



# Southern Resident Killer Whale

ACCOUNTABILITY FRAMEWORK

Evaluating Support for Recovery



Supporting  
Recovery



## Recovery Goal

Ensure the long-term viability of the Southern Resident Killer Whale population by achieving and maintaining demographic conditions that preserve their reproductive potential, genetic variation, and cultural continuity.

## Priority Action Categories, Indicators and Performance Measures in this Framework

**This Accountability Framework is a tool** to help us understand if short- and longer-term management measures are supporting the recovery of the Southern Resident Killer Whale. Within this Framework, proxy indicators and performance measures are identified for three priority action categories to enable consistent reviews of performance data and the addition or modification of indicators and measures over time, which allows us to:

- Assess how well our actions are working,
- Provide essential information about the state of, and trends toward the overall goal,
- Highlight needs for improvement, and
- Supply reliable information for discussions and initiatives going forward.

## Contents

About This Framework	1
The Foundation for Recovery	2
 <b>Priority Action Category 1: Monitor and Understand Southern Resident Killer Whales</b>	<b>3</b>
1.1 Presence	4
1.2 Health	5
1.3 Population Dynamics	5
 <b>Priority Action Category 2: Reduce Threats</b>	<b>6</b>
2.1 Chinook Salmon Abundance & Fishing Mortality	7
2.2 Chinook Salmon Enhancement	8
2.3 Salmon Habitat Protection and Restoration	8
2.4 Underwater Noise	9
2.5 Changes in Behaviour	9
2.6 Contaminants	10
 <b>Priority Action Category 3: Activate Support for Southern Resident Killer Whale Recovery</b>	<b>11</b>
3.1 Awareness Through Public Outreach and Education	12
3.2 Compliance	12
Moving Forward	13
References	13
Appendix: Summary of Priority Action Categories, Indicators and Performance Measures	14

Understanding overall trends and patterns of the data over time is important, as data for any given hour, day or year can fluctuate significantly.



PHOTO: J. TOWERS

## About This Framework

### **The Southern Resident Killer Whale population is at risk.**

This endangered population is facing low quality and availability of food, increased noise and disturbance in their habitat, and contaminants in their environment. To help Southern Resident Killer Whales recover, the Government of Canada has taken action to introduce comprehensive measures. These measures are aimed at improving our scientific understanding of the population, reducing the threats that Southern Resident Killer Whales face, and increasing public awareness about what we can all do to help. But given the complex environment and number of different impacts, how do we know if these measures are working?

That's where the Accountability Framework comes in. The Accountability Framework looks at data collected by the Government of Canada and its partners through three priority action categories, which each have indicators and performance measures. Together, the information collected about these categories describes an important piece of the puzzle and offers a snapshot of how the Government of Canada and its partners are doing in their support of Southern Resident Killer Whale recovery. They give us information about trends towards our goal, they highlight where we need to improve, and they provide information for discussions going forward.



**Priority action categories, indicators and short- and long-term performance measures help to tell a story about how well our actions are working over time.**

# The Foundation for Recovery

The Southern Resident Killer Whale was first listed as endangered under the *Species at Risk Act* in 2003. Since that time, a number of actions have been taken toward recovery planning, protection, and implementation of recovery measures.



**Broad strategies for recovery are identified in the Recovery Strategy for Northern and Southern Resident Killer Whales (*Orcinus orca*) in Canada**, along with the recovery goal for the Southern Resident population, which is to “ensure the long-term viability of the population by achieving and maintaining demographic conditions that preserve their reproductive potential, genetic variation, and cultural continuity”.



**The Action Plan for Northern and Southern Resident Killer Whale (*Orcinus orca*) in Canada** follows from the Recovery Strategy, and outlines the detailed recovery actions to support the direction set out in the Recovery Strategy.



**The suite of interim annual management measures** focus on actions being implemented each year by the Government of Canada.



