Progress Towards the Implementation of the Action Plan for the

Northern and Southern Resident Killer Whales (*Orcinus orca*)

for the Period 2017 to 2024

2026
Species at Risk Act
Action Plan Report Series

Canada

Recommended citation:

Fisheries and Oceans Canada. 2026. Progress Towards the Implementation of the Action Plan for the Northern and Southern Resident Killer Whales (*Orcinus orca*) for the Period 2017 to 2024. *Species at Risk Act* Action Plan Report Series. Fisheries and Oceans Canada, Ottawa. iii + 18 pp.

For copies of the progress report, or for additional information on species at risk, including Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status reports, recovery strategies, residence descriptions, action plans, and other related recovery documents, please visit the Species at Risk Public Registry.

Cover photo: Southern Resident Killer Whales, by David Gaspard.

Également disponible en français sous le titre
« Progrès de la mise en œuvre du plan d'action pour les épaulards (*Orcinus orca*) résidents du nord et du sud pour la période 2017 à 2024 »

ISBN 978-0-660-99283-9

Catalogue no. CW69-21/27-1-2026E-PDF

Preface

The *Species at Risk Act* (S.C. 2002, c.29) (SARA) requires the competent minister(s) to monitor and report on the implementation of recovery documents (that is, recovery strategies, action plans, and management plans) for species at risk. These reports must describe the progress made towards the species' recovery or conservation[1].

The Minister of Fisheries is the competent minister for aquatic species at risk. The minister responsible for the Parks Canada Agency is the competent minister for aquatic species at risk that are found in their jurisdiction. Fisheries and Oceans Canada (DFO) and Parks Canada (PC) have jointly prepared this progress report.

Reporting on the progress toward implementing recovery documents includes reporting on the collective efforts of the competent minister(s), provincial and territorial governments, and all other parties involved in carrying out actions that contribute to the species' recovery or conservation.

As stated in the preamble to SARA, success in the recovery and conservation of species at risk depends on the commitment and cooperation of many contributors, and will not be achieved by DFO and PC, or any other jurisdiction, alone. All Canadians are invited to join in supporting and implementing the recovery documents, for the benefit of the species and Canadian society as a whole.

Acknowledgments

This progress report was prepared by Jessica Banning, Rangyn Lim, Lara Slapcoff, Alannah Biega and Ahdia Hassan (DFO Species at Risk Program). To the extent possible, this progress report was prepared with input from Environment and Climate Change Canada; Transport Canada; Department of National Defence; U.S. National Oceanic and Atmosphere Administration; Government of British Columbia; the Port of Vancouver; Washington State Department of Fish and Wildlife; First Nations and Indigenous organization, and academic and non-governmental organization partners. The progress toward species recovery described in this report would not have been achieved without the partnerships and contributions of many individuals and organizations.

[1] 'Recovery' applies to species listed under SARA as threatened, endangered, or extirpated, which require a recovery strategy and one or more action plan(s). 'Conservation' applies to species listed under SARA as special concern, which require a management plan.

Executive summary

The Northern and Southern Resident Killer Whales (*Orcinus orca*) were listed as threatened and endangered, respectively, under the *Species at Risk Act* (SARA) in 2003. The "Action Plan for Northern and Southern Resident Killer Whale (*Orcinus orca*)" was finalized and published on the Species at Risk Public Registry in 2017. This report provides updates on progress made by the Government of Canada, partners and the broader conservation community towards implementing the action plan and achieving its population and distribution objective from when the action plan was published in March 2017 until February 2024.

The main threats identified for Northern Resident Killer Whales (NRKW) and Southern Resident Killer Whales (SRKW) include reductions in the availability and quality of prey, environmental contamination, and both physical and acoustic disturbances (DFO 2017a). An additional emerging threat, vessel strike, was identified during a science-based review of recovery actions for SRKW (DFO 2017b).

The population and distribution objective for NRKW and SRKW is to 'ensure the long-term viability of Resident Killer Whale (RKW) populations by achieving and maintaining demographic conditions that preserve their reproductive potential, genetic variation, and cultural continuity'[2] (DFO 2017a). To achieve the population and distribution objective, the action plan identifies 98 recovery measures categorized under 5 broad strategies: monitor the population abundance and demographics of RKW and refine knowledge of their seasonal distribution and foraging ecology in Canadian Pacific waters; ensure that RKW have an adequate and accessible food supply to allow recovery; ensure that disturbance from human activities does not prevent the recovery of RKW; ensure that chemical and biological pollutants do not prevent the recovery of RKW populations; protect critical habitat for RKW and identify additional areas for critical habitat designation and protection.

