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Action Plan Series

Action Plan for the Northern and Southern Resident Killer Whales (*Orcinus orca*) in Canada [DRAFT]

Killer Whale

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Canada

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For copies of the action plan, or for additional information on species at risk, including COSEWIC Status Reports, residence descriptions, recovery strategies, and other related recovery documents, please visit the SAR Public Registry[1].

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[1] www.registrelep.gc.ca/default_e.cfm

Preface

The federal, provincial, and territorial government signatories under the Accord for the Protection of Species at Risk (1996)[2] agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the federal competent ministers are responsible for the preparation of action plans for species listed as Extirpated, Endangered, and Threatened for which recovery has been deemed feasible. They are also required to report on progress five years after the publication of the final document on the SAR Public Registry.

Under SARA, one or more action plan(s) provides the detailed recovery planning that supports the strategic direction set out in the recovery strategy for the species. The plan outlines what needs to be done to achieve the population and distribution objectives (previously referred to as recovery goals and objectives) identified in the recovery strategy, including the measures to be taken to address the threats and monitor the recovery of the species, as well as the proposed measures to protect critical habitat that has been identified for the species. The action plan also