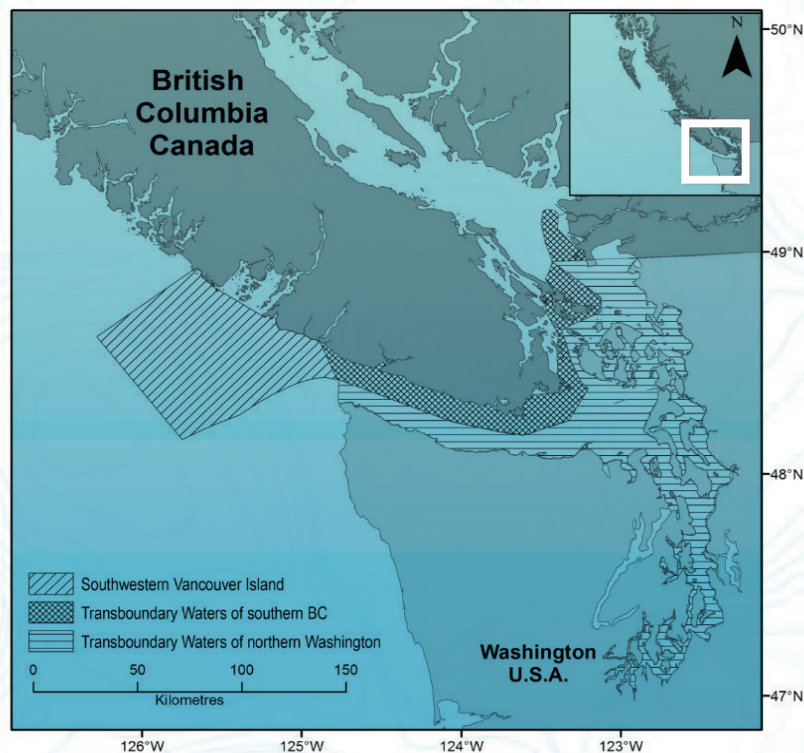
**The 2019 Southern Resident Killer Whale Accountability Report** provides information and interpretation of data for the various indicators and performance measures for each of the priority action categories.

Together, these documents, along with Indigenous knowledge, science, and expert advice, offer a foundation for recovery. By working with Indigenous groups, marine educators, industry, stakeholders, marine users, and the public to adjust human activities, the opportunity for recovery success is amplified.

Threats to this population are imminent and highly complex with the potential to have cumulative effects.



Critical habitat is defined under the *Species at Risk Act* as the habitat necessary for the survival or recovery of a species.