Progress has been made under each of the 5 broad strategies. Of the 98 recovery measures in the action plan, 1 is complete, and 92 are in progress or ongoing. Five lower priority recovery measures have not been started. Key achievements as well as knowledge gaps and future priorities supporting RKW recovery are summarized in this report by broad strategy. While progress has been made towards implementing recovery measures, the population and distribution objective has not been achieved for NRKW or SRKW. During the period covered by this progress report, the NRKW population has made improvements towards meeting the objective, growing from 303 individuals (in 2017) to 345 individuals in 2023 (DFO unpublished data). However, SRKW numbers declined from 77 in July 2017 to 74 in July 2023 (Center for Whale Research 2023). Key threats affecting the populations persist, and demographic conditions that influence reproductive potential, genetic variation, and cultural continuity remain a conservation concern, particularly for SRKW. Given the long lifespan and slow reproduction rates of the species, achieving recovery is a long-term commitment that requires sustained efforts to mitigate threats.

[2] Culture refers to information and behavioural traits that are transmitted within and between generations by social learning.

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1 Introduction

The report “Progress Towards the Implementation of the Action Plan for the Northern and Southern Resident Killer Whales for the Period 2017 to 2024” (progress report) outlines the progress made toward meeting the objectives listed in the “Action Plan for the Northern and Southern Resident Killer Whale (*Orcinus orca*) in Canada” (herein referred to as ‘action plan’; Fisheries and Oceans Canada [DFO] 2017a) from when the action plan was published in March 2017 until February 2024. It also summarizes key knowledge gaps and future priorities to support recovery. Under the *Species at Risk Act* (SARA), the competent minister must report on the implementation of an action plan 5 years after the plan comes into effect; however, due to delays in completing the report, the reporting period was extended to capture up-to-date information.

This report should be considered as one in a series of documents for Resident Killer Whales (RKW) that are linked and should be taken into consideration together; including the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status report (COSEWIC 2023), the recovery strategy (DFO 2018), the critical habitat orders (Justice Canada 2018a; 2018b), reports on progress towards recovery strategy implementation (DFO 2016; DFO 2022), Parks Canada (PC) multi-species action plans (Parks Canada Agency 2016; 2017; 2018), the “Southern Resident Killer Whale: A Science Based Review of Recovery Actions for Three At-Risk Whale Populations” (whale science report) (DFO 2017b); the Imminent Threat Assessment for Southern Resident Killer Whales (Government of Canada 2018a)[3]; and the “Southern Resident Killer Whale Accountability Framework: Evaluating support for recovery (DFO 2020).

For more information on the contents of this document, please contact the Pacific region Species at Risk Program (DFO.PACSAR-LEPPAC.MPO@dfo-mpo.gc).

2 Background

2.1 COSEWIC assessment summary and threats to the populations and their critical habitat

The Northern Resident Killer Whale (NRKW) and the Southern Resident Killer Whale (SRKW) were listed under SARA (S.C. 2002, c.29) in 2003 as threatened and endangered, respectively. Since the initial publication of the recovery strategy in 2008, it has undergone amendments in 2011 to clarify the attributes of critical habitat (DFO 2011), and 2018 to identify critical habitat in two additional areas for RKW (DFO 2018). The action plan was published in 2017.

The latest COSEWIC assessment summaries are provided below.

[3] The 2018 Imminent Threat Assessment was updated in November 2024, which is beyond the timeframe of this progress report. Based on the information reviewed and analysis undertaken it was determined that the conclusions drawn from the 2018 ITA are still relevant in 2024, and imminent threat still exists.

