05W0110 - *Morning Sunrise*, M07M0088 - *Big Sisters*, M08W0189 - *Love and Anarchy*, M09L0074 – *Le Marsouin I*, M10M0014 - *Craig and Justin*, M12W0054 – *Jessie G*, M12W0062 - *Pacific Siren*, M14P0121 – *Five Star*, M15P0286 – *Caledonian*, M16A0140 – *C19496NB*, M17C0061 – *Emma Joan*, M17P0052 – *Miss Cory*, M18P0073 – *Western Commander*, M18A0425 – *Charlene A* and M18A0454 – *Atlantic Sapphire*.

Vessel masters are advised to carefully consider stability when transporting gear. Care must be given to the stowage and securing of all traps, cargo, skiffs, equipment, fuel containers and supplies and also to correct ballasting. Know the limitations of your vessel; if you are unsure contact a reputable marine surveyor, naval architect or the local Transport Canada Marine Safety office.

WorkSafeBC's Occupational Health and Safety Regulations (OHSR) require owners of fishing vessels to provide documentation on board, readily accessible to crew members, which describes vessel characteristics, including stability.

Fish Safe has developed a code of best practices for the food and bait/roe herring fisheries and the prawn fishery: These Best Practices are available on Fish Safe's website for convenient download here: https://www.fishsafebc.com/best-practices Please contact Ryan Ford at Fish Safe for a copy of the program materials they developed to address safety and vessel stability in these fisheries. Ryan Ford – office: (604) 261261-9700 - Email: ryan@fishsafebc.com.

2.2. **Emergency Drill Requirements**

The *Canada Shipping Act, 2001* requires that the Authorized Representative of a Canadian Vessel shall develop procedures for the safe operation of the vessel and for dealing with emergencies. The Act also requires that crew and passengers receive safety training. The Marine Personnel Regulations require that all personnel on board required to meet the minimum safe manning levels have received MED (Marine Emergency Duties) training to an A1 or A3 level, depending on the vessel's voyage limits, within 6 months of serving aboard. MED A3 training is 8 hours in duration and is applicable to seafarers on fishing vessels less than 150 GRT that are within 25 miles from shore (NC2). MED A1 training is 19.5 hours duration and is applicable to all other fishing vessels.

To assist fishers in meeting their crew training requirements, Fish Safe has created a downloadable '*New Crew Orientation Form and How To Guide'* available on Fish Safe's website here: https://www.fishsafebc.com/downloadable-tools

MED provides a basic understanding of the hazards associated with the marine environment; the prevention of shipboard incidents; raising and reacting to alarms; fire and abandonment situations; and the skills necessary for survival and rescue.

WorkSafeBC's Occupational Health and Safety Regulation (OHSR) requires written rescue and evacuation procedures for work on or over water. Additionally, fishing vessel masters must establish procedures and assign responsibilities to each crew member to cover all emergencies, including the following: crew member overboard, fire on board, flooding of the vessel, abandoning ship, and calling for help. Fishing vessel masters are also required to conduct emergency drills at the start of each fishing season, when there is a change of crew, and at periodic intervals to ensure that crewmembers are familiar with emergency procedures.

Between 2011 and 2015 the TSB investigated 17 fishing vessel accidents which resulted in 17 fatalities. The report's findings highlighted the lack of safety drills and safety procedures and practices. The *Safest Catch* program, delivered by Fish Safe and free to BC commercial fishers, includes comprehensive practice of drills such as abandon ship, man overboard and firefighting drills.

2.3. Cold Water Immersion

Drowning is the number one cause of death in BC's fishing industry. Cold water is defined as water below 25 degrees Celsius, but the greatest effects occur below 15 degrees C. BC waters are usually below 15 degrees C. Normal body temperature is around 37 degrees Celsius; cold water rapidly draws heat away from the body. The effects of cold water on the body occur in four stages: cold shock, swimming failure, hypothermia and post-rescue collapse. Know what to do to prevent you or your crew from falling into the water and what to do if that occurs. More information is available in the WorkSafeBC Bulletin Cold Water Immersion (available from the WorkSafeBC website at www.worksafebc.com).

Under the recently amended (June 2019) OHS Regulation, section 24.96.1, a crewmember must wear a PFD or lifejacket when on board a fishing vessel that has no deck or deck structure or when on the deck of a fishing vessel that has a deck or deck structure. The use of a PFD will prepare a crewmember to remain afloat, to survive the effects of cold shock, reduce the need to swim and give rescuers time to respond.