**Southern Resident Killer Whale critical habitat boundaries in Canada and the U.S.**

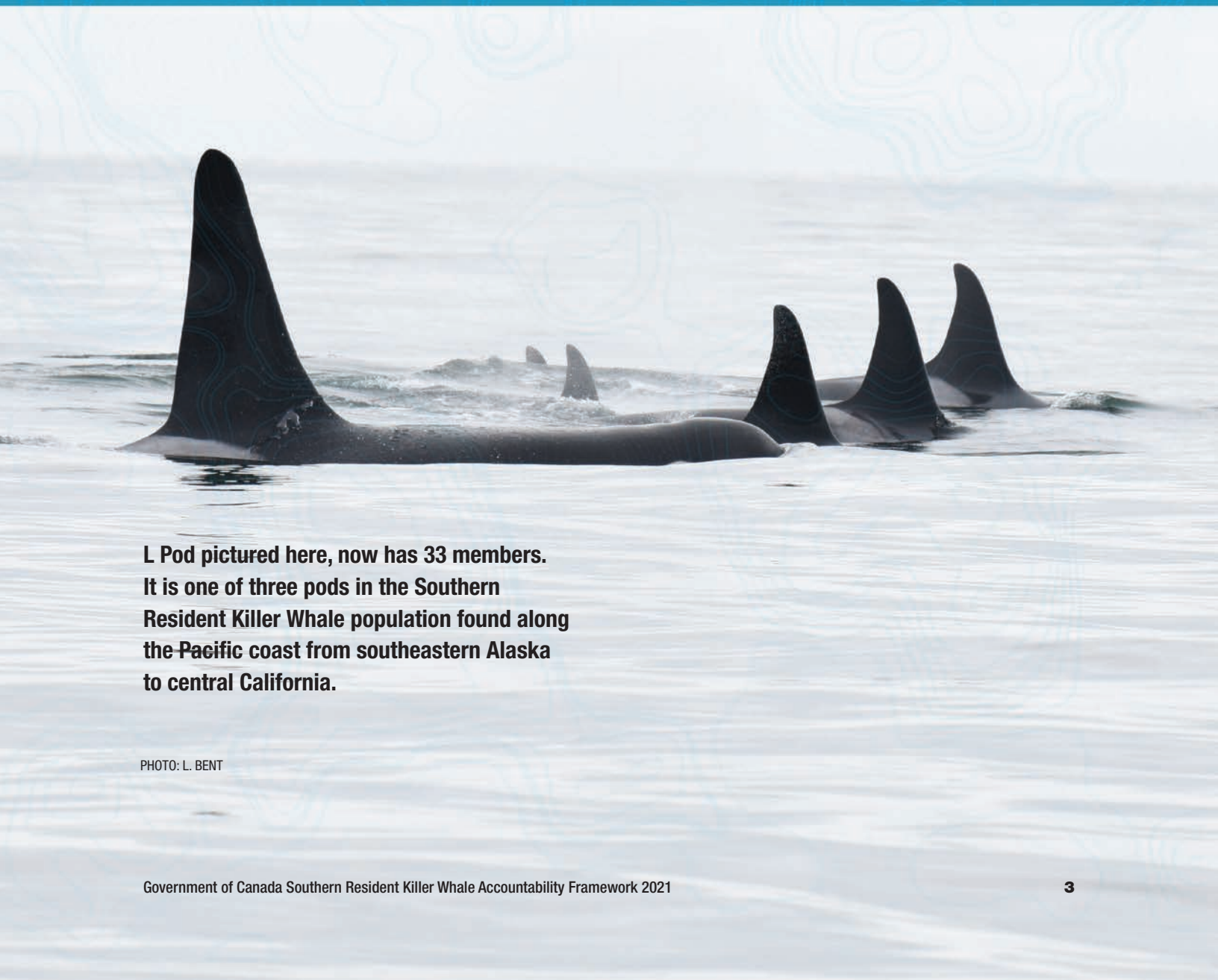


**PRIORITY ACTION CATEGORY 1**

# Monitor and Understand Southern Resident Killer Whales

**Indicators:**

- 1.1 Presence
- 1.2 Health
- 1.3 Population Dynamics



**L Pod pictured here, now has 33 members. It is one of three pods in the Southern Resident Killer Whale population found along the Pacific coast from southeastern Alaska to central California.**

PHOTO: L. BENT



This priority action category focuses on monitoring and understanding the Southern Resident Killer Whale population. Indicators around presence, health and population dynamics are used as proxies to represent the overall long-term viability of the population as it relates to reproductive potential, genetic variation, and cultural continuity. By monitoring changes to these indicators, we can better understand if our actions are working.

## Indicator 1.1: Presence

### Why is this Indicator Important?

**Understanding when this population is in Canadian waters** through visual sightings or acoustic detection can let us know what times of the year the whales are around, as well as where the whales are spending their time. This information can then be used to target the timing and location of management measures.

### What is the Outlook?

Although the Government of Canada does not have a continuous sighting and detection program, several initiatives indirectly contribute to understanding of presence, habitat use and distribution, including passive and near real-time hydrophone networks, and visual sightings while doing research out on the water.

**DFO's Whale Tracking Network** tracks whale presence in near real-time on the West Coast of Vancouver Island, the Gulf Islands, and the Northern Strait of Georgia.

**DFO's Cetacean Research Program** deploys hydrophones for monitoring distribution and habitat use of whales and dolphins.



**73-99**

**Fluctuation in the total number of individuals in J, K and L pods combined since 1976.**

**DFO's Science Program** collects acoustic data to develop a baseline of underwater noise and detect killer whale presence.

**Several groups gather important sightings and detection data** of Southern Resident Killer Whales.

**The Center for Whale Research (CWR)** has a dedicated, and mostly volunteer, sighting system made up of whale watch tour operators, government and academic researchers from Canada and the U.S., and killer whale enthusiasts, that help the CWR monitor the location of whales in critical habitat day-to-day, on a year-round basis.

**The B.C. Cetacean Sightings Network (BCCSN)** compiles sightings data to better understand the relative abundance, distribution, and habitat use of threatened and endangered cetacean populations.

**Cetus Research & Conservation Society (CETUS)** Straitwatch program is a marine mammal monitoring, outreach, and education program.