Assessment Summary – December 2023

Common name: Killer Whale – Northeast Pacific Southern Resident population

Scientific name: *Orcinus orca*

Status: Endangered

Reason for designation: The population of this long-lived fish-eating apex marine predator is very small (46 mature individuals) and continues to decline. No immigration occurs and the population shows signs of inbreeding depression. The population is limited and dependent on the availability and abundance of its principal prey, Chinook Salmon, whose current low abundance is expected to continue. The whales are also threatened by increasing vessel traffic and associated acoustic disturbance, contaminants, vessel strikes, and, potentially, oil spills.

Occurrence: Pacific Ocean

Status history: The "North Pacific resident populations" were given a single designation of Threatened in April 1999. Split into three populations in November 2001. The Southern Resident population was designated Endangered in November 2001. Status re-examined and confirmed in November 2008 and December 2023.

Assessment Summary – December 2023

Common name: Killer Whale – Northeast Pacific Northern Resident population

Scientific name: *Orcinus orca*

Status: Threatened

Reason for designation: The population of this long-lived fish-eating apex marine predator is small (~176 mature individuals) and dependent on the availability of its principal prey, Chinook Salmon, whose current low abundance is expected to continue. This whale is at risk from physical and acoustical disturbance, vessel strikes, contaminants, and, potentially, oil spills. Although this population meets criteria for Endangered, it has been increasing slowly (average of 2%/yr) since monitoring began in 1974, likely recovering from past human-caused mortality and live-capture for public display.

Occurrence: Pacific Ocean

Status history: The "North Pacific resident populations" were given a single designation of Threatened in April 1999. Split into three populations in November 2001. The Northern Resident population was designated Threatened in November 2001. Status re-examined and confirmed in November 2008 and December 2023.

Section 4 of the recovery strategy (DFO 2018) provides information on the threats to RKW survival and recovery. These threats include prey availability, environmental contamination, and physical and acoustic disturbance.

2.2 Recovery

This section summarizes the population and distribution objective, as well as the broad strategies that are necessary to meet the objective for the recovery of NRKW and SRKW.

The action plan (DFO 2017a) described the following population and distribution objective for RKW:

> ensure the long-term viability of RKW populations by achieving and maintaining demographic conditions that preserve their reproductive potential, genetic variation, and cultural continuity[4]

Section 1.2 of the action plan (DFO 2017a) identifies 98 recovery measures that provide the best chance of achieving the population and distribution objective for the NRKW and SRKW, to be undertaken by DFO and/or its partners under the following broad strategies:

1. Monitor the population abundance and demographics of Resident Killer Whales and refine knowledge of their seasonal distribution and foraging ecology in Canadian Pacific waters.
2. Ensure that RKW have an adequate and accessible food supply to allow recovery.
3. Ensure that disturbance from human activities does not prevent the recovery of RKW.
4. Ensure that chemical and biological pollutants do not prevent the recovery of RKW populations.
5. Protect critical habitat for RKW and identify additional areas for critical habitat designation and protection.

3 Progress towards meeting the population and distribution objective

Section 3.1 summarizes the progress made for each of the broad strategies and section 3.2 identifies key knowledge gaps and future priorities for the RKW.

Under SARA, the competent minister must report on the implementation of an action plan 5 years after the plan comes into effect. Due to delays in completing the report on a 5-year cycle, the reporting period was extended to cover 7 years (March 2017 to February 2024).

3.1 Summary of progress towards recovery

This section summarizes the progress made in each of the 5 broad strategies by the Government of Canada, its partners and the broader conservation community from March 2017 to February 2024. A detailed Recovery Measures Table on progress toward implementation of all 98 recovery measures identified in the RKW action plan is compiled by the Government of Canada and available upon request. Of the 98 recovery measures in the action plan, 1 is complete and 92 are in progress or ongoing. Five lower priority recovery measures have not been started.

[4] Culture refers to a body of information and behavioural traits that are transmitted within and between generations by social learning (DFO 2018)

Broad strategy 1: monitor the population abundance and demographics of Resident Killer Whales and refine knowledge of their seasonal distribution and foraging ecology in Canadian Pacific waters