Section 8.26, which requires workers to wear a PFD or lifejacket when working "under conditions which involve a risk of drowning", would continue to apply to fishing crewmembers and other workers (e.g. when they are working on shore, docks and other vessels). The specific requirements can be found on WorkSafeBC's PFD Primer provided on Fish Safe's website here: https://www.fishsafebc.com/cold-water-survival.

It has been demonstrated time and again that, when worn, PFD's save lives - and the chance of surviving a mishap increases significantly when these devices are worn while working on deck.

Resulting from the TSB investigations into the *Diane Louise* - M14P0110 and the *Caledonian* – M15P0286 fishing vessel accidents the Board recommended that both TC and WorkSafeBC require that persons wear a suitable personal flotation devices (PFDs) at all times when: on the deck of a commercial fishing vessel; or, when on board a commercial fishing vessel without a deck or deck structure, and ensure that programs are developed to confirm compliance.

2.4. Other Issues

2.4.1. Weather

Vessel owners and masters are reminded of the importance of paying close attention to current weather trends and forecasts during the voyage. Marine weather information and forecasts can be obtained on VHF channels 21B, Wx1, Wx2, Wx3, or Wx4. Weather information is also available from Environment Canada website at: https://weather.gc.ca/marine/index_e.html

2.4.2. Emergency Radio Procedures

Vessel owners and masters should ensure that all crew are able to activate the Search and Rescue (SAR) system early rather than later by contacting the Canadian Coast Guard (CCG). It is strongly recommended that all fish harvesters carry a registered 406 MHz Emergency Position Indicating Radio Beacon (EPIRB). These beacons should be registered with the National Search and Rescue secretariat. When activated, an EPIRB transmits a distress call that is picked up or relayed by satellites and transmitted via land earth stations to the Joint Rescue Co-ordination Centre (JRCC), which will task and co-ordinate rescue resources. The TSB notes that there have been several recent occurrences on board vessels not equipped with an EPIRB, and that were either unable or did not use any other means of emergency signaling distress (e.g. M14P0121,

M14A0289, M15A0189, M16A0327, M18A0076, M18A0303, M18A0078, M18P0184, M19A0082, M19P0242, M20A0258, M20A0160, M21A0315) which resulted in 26 fatalities.

Fish harvesters should monitor VHF channel 16 or MF 2182 KHz and make themselves and their crews familiar with other radio frequencies. All crew should know how to make a distress call and should obtain their restricted operator certificate from Industry Canada. However, whenever possible, masters should contact the nearest Canadian Coast Guard (CCG) Marine Communications and Traffic Services (MCTS) station (on VHF channel 16 or MF 2182 kHz) prior to a distress situation developing. Correct radio procedures are important for communications in an emergency. Incorrect or misunderstood communications may hinder a rescue response.Further information is available at Radio Aids to Marine Navigation General

Since August 1, 2003 all commercial vessels greater than 8 metres in length are required to carry a Class D VHF Digital Selective Calling (DSC) radio. A registered DSC VHF radio has the capability to alert other DSC equipped vessels in your immediate area and MCTS that your vessel is in distress. Masters should be aware that they should register their DSC radios with Industry Canada to obtain a Marine Mobile Services Identity (MMSI) number or the automatic distress calling feature of the radio may not work. For further information see the Coast Guard website at: Canadian Coast Guard (ccg-gcc.gc.ca) or go directly to the Industry Canada web page: www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf01032.html

A DSC radio that is connected to a GPS unit will also automatically include your vessel's current position in the distress message. More detailed information on DSC can be found here: TC DSC Safety Bulletin. Questions regarding Coast Guard DSC capabilities can be obtained by contacting your local MCTS centre (Prince Rupert MCTS (250)627-3070 or Victoria MCTS (250)363-6333).

2.4.3. Collision Regulations

Fish harvesters must be knowledgeable of the *Collision Regulations* and the responsibilities between vessels where risk of collision exists. Navigation lights must be kept in good working order and must be displayed from sunset to sunrise and during all times of restricted visibility. To help reduce the potential for collision or close quarters situations which may also result in the loss of fishing gear, fish harvesters are encouraged to monitor the appropriate local Vessel Traffic Services (VTS) VHF channel when travelling or fishing near shipping lanes or other areas frequented by large commercial vessels. Vessels required to participate in VTS include:

a) every ship twenty metres or more in length,
b) every ship engaged in towing or pushing any vessel or object, other than fishing gear,
c) where the combined length of the ship and any vessel or object towed or pushed by the ship is forty five metres or more in length; or
d) where the length of the vessel or object being towed or pushed by the ship is twenty metres or more in length.