**Saturna Island Marine Research and Education Society (SIMRES)** is a community-based non-profit organization focused on building awareness of marine life in the Salish Sea.

PHOTO: C. KONRAD

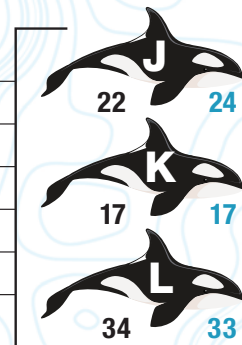


The total Southern Resident Killer Whale population at the December 2020 census was 74 and only 23 females were within the age range for reproduction.

	2019	2020
<b>TOTAL POPULATION</b>	<b>73</b>	<b>74</b>
Reproductive Females	23	23
Reproductive Males	17	17
Births	2	2
Deaths/Losses	3	2

*(December 2020 Census)*

Change in Population by Pod



### Indicator 1.2: Health

#### Why is this Indicator Important?

**Body condition trends** through recording, measuring and interpreting photographic images and field observations helps give us information on the health of individuals as well as the population as a whole.

#### What is the Outlook?

The Government of Canada works with US National Oceanic and Atmospheric Administration (NOAA) researchers and the Center for Whale Research, to study general body condition, stress hormones, and contaminant levels.

**Photogrammetry datasets** gathered over several decades help researchers identify individual animal health. Researchers with SR3 SeaLife Response, Rehabilitation and Research, the Southwest Fisheries Science Center, NOAA Fisheries, and the Center for Whale Research interpret images to assess body condition through obvious shape changes due to pregnancy, nutrition levels, stress or disease.

### Indicator 1.3: Population Dynamics

#### Why is this Indicator Important?

**Trends in population dynamics** including, pregnancies, births, calf survival and importantly, the number of reproductive females and males, gives us an indication as to whether the population is likely to increase or decrease over time.

#### What is the Outlook?

**To minimize impacts of research on the population, the Government of Canada works collaboratively** with, and relies upon, population data from lead partners in the U.S., including the Center for Whale Research and OrcaNetwork.

As reported by the Center for Whale Research, the total Southern Resident Killer Whale population was 74 at the December 2020 census (Center for Whale Research, 2020).



## PRIORITY ACTION CATEGORY 2

# Reduce Threats

### Indicators:

- 2.1 Chinook Salmon Abundance & Fishing Mortality
- 2.2 Chinook Salmon Enhancement
- 2.3 Salmon Habitat Protection and Restoration
- 2.4 Underwater Noise
- 2.5 Changes in Behaviour
- 2.6 Contaminants







This priority action category focuses on actions undertaken to reduce each of the main threats. Threats are low quality and availability of food, noise and disturbance in their habitat, and contaminants in their environment.

## Indicator 2.1:

### Chinook Salmon Abundance and Fishing Mortality

#### Why is this Indicator Important?

**Chinook salmon are the primary prey of Southern Resident Killer Whales**, yet Southern BC Chinook salmon have been in decline for many years, driven by a number of factors including habitat degradation, pollution, harvest, and ecological and physical factors. This means that there is a limited amount of food available for the population.

**Understanding how much salmon is available, and the impacts of other interactions in the ecosystem** helps scientists and managers understand what actions could support Chinook populations and enhance the availability of Chinook as prey to the Southern Resident Killer Whale.

#### What is the Outlook?

**Fraser River stocks have been identified as the most important stocks** for Southern Resident Killer Whale diet in the summer from May to September (Southern Resident Killer Whale Priority Chinook Stocks Report). However, many of these salmon stocks are at risk.

**Prey quality** for Southern Resident Killer Whales can be identified as length, age, caloric value, lipid content, and contaminant load. The Government of Canada regularly collects length and age data at a number of locations to understand trends over time, and measures a number of priority contaminants in Southern Resident Killer Whale prey.

DFO's Pacific State of the Salmon Program reports on Canadian Pacific salmon population status and trends, as well as the factors that likely contribute to those trends.



PHOTO: EIKO JONES

Southern BC Chinook stocks have been in decline in recent years, limiting food availability and therefore, the recovery potential of the Southern Resident Killer Whale population.