- Continued monitoring expanded our knowledge of both NRKW and SRKW distribution and seasonal habitat use. This was implemented through annual population surveys, using photo-identification for NRKW and vessel surveys for SRKW (presence and habitat use) and acoustics data for both NRKW and SRKW, carried out by DFO, PC and partners (Center for Whale Research 2023; DFO unpublished data; Pilkington et al. 2023; Thornton et al. 2022a; Towers et al. 2020; Parks Canada 2025).
    - As of 2023, the best population estimate for NRKW was 345 individuals, up from 303 individuals in 2017 (DFO unpublished data).
    - As of July 1, 2023, the SRKW population declined to 74 individuals, from 77 individuals in July 2017 (Center for Whale Research 2023).
- Estimated the carrying capacity of RKW habitat using population models and current Chinook Salmon availability. Results projected that the NRKW population trajectory increases to carrying capacity within 25 years while the SRKW population trajectory declines with a 26% probability of extinction within 86 years if no further management action is taken (Murray et al. 2019; 2021).
- Investigated the role of genetics in RKW population dynamics (Kardos et al. 2023) and indicators of accelerating decline in SRKW (Williams et al. 2024).

Broad strategy 2: ensure that RKW have an adequate and accessible food supply to allow recovery

- Sampled and studied RKW prey to identify prey preferences (Ford et al. 2017; Hanson et al. 2021; NOAA and Washington Department of Fish and Wildlife 2018).
- Investigated the relationship between prey abundance and RKW population dynamics and body condition (Ford et al. 2017; Groskreutz et al. 2019; Ruggerone et al. 2019; Stewart et al. 2021) and modeled cumulative effects of threats, including prey availability, on RKW populations (Murray et al. 2019; 2021).
- Reported on the State of the Canadian Pacific Salmon and the availability of RKW prey (Couture et al. 2022; Freshwater et al. 2021; 2022; Grant et al. 2019).
- Estimated stock-specific Chinook Salmon abundance in the La Perouse Bank critical habitat area during spring/summer and Chinook Salmon habitat use and survival along the continental shelf and the southern Salish Sea (Freshwater et al. 2024, Freshwater and King 2024).
- Implemented management actions towards increasing prey availability by reducing fisheries for Chinook Salmon, closing fisheries in key foraging areas, increasing Chinook Salmon hatchery production, restoring coastal salmon habitat, and identifying important habitat for salmon and their prey (Government of Canada 2021a; 2024a, Kroeker, pers. comm. 2026).
- Efforts to support salmon restoration that have the potential to benefit RKW by increasing prey abundance:
    - Initiated the British Columbia Salmon Restoration and Innovation Fund (BCSRIF) in 2019, a contribution program funded jointly by the federal and provincial government to support protection and restoration activities for priority wild fish stocks, including salmon (DFO 2024).

  - Launched the Pacific Salmon Strategy Initiative (PSSI) in 2021, investing $686 million over 5 years to recover Pacific salmon (Government of Canada 2021a).
  - Committed to banning open net-pen salmon aquaculture in BC coastal waters by June 30, 2029, in an effort to protect wild salmon and promote more sustainable aquaculture practices (Government of Canada 2024b).

Broad strategy 3: ensure that disturbance from human activities does not prevent the recovery of RKW