Exceptions include:

a) a ship towing or pushing inside a log booming ground,
b) a pleasure yacht **less than** 30 metres in length, and
c) a fishing vessel that is **less than** 24 metres in length and not **more than** 150 tons gross.

More detailed information on VTS can be obtained by calling either Prince Rupert MCTS (250)627-3070 or Victoria MCTS (250)363-6333 or from the Coast Guard website: https://www.ccg-gcc.gc.ca/publications/mcts-sctm/ramn-arnm/part3-eng.html

2.4.4. Buddy System

Fish harvesters are encouraged to use the buddy system when transiting and fishing as this allows for the ability to provide mutual aid. An important trip consideration is the use of a sail/voyage plan which includes the particulars of the vessel, crew and voyage. The sail plan should be left with a responsible person on shore or filed with the local MCTS. After leaving port the fish harvester should contact the holder of the sail plan daily or as per another schedule. The sail plan should ensure notification to JRCC when communication is not maintained which might indicate your vessel is in distress. Be sure to cancel the sail plan upon completion of the voyage.

3. WORKSAFEBC

WorkSafeBC exercises jurisdiction over workplace health and safety, including the activities of crews of fishing vessels. Commercial fishing, diving and other marine operations are subject to the provisions of the *Workers Compensation Act (WCA)* and requirements in Part 24 of the Occupational Health and Safety Regulation (OHSR). Examples of Part 24 regulatory requirements related to fishing include, but are not limited to, the requirement to establish emergency procedures, to conduct emergency drills, to provide immersion suits for the crew, to provide stability documentation for the vessel, safe work procedures, injury reporting, correction of unsafe working conditions, the requirement to wear personal floatation devices (PFDs), etc.

Other sections of the OHSR also apply to commercial fishing operations. For example, Part 3 addresses training of young and new workers, first aid, and employer incident/accident investigations. Part 4 addresses general conditions such as maintenance of equipment, workplace conduct and impairment. Part 8 addresses issues related to safety headgear, safety footwear, eye and face protection, limb and body protection and personal flotation devices (PFDs) when working on the dock. Part 12 addresses issues related to tools, machinery and equipment, including safeguarding. Part 15 addresses issues related to rigging.

Both owners and masters of fishing vessels are considered to be employers. Under the *Workers Compensation Act* and the OHS Regulation (OHSR) they have varying and overlapping duties and responsibilities. Masters, because they have the most control during fishing and related activities, are considered to be the employer with primary responsibility for the health and safety of the crew.

The OHSR and the WCA are available from the Provincial Crown Printers or by visiting the WorkSafeBC website: http://www.worksafebc.com

NOTE: Regarding the OHSR requirement to wear PFD's, WorkSafeBC has produced a video entitled "Turning the Tide – PFD's in the Fishing Industry". For more information on PFD use, including a link to the video, please access the following site:

Turning the Tide: PFDs in the Fishing Industry | WorkSafeBC

https://www.worksafebc.com/en/about-us/news-events/news-releases/2018/November/new-

fishing-industry-safety-video

For further information, contact an Occupational Safety Officer:

1.	Cody King	Courtenay	(250) 334-8733
2.	Paul Matthews	Courtenay	(250) 334-8703
3.	Bruce Logan	Vancouver/Richmond/Delta	(604) 244-6477
4.	Wayne Tracey	Port Moody	(604) 232-1939
5.	Kevin Legros	Terrace	(250) 615-6617

or the Manager of Interest for Marine and Fishing, Pat Olsen: (250) 334-8777.

For information on projects and initiatives related to commercial fishing health and safety, please contact Tom Pawlowski, Manager, OHS Consultation and Education Services, at (604) 233-4062 or by email: tom.pawlowski@worksafebc.com or Helen Chandler OHS Consultant at (604)276-3174 or by email: helen.chandler@worksafebc.com.

4. FISH SAFE BC

Fish Safe encourages Vessel masters and crew to take ownership of fishing vessel safety. Through this industry driven and funded program Fish Safe provides fishing relevant tools and programs to assist fishers in this goal. The Fish Safe Stability Education Program and 1 Day Stability Workshop are available to all fishers who want to improve their understanding of stability and find practical application to their vessel's operation. The SVOP (Small Vessel Operator Proficiency) Course is designed to equip crew with the skills they need to safely navigate during their wheel watch. The *Safest Catch* Program, along with fisher-trained Safety Advisors, is designed to give fishers the tools they need to create a vessel specific safety management system.

As referenced throughout the above documentation, Fish Safe provides a broad range of courses, programs and services that are either free for BC commercial fishers or highly subsidized.