## Indicator 2.2:

### Chinook Salmon Enhancement

#### Why is this Indicator Important?

**With declines in wild fish stocks**, the Government of Canada turned to hatchery production of Chilliwack River Chinook as an additional source of food for Southern Resident Killer Whales.

**This indicator considers** whether the number of juvenile salmon released to support killer whale recovery reflects production planning, and whether the releases were able to be coded-wire and genetically tagged.

#### What is the Outlook?

**The Chilliwack River Hatchery** produces approximately one million Chilliwack River Chinook annually for harvest, and an additional one million for prey availability. The increased release of Chilliwack River Hatchery Chinook began in 2019 (2018 brood year) with the intent of increasing marine abundance through the release of 300,000 additional fish. In 2020, the incremental release was 1.2 million fish.

While the last incremental targeted release for Southern Resident Killer Whales is planned for 2024, adult returns from the increased hatchery production will be available until 2028, with the potential for returns as late as 2032.

**Collaborative efforts** through the Salmon Enhancement Program's Community Involvement Program continue to enhance important Chinook stocks for rebuilding, assessment, and harvest objectives at community hatcheries.



**2,000,000**

**Chilliwack River Hatchery currently produces approximately 1 million Chilliwack River Chinook annually for harvest and an additional 1 million for prey availability.**

## Indicator 2.3:

### Salmon Habitat Protection and Restoration

#### Why is this Indicator Important?

**Healthy salmon depend on a healthy habitat.**

Freshwater and marine habitats are vital to different life stages of salmon, but natural and human-induced changes to these habitats including, drought, flood, forest cover removal, mining operations, water withdrawal, run-off pollution, and climate change impacts can alter the ecology of freshwater systems. This can result in changes to nutrient flow, food availability, and water temperatures, which in turn affect salmon health.

#### What is the Outlook?

To assess freshwater habitats (streams, lakes, and estuaries), DFO has identified a preliminary suite of indicators to measure the quantity of habitat (e.g. stream length, lakeshore spawning area), its state or condition (e.g. water temperature and quality, estuary contaminants), and habitat pressure from land and water uses (e.g. road development, water extraction).

**Research is ongoing** to better understand marine and freshwater ecosystems, including the impacts of climate change and oceanic conditions on salmon survival.

**Restoring and improving fish habitat** critical to the survival of wild salmon stocks includes building side channels, improving water flows, stabilizing stream banks, rebuilding estuary marshes, removing barriers to fish migration, and planting stream-side vegetation.

**Watershed planning** is undertaken with community partners to ensure projects are integrated into local and area plans.

**Restoration efforts** target high priority salmon habitat where it is known that the freshwater or estuarine environment is limiting adult spawner recruitment or egg to fry/smolt survival, and filling knowledge gaps where habitat limitations are not known.

**The Government of Canada with the Province of BC have been investing** in longer-term habitat projects through initiatives such as the British Columbia Salmon Restoration and Innovation Fund.



## Indicator 2.4: Underwater Noise

### Why is this Indicator Important?

**Noise disturbance impacts the population's ability to feed, rest and socialize** as Southern Resident Killer Whales use sound to hunt and communicate with other members.

### What is the Outlook?

**Ocean noise** is affected by a number of factors including weather, water column, tide direction, and human made factors such as vessel noise and construction.

**Noise is being reduced in key areas of critical habitat through Interim Sanctuary Zones and fishing area closures** that limit vessel presence. Additionally, research to advance engine technology and vessel design will reduce noise in the ocean.

**The Vancouver Fraser Port Authority's Enhancing Cetacean Habitat and Observation Program** has been working on successful initiatives to reduce underwater noise by reducing speeds of large commercial vessels.

**Several hydrophone systems are operated by the Government of Canada in Southern BC** to understand underwater noise levels in key Southern Resident Killer Whale areas.

**Southern Resident Killer Whales use sound to hunt and communicate.**



PHOTO: L. BENT

## Indicator 2.5: Changes in Behaviour

### Why is this Indicator Important?

**Vessel noise, nearby fishing activities and other human-caused disturbance can cause changes in behaviour** such as hunting, mating and resting. Observing where, when, and how Southern Resident Killer Whales react to human activities and the potentially negative effects these have on population health, is key to understanding what measures are required in order to reduce threats while minimizing socio-economic impacts.