- Amended the *Marine Mammal Regulations* (MMRs) under the *Fisheries Act* in 2018 to include: a minimum approach distance of 200m to all Killer Whales in Canadian Pacific waters; provisions related to reducing human disturbance of marine mammals; and a definition of disturbance to marine mammals (Justice Canada 2018c).
- Implemented a suite of annual management measures to mitigate disturbance to SRKW including: increasing vessel approach distances for Killer Whales to 400m in southern BC coastal waters (2019 to 2024), implementing Interim Sanctuary Zones (2019 to 2024), restricting vessel speeds in areas frequented by SRKW (2022 to 2024), and prohibiting vessels from impeding the path of Killer Whales (2023 to 2024) (Government of Canada 2024a).
- Established the "Sustainable Whale Watching Authorization" for whale watch operators, prohibiting them from offering tours to observe SRKW (Transport Canada 2024).
- Continued conducting stewardship and outreach activities with several partners, including the promotion of the MMRs and the Be Whale Wise (BWW) Outreach Toolkit and Guidelines for best vessel practices around whales (Be Whale Wise 2024).
- Partnered with The Whale Trail to promote shore-based whale watching, marking each location with an interpretive sign providing information on marine mammals, cultural history, and ways individuals can protect marine mammals (Kroeker, pers. comm. 2026).
- Developed and implemented "*Species at Risk Act* Section 11 Conservation Agreement to Support the Recovery of the Southern Resident Killer Whale" with the Vancouver Fraser Port Authority (VFPA), Transport Canada and six commercial shipping associations. The goal of this agreement is to reduce the acoustic and physical disturbance to SRKW by large commercial vessels in Pacific Canadian waters, in particular those vessels that call at the Port of Vancouver (Government of Canada 2019a).
- Implemented and assessed the efficacy of the voluntary slowdowns and inshore lateral displacement trials for large commercial vessels, led by the VFPA in areas of SRKW critical habitat (Vagle and Neves 2019; Vagle 2020; Burnham et al. 2021b; Vancouver Fraser Port Authority 2024).
- Developed the WhaleReport Alert System (WRAS), an initiative by Ocean Wise, that provides real-time alerts to commercial mariners when whales are present so that they may undertake adaptive mitigation measures, such as slowing down or altering course (Ocean Wise 2024).
- Created the Canadian Coast Guard 'Marine Mammal Desk', which reports near real-time whale sightings and advises vessel traffic by providing enhanced situational awareness of activity of RKW and other whales (Canadian Coast Guard 2021).
- Analysed baseline natural and anthropogenic underwater noise profiles in RKW habitat to better understand anthropogenic impacts (Burnham et al. 2021a; 2023; Lee pers. comm. 2024; Vagle et al. 2021a; 2021b).

- Identified priority areas for foraging (Stredulinsky et al. 2023) and mitigation of vessel-related threats to SRKW (DFO 2021; Thornton et al. 2022a; 2022b).
- Completed a co-occurrence analysis of SRKW presence and the potential for vessel-related impacts in SRKW critical habitat from May to October (DFO 2021).
- Assessed overall foraging behaviours of RKW (Tennessen et al. 2023) and the implications of vessel disturbance and underwater noise on RKW acoustic use, behaviour and foraging success (Burnham et al. 2023; Granger et al. 2023; Holt et al. 2021a; 2021b; Konrad Clarke et al. 2024; Tennessen et al. 2024).
- Under Canada's leadership, the International Maritime Organization (IMO) Revised Underwater Radiated Noise (URN) Guidelines took effect in October 2023, and in 2024 the IMO further approved an action plan for the reduction of underwater noise from commercial shipping. The URN Action Plan aims to address barriers to the uptake of the Revised URN Guidelines to further prevent and reduce URN from ships (International Maritime Organization 2024).
- The Marine Environmental Quality Program contributed $26.6 million over 5 years beginning in 2019, to better understand the impact of vessel noise on marine mammals, including SRKW (Government of Canada 2019b).

Broad strategy 4: ensure that chemical and biological pollutants do not prevent the recovery of RKW populations

- Established a contaminants technical working group in 2018 to investigate the threat of contaminants to SRKW (ECCC 2020; Government of Canada 2023b).
- Conducted monitoring for contaminants in various environmental compartments (air, surface freshwater, freshwater sediment, wastewater, landfill leachate) to further our understanding of contaminants in SRKW habitat and their impacts.
- Launched the Pollutants Affecting Whales and their Prey Inventory Tool (PAWPIT) to identify and prioritize contaminants and their sources that are potentially affecting SRKW and Chinook Salmon (Government of Canada 2023a).
- Placed stronger controls on contaminants impacting whales, including publishing amendments to the *Prohibition of Certain Toxic Substances Regulations* in 2022 to strengthen regulatory controls for 5 persistent organic pollutants (Government of Canada 2020; 2021b).
- Reduced contaminant releases via wastewater systems in RKW habitat, as required under the *Wastewater Systems Effluent Regulations*.
- Designed a framework for developing Environmental Quality Guidelines that protect apex marine mammals, including RKW, from the bioaccumulation of toxic substances (McTavish et al. 2024).
- Conducted necropsies and tissue sampling on stranded deceased Killer Whales in BC and, when feasible, to screen for pathogens (Cottrell pers. comm. 2021; Raverty et al. 2020; 2021).
- Developed new methodology for measuring harmful algal biotoxins in seawater, fish tissues, and whale fecal samples (Ross et al. 2021; 2022).
- Finalized a Pacific Marine Mammal Spill Response Plan that prioritizes RKW in spill response measures (Hawryshyn pers. comm. 2023).
- Monitored leachate/discharge from municipal solid waste landfill sites and wastewater treatment plants located near RKW habitat, focusing on contaminants of particular concern for RKW and their prey (Government of Canada 2023b; 2024c; 2024d; 2024e).