Fish Safe is managed by Ryan Ford, Program Manager and support staff including John Krgovich, Program Coordinator, Stephanie Nguyen, Program Assistant, Rhoda Huey, Bookkeeper/Administrative Assistant, and an experienced team of fisher Safety Advisors. All activities and program development is directed by the Fish Safe Advisory Committee (membership is open to all interested in improving safety on board fishing vessels). The Advisory Committee meets two to three times annually to discuss safety issues and give direction to Fish Safe in the development of education and tools for fish harvesters.

Fish Safe also works closely with WorkSafeBC to improve the fishing injury claims process. For further information contact:

Ryan Ford
Program Manager
Fish Safe
#100, 12051 Horseshoe Way
Richmond, BC V7A 4V4

Cell: (604) 739-0540
Office: (604) 261-9700
Email: ryan@fishsafebc.com
http://www.fishsafebc.com

5. TRANSPORTATION SAFETY BOARD

The Transportation Safety Board (TSB) is not a regulatory board. The TSB is an independent agency that investigates marine, pipeline, railway and aviation transportation occurrences to determine the underlying risks and contributing factors. Its sole aim is the advancement of transportation safety by reporting publicly through Accident Investigation Reports or Marine Safety Information Letters or Advisors. It is not the function of the Board to assign fault or determine civil or criminal liability. Under the TSB Act, all information collected during an investigation is completely confidential.

In 2014, the TSB Pacific Region released three investigation reports:

- the collision between trawl fishing vessel *Viking Storm* and US long line fishing vessel *Maverick* and the subsequent fatality,
- the person over board off the prawn fishing vessel *Diane Louise* and the subsequent fatality, and
- the capsizing of the crab fishing vessel *Five Star* and subsequent fatality.

In 2016, the TSB Pacific Region released one investigation report:

- the capsizing of the trawl *Caledonian* and subsequent fatalities.

In 2018, the TSB Pacific Region released two investigation reports:

- the capsizing and sinking of the *Miss Cory* and subsequent fatality
- the sinking of the *Western Commander* and and loss of life

In 2020 the TSB pacific region is currently investigating the fatal accident involving the *Arctic Fox II* on August 11.

The TSB issued five recommendations following the *Caledonian* report. Three recommendations issued are aimed at ensuring all crews have access to adequate stability information that meets their needs. That means:

- All commercial fishing vessels should have a stability assessment appropriate for their size and operation.
- The information from that assessment must then be kept current, and it must be used to determine safe operating limits.

Moreover, these operating limits must be easily measurable, and relevant to the vessel's operation. For example, that could mean marking the sides of a vessel's hull to indicate the maximum operating waterline, or maximum permitted loads can be specified in the most relevant unit of measure—total catch weight for instance, or the safe number of traps. Regardless, for it to be of real, practical use, the information must be presented in a format that is clearly understood and easily accessible to crew.

The other two recommendations address the most basic step that harvesters can take: wearing a personal flotation device. Here in British Columbia, roughly 70 percent of all fishing-related fatalities in the past decade came while not wearing a PFD. Yet many harvesters still do not wear them. TC regulations currently require that PFDs be worn only if harvesters identify a risk, however; you never know when you could end up in the water. So the TSB is recommending to TC to require persons to wear suitable personal flotation devices at all times when on the deck of

a commercial fishing vessel or when on board a commercial fishing vessel without a deck or deck structure and that programs are developed to confirm compliance. In June 2019, WorksafeBC amended its fishing regulation related to the use of PFDs. Under the amendments, crewmembers must wear a PFD or lifejacket when on board a fishing vessel that has no deck or deck structure, or when on the deck of a fishing vessel that has a deck or deck structure. Crewmembers are not required to wear lifejackets or PFDs below deck or when inside a deck structure where there is risk of entrapment. This amendment removes the need for a risk of drowning to be present before a PFD must be worn.

For more information about the TSB, visit the website at http://www.tsb.gc.ca

For information about the TSB's investigation into fishing safety, or to view a brief video, visit: http://www.tsb.gc.ca/eng/medias-media/videos/marine/m09z0001/index.asp

To view information on the TSB's recent safety Watchlist, visit: http://www.tsb.gc.ca/eng/surveillance-watchlist/marine/2020/marine-01.html

Reporting an Occurrence: www.tsb.gc.ca/eng/incidents-occurrence/marine/

After a reportable occurrence happens; you can fill out the TSB 1808 form or call the TSB at the contact information below.

Recently the TSB produced a Safe at Sea: Activity book on fishing safety intended for the next generation of fish harvesters (ages 4-7).

Download a copy. www.tsb.gc.ca › eng › medias-media › prudence-safe › safe-at-sea

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