### What is the Outlook?

**To understand killer whale behaviour, Canadian scientists use focal follow research to follow individuals and record behaviour.** Scientists sometimes also use non-invasive tags which attach with a suction cup to digitally record movement and noise through a built-in hydrophone and suite of sensors. These methods allow scientists to determine where killer whales hunt, how much time they are spending hunting, and how successful their hunt has been.

**Several groups carry out behavioural studies of Southern Resident Killer Whales** as part of their work on the water:

- **The Oceans Research and Conservation Association (ORCA)** undertakes land-based observations of Southern Resident Killer Whale behaviour around vessels within Southern Resident Killer Whale critical habitat in Haro Strait, the Salish Sea.
- **The Saturna Island Marine Research and Education Society** takes land based marine mammal observations from Saturna Island, including killer whale location and behaviour, and number of vessels in the vicinity.
- **Cetus Research & Conservation Society Straitwatch Program** uses time on the water to record data about whales, the activity of vessels in the vicinity, and basic environmental data.



## Indicator 2.6: Contaminants

### Why is this Indicator Important?

**Contaminants in the environment** originate from a number of sources including municipal and industrial wastewater and urban and agricultural runoff.

Since Southern Resident Killer Whales are at the top of the food chain, many of these contaminants accumulate in their body fat, which can cause damage to the nervous system, reduction in the capability of the immune system and impairment of reproductive capabilities.

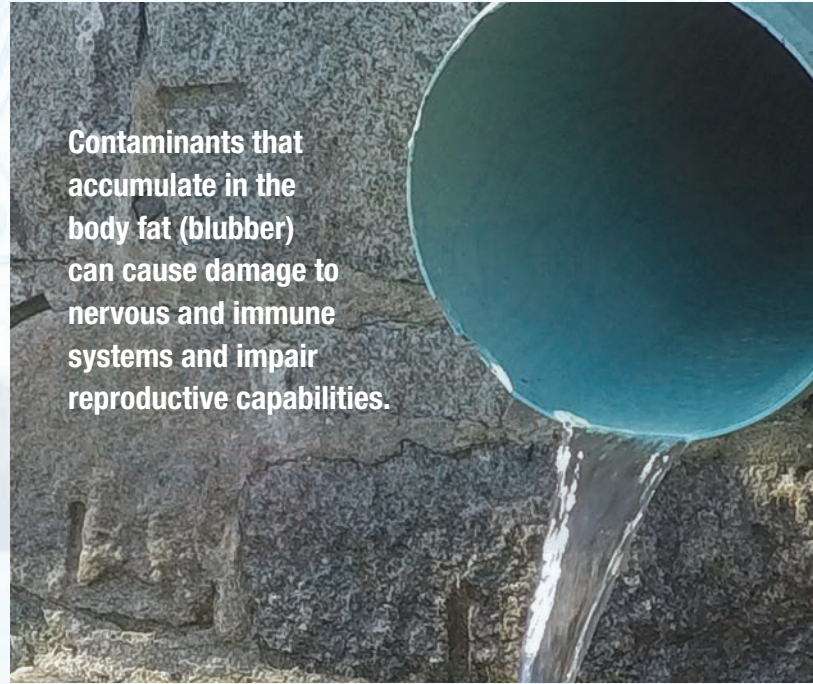
### What is the Outlook?

**Samples are being collected** from air, freshwater (and sediment), landfill leachate, wastewater, disposal at sea sites, and prey components to better understand where contaminants are coming from and in what quantities.

Efforts are being made to develop and implement further controls on contaminants.

**A priority list of contaminants of concern** affecting Southern Resident Killer Whales and Chinook salmon has been developed, based on a review of published scientific literature and expert knowledge.

**Existing Environmental Quality Guidelines** were compiled for priority contaminants. Of these, 59 guidelines have been recommended for use.