- Several studies have been completed to investigate the presence and impact of chemical and biological pollutants in RKW, their prey, and/or habitat (Brown et al. 2022; Holbert et al. 2024; Kim et al. 2023; Ross and Mueller 2024).

Broad strategy 5: protect critical habitat for RKW and identify additional areas for critical habitat designation and protection

- In 2018, critical habitat was amended in the recovery strategy to include two additional areas: 1) waters on the continental shelf off southwestern Vancouver Island, including Swiftsure and La Perouse Banks for NRKW and SRKW; and 2) waters west of Dixon Entrance along the north coast of Graham Island from Langara to Rose Spit for NRKW. Subsequently, the previous critical habitat order was replaced to ensure the legal protection of the amended critical habitat identified in the Recovery Strategy (DFO 2018; Justice Canada 2018a; 2018b).
- Identified areas of SRKW intensity of occurrence (that is, habitat preference) within SRKW critical habitat as the Swiftsure Bank Area, Haro Strait, coastal waters near the Fraser River and other locations (Thornton et al. 2022a; 2022b).
- National Oceanic and Atmospheric Administration (NOAA) revised the designation of critical habitat for SRKW in the United States (US) in 2021, through a final rule, which designated six additional areas (totalling 15,910 square miles) of critical habitat along the US West Coast (NOAA 2021).

3.2 Key knowledge gaps and future priorities for the Northern and Southern Resident Killer Whales

The following areas were identified where further work is needed to support the recovery of these populations, including:

Broad strategy 1: monitor the population abundance and demographics of Resident Killer Whales and refine knowledge of their seasonal distribution and foraging ecology in Canadian Pacific waters

- Development of behavioural or physiological RKW health indicators to function as an early indication of demographic change.
- Further research into winter habitat use and diet to achieve a more comprehensive understanding of RKW annual requirements.
- Better understanding of foraging efficiency, the energy cost associated with foraging, the effect of declining prey size, and the use of RKW body condition as a recovery indicator to inform prey availability and management measures. This work also applies to broad strategy 2.

Broad strategy 2: ensure that RKW have an adequate and accessible food supply to allow recovery

- Continued evaluation of the effectiveness of the annual management measures addressing threats to SRKW (for example, seasonal recreational and commercial salmon fishing closures and Interim Sanctuary Zones; Government of Canada 2024a) . These annual management measures also apply to broad strategies 3 and 4.
- Further research into RKW prey abundance and distribution.

Broad strategy 3: ensure that disturbance from human activities does not prevent the recovery of RKW

- Further investigation into the impacts of underwater noise on RKW, particularly in critical habitat and high-use areas, on foraging and reproduction and the metabolic cost associated with this disturbance; application of this information to inform underwater noise targets, thresholds or other management approaches in a comprehensive noise management framework. This work also applies to broad strategy 5.
- Continued improvements and increased application of near real-time detection technologies to support management actions, including vessel strike risk, and acoustic and physical disturbance threat reduction.
- Increased understanding of the vessel strike risk for RKW.

Broad strategy 4: ensure that chemical and biological pollutants do not prevent the recovery of RKW populations

- Continued research into the level and impacts of contaminants on RKW and their prey.
- Identification of sources of biological pollutants and contaminants and the measures to reduce or stop the release of these contaminants into RKW habitat.
- Building on recent positive coordination as part of the Aleutian Isle incident response, explore opportunities to increase collaboration and coordination in Transboundary Spill response with the US.

Broad strategy 5: protect critical habitat for RKW and identify additional areas for critical habitat designation and protection

- Continued evaluation of RKW ecological and critical habitat requirements, amending critical habitat designations when necessary.

3.3 Socio-economic costs and benefits

Under section 55 of SARA, the responsible federal minister is required to undertake an evaluation of the socio-economic costs of the action plan and benefits to be derived from its implementation. This section updates the socio-economic impacts associated with the implementation of the action plan.