**Contaminants that accumulate in the body fat (blubber) can cause damage to nervous and immune systems and impair reproductive capabilities.**

4 types of contaminants of major concern to Southern Resident Killer Whales:

- 1] Polychlorinated biphenyls (PCBs)
- 2] Dichlorodiphenyltrichloroethane (DDT)
- 3] Perfluorooctanesulfoic acid (PFOS)
- 4] Perfluorooctanoic acid (PFOA)

PHOTO: J. TOWERS



**PRIORITY ACTION CATEGORY 3**

# Activate Support for Southern Resident Killer Whale Recovery

**Indicators:**

- 3.1 Awareness Through Public Outreach and Education
- 3.2 Compliance

**These highly social animals are cherished by Canadians and visitors alike and have significant cultural value for Indigenous peoples.**

PHOTO: J. TOWERS



**This priority action category focuses on understanding how well people are supporting measures for recovery as a result of awareness, outreach, education and compliance.**

### Indicator 3.1:

## Awareness Through Public Outreach and Education

### Why is this Indicator Important?

**The ability to comply with management measures** requires the public to have knowledge of the measures themselves, including the rationale for why the measures are in place.

**Compliance is most successful when outreach and education efforts are clear, concise and targeted.** This includes identifying who needs to follow the management measures, where they apply, what is expected when following the measures, and why the measures matter.

### What is the Outlook?

**Outreach and education efforts are targeted** to marine users in areas within and adjacent to where management measures are implemented.

Target audiences include recreational boaters, fishers, commercial vessels, Indigenous groups, tourism associations, visitor centres, resorts, whale watchers, marinas and yacht clubs, coastal communities, as well as visitors to Parks Canada locations in Coastal BC.

**Distribution of paper and electronic products helps get the word out to many different user groups.** These include brochures, posters, postcards, videos, interpretive signs, emails, newsletters, social media campaigns, fishing charts and notices.

**Direct communication** through participation in events (virtual or in-person), dock walks, marina visits, and community town halls allows for great opportunities to answer questions.

**The Government of Canada partners with several outreach and education organizations,** environmental groups and other Canadian and United

States government agencies including the following three key groups:

- **Be Whale Wise** is a partnership of Canadian and U.S. governmental agencies, Environmental Non-Governmental Organizations and other stakeholders in the Salish Sea to research, implement, and educate best vessel practices around whales.
- **Cetus Research & Conservation Society**, which operates the Straitwatch Program, is a non-profit organization based in British Columbia that works to reduce human impacts on marine mammals in the Salish Sea and along the coast, and strives to decrease vessel disturbance on whales through on-the-water boater education.
- **The U.S. counterpart to Straitwatch is the Soundwatch Boater Education Program** whose mission is to prevent vessel disturbance to killer whales and other marine wildlife in the Central Salish Sea.

### Indicator 3.2: Compliance

### Why is this Indicator Important?

Understanding how well people are following mandatory and voluntary rules provides us with insight into whether people are changing their behaviour to help protect this endangered population, and to determine if more stringent measures are needed.

### What is the Outlook?

**Enforcement across multiple agencies** including Fisheries and Oceans Canada, RCMP, Canadian Coast Guard, Transport Canada, Parks Canada Agency and the Canadian Border Services Agency, patrol on-water, use aerial surveillance, and monitor vessels with Radio Detection and Ranging (RADAR) and Automated Identification System (AIS) data. Enforcement effort is focused on measures that are similar to those in place in previous years, while education and outreach is focused on newer measures.

This Framework is a tool for progress reporting over the longer-term. Updates will be shared when short-term measures reveal significant results or indicate the need for change.



## Moving Forward

The management measures implemented by the Government of Canada support Southern Resident Killer Whale survival and recovery by taking action to reduce threats around disturbance, reduced food availability, and contaminants. By working with Indigenous groups, marine educators, stakeholders, marine users and the public to adjust human activities within Southern Resident Killer Whale critical habitat, we increase the opportunity for success of protecting this endangered population.

Moving forward, priority action categories, indicators, and performance measures may be refined for future Accountability Reports. Given that many of the indicators and associated performance measures are likely to be more informative over time, reporting on progress over longer periods of time (such as every 5 years) is likely to be most informative and useful.

The Government of Canada continues to be committed to protecting the Southern Resident Killer Whale and the ecosystems they rely on today, and for future generations, and looks forward to continuing to work with Indigenous groups, other levels of government and stakeholders in moving this work forward in the years to come.