In the “Action Plan for the Northern and Southern Resident Killer Whale” (DFO 2017a), the incremental costs resulting from implementing the recovery measures were expected to be low[5]. However, at the time, many of the measures were of an investigative nature and not well-defined. This analysis suggests that the action plan has resulted in significant costs, borne by the federal government through its Species at Risk Program funding initiatives. Costs of implementing the action plan were also incurred by the commercial and recreational fishing sectors through area and time-based salmon harvest closures, but the impact to these sectors cannot be determined due to confounding factors such as changes in salmon biomass, the implementation of programs outside of the action plan (including co-occurring closures

[5] Significant cost is defined by Treasury Board guidance as greater than $1M annualized (or greater than $10M Present Value over a 10 year period). See guidance here: Policy on Cost-Benefit Analysis - Canada.ca

implemented to reduce harvest impacts on Fraser River stocks of concern), such as the PSSI, and other factors.

The federal government has directly supported recovery through various Species at Risk funding programs. The majority of the costs borne by the federal government for RKW recovery are attributable to Grants and Contributions, provided via funding programs, including: the Habitat Stewardship Program for Species at Risk, Aboriginal Fund for Species at Risk, and the Canada Nature Fund for Aquatic Species at Risk. Projects funded by these programs had dollar and in-kind costs fully or partially matched by recipients. The key cost categories included research (including vessel surveys, sampling, and studies), annual censuses, stewardship, and outreach.

Based on available data, costs have steadily increased from 2017, peaking in the 2021 to 2022 fiscal year. During the reporting period (fiscal year 2017 to 2018 through 2023 to 2024), 42 projects (totaling an estimated $10.9 million and averaging $1.56 million annually)[6] targeting Resident Killer Whales were budgeted for funding through Grants and Contributions programs. A further $0.95 million was committed between fiscal years 2020 to 2021 and 2023 to 2024 for federal government spending on the implementation of recovery measures for Resident Killer Whales.

In addition to the aforementioned programs that have directly supported recovery, several large scale funding initiatives (implemented outside the action plan) benefitting NRKW and SRKW and their prey include: $167.4 million over 5 years committed through the Whales Initiative in 2018 under the Oceans Protection Plan (Government of Canada 2018b) and an additional $61.5 million over 5 years addressing principal anthropogenic threats to SRKW specifically; $254.08 million over 7 years committed to the BCSRIF between 2019 and 2026; $26.6 million over 5 years was contributed by the Marine Environmental Quality Program in 2019, to better understand the impact of vessel noise on marine mammals, including SRKW; and $686 million to the PSSI in 2021. However, as these funding programs do not pertain solely to the measures in the action plan, they are not included in the calculation of the costs of the 2017 action plan.

Some recovery measures have incurred a cost to industry stakeholders to implement. For example, the annual SRKW management measures implemented by the Government of Canada from 2018 to present restrict fishing and vessel activities in some areas of important habitat for SRKW. These management measures support several of the recovery measures included in the action plan and were informed by the best available science as well as advice from Indigenous groups, technical working groups, stakeholders, and the public.

While it is not possible to attribute harvest changes solely to the SRKW closures due to other external factors that may impact harvest, including co-occurring closures that were implemented to reduce harvest impacts on Fraser River stocks of concern, based on commercial harvest data of salmon from DFO logbooks and sales slips between 2014 to 2017 (before SRKW closures) and 2023 (after closures), the amount of average annual commercial harvest landed value in the subareas during the timed closures fell by approximately $1.2 million (2023), or 480,000 kg. As data was only available at the subarea level, the geographical area of each subarea overlapped by the closures was used to develop activity estimates in the closure areas. As such, the activity estimates in each area demonstrate activity coinciding with the closure rather than the impact of each closure. Furthermore, these estimates assume that harvest is

[6] Figures are in 2023 dollars.

distributed equally across the subarea, and do not take into account the concentration of effort within the subarea. Additionally, changes in biomass, the implementation of programs such as the PSSI, and other factors might play a role in the change in harvest. For example, between 2014 to 2017 and 2023, annual average coastwide commercial salmon marine harvest fell by nearly $61 million and 17 million kg. This represents a decrease of approximately 22% for both metrics, in comparison to a decrease of 68% in landed value and 51% in landed weight in the areas affected by the closures. There may be further impacts to the commercial fishery associated with voluntary vessel slow down measures in the action plan. However, these are not possible to quantify.