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## Appendix

### Summary of Priority Action Categories, Indicators and Performance Measures

Within this Framework, proxy indicators and performance measures are identified for three priority action categories to enable consistent reviews of performance data and the addition or modification of indicators and measures over time which allows us to:

- Assess how well our actions are working,
- Provide essential information about the state of, and trends toward the overall goal,
- Highlight needs for improvement, and
- Supply reliable information for discussions and initiatives going forward.

INDICATORS	PERFORMANCE MEASURES
 <b>Priority Action Category 1: Monitor and Understand Southern Resident Killer Whales</b> 	
1.1 Presence	<ul style="list-style-type: none"> <li>• Trends in number of sightings and acoustic detections in critical habitat/management areas</li> </ul>
1.2 Health	<ul style="list-style-type: none"> <li>• Changes in body condition of individuals, pods and population</li> </ul>
1.3 Population Dynamics	<ul style="list-style-type: none"> <li>• Trends in health, such as number of individuals suffering from parasitism</li> </ul>
	<ul style="list-style-type: none"> <li>• Total number of individuals (pod/population)</li> </ul>
	<ul style="list-style-type: none"> <li>• Age structure</li> </ul>
	<ul style="list-style-type: none"> <li>• Number of reproductive females and males</li> </ul>
	<ul style="list-style-type: none"> <li>• Number of births</li> </ul>
	<ul style="list-style-type: none"> <li>• Number of deaths</li> </ul>
 <b>Priority Action Category 2: Reduce Threats</b> 	
2.1 Chinook Salmon Abundance and Fishing Mortality	<ul style="list-style-type: none"> <li>• Number of Fraser River stocks assessed as at risk</li> </ul>
	<ul style="list-style-type: none"> <li>• Canadian catch and escapement number compared to multi-year averages</li> </ul>
	<ul style="list-style-type: none"> <li>• Ocean abundance of Southern BC Chinook</li> </ul>
2.2 Chinook Salmon Enhancement	<ul style="list-style-type: none"> <li>• Number of actual vs. planned juvenile Chinook salmon releases from Chilliwack River Hatchery</li> </ul>
	<ul style="list-style-type: none"> <li>• Proportion of Chinook hatchery fish in scat (2017-2020 compared to 2021-2028)</li> </ul>
2.3 Salmon Habitat Restoration & Protection	<ul style="list-style-type: none"> <li>• Number of projects funded for prey of importance</li> </ul>
	<ul style="list-style-type: none"> <li>• Amount of habitat restored for stocks of importance</li> </ul>
2.4 Underwater Noise	<ul style="list-style-type: none"> <li>• Change in underwater noise levels in critical habitat/management areas</li> </ul>
2.5 Changes in Behaviour	<ul style="list-style-type: none"> <li>• Changes in habitat use</li> </ul>
	<ul style="list-style-type: none"> <li>• Changes in behaviour around vessels</li> </ul>
2.6 Contaminants	<ul style="list-style-type: none"> <li>• Contaminant load in prey samples</li> </ul>
	<ul style="list-style-type: none"> <li>• Trends in contaminant load in the environment including freshwater, air, ocean sediment, landfill leachate, wastewater</li> </ul>
 <b>Priority Action Category 3: Activate Support for Southern Resident Killer Whale Recovery</b> 	
3.1 Awareness Through Outreach and Education	<ul style="list-style-type: none"> <li>• Number of brochures and posters distributed</li> </ul>
	<ul style="list-style-type: none"> <li>• Number of presentations, interpretive programs, dock walks, marina visits, conference and event attendance</li> </ul>
	<ul style="list-style-type: none"> <li>• Number of public enquires (phone and email)</li> </ul>
	<ul style="list-style-type: none"> <li>• Number of social media and web posts, magazine and news articles</li> </ul>
	<ul style="list-style-type: none"> <li>• Number of people reached</li> </ul>
3.2 Compliance	<ul style="list-style-type: none"> <li>• Number of patrol and enforcement hours</li> </ul>
	<ul style="list-style-type: none"> <li>• Number and type of enforcement actions</li> </ul>
	<ul style="list-style-type: none"> <li>• Number and type of incidents</li> </ul>





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Cat. No. Fs23-640/2021E-PDF ISBN 978-0-660-39023-9