Economic impacts may have also been incurred by businesses that directly service the tidal recreational sector, including lodges, charters and guides. However, due to data constraints, it is only possible to estimate changes in recreational salmon fisheries catch in the closed proportion of each affected larger management area. As such, while unlikely to be true, this estimate assumes that fishing effort is distributed equally across the Pacific Fisheries Management Area (PFMA). Despite the recreational salmon fishing closures, it is estimated that recreational harvest has increased by approximately 2,800 fish caught between 2014 and 2017 and 2023 in the affected PFMAs, suggesting that it's possible that displaced anglers were able to move to areas in the PFMAs where recreational fishing is permitted. In addition to changes in salmon biomass and other factors such as PSSI, displacement of harvest may also affect harvest figures, that is recreational angling activity may be displaced elsewhere within the same larger management area during the closure times. Displacement may lead to negative impacts for local businesses nearest the closure areas.

Socio-economic benefits cannot be quantified but may accrue from several sources. RKW have historically been both ecologically and culturally significant to many Indigenous peoples. Further benefits flow from the values Canadians have for the preservation of wildlife species and their associated provision of ecosystem goods and services. The ongoing implementation of the action plan recovery measures could result in an enhanced public profile of RKW, increased awareness of conservation of RKW, and improved information to fill knowledge gaps. The recovery measures could also result in spin-off benefits to other marine mammals. If measures lead to recovery or if abundance increases (as in the case of NRKW), incremental benefits for Canadians more broadly would result from changes to ecosystem goods and services supported by RKW (that is, indirect use), as well as non-market benefits such as bequest, existence, and option values.

4 Concluding statement

Since the publication of the "Action Plan for the Northern and Southern Resident Killer Whale (*Orcinus orca*) in Canada" (DFO 2017a), progress has been made towards implementing recovery measures; however, the population and distribution objective has not been achieved. During the reporting period, the NRKW population has made improvements towards meeting the objective, increasing from 303 individuals in 2017 to 345 individuals in 2023 (DFO unpublished data). However, SRKW numbers declined from 77 individuals in July 2017 to 74 individuals in July 2023 (Center for Whale Research 2023). Given the long lifespan and slow reproduction rate of the species, achieving recovery is a long-term goal. The effects of recovery efforts can be expected to take multiple generations before substantial results may be observed.

Since 2017, several actions have contributed to threat mitigation, notably: strengthened protections through the amendment of the MMRs under the *Fisheries Act* and the identification of two additional areas of critical habitat via critical habitat orders for NRKW and SRKW,

respectively (Justice Canada 2018a, 2018b). Enhanced management measures have been implemented for SRKW on an annual basis since 2018, which include, but are not limited to, area-based fishing closures, interim sanctuary zones, speed-restricted zones, increased avoidance distances for vessels, enhancement of Chinook Salmon, pollution prevention initiatives, and education, compliance and enforcement activities. The "*Species at Risk Act* Section 11 Conservation Agreement to Support the Recovery of the Southern Resident Killer Whale" (2019 to 2024) was developed and implemented with VFPA, Transport Canada, and commercial shipping associations to reduce the acoustic and physical disturbance to SRKW by large commercial vessels in Pacific Canadian waters. There have been advancements in whale detection technology, acoustic monitoring systems, and research on a range of RKW anthropogenic threats, including but not limited to prey, acoustic disturbance, and sources and impacts of contaminants.

Despite ongoing efforts to mitigate threats, imminent threats affecting the survival and recovery to SRKW persist as the population continues to decline (COSEWIC 2023). Areas for future work include further investigation into the impacts of underwater noise on RKW; assessment of the quantity and quality of prey species; continued research into the levels and impacts of contaminants; and continued implementation and evaluation of management measures addressing the threats to SRKW.

The Government of Canada remains committed to the survival and recovery of RKW. The work started and completed to date has built a strong foundation for continued research and management of these populations. The progress made to date would not have been achieved without the contribution from Indigenous groups, partners, and stakeholders. DFO and PC look forward to continuing these successful collaborations and welcome the participation of additional partners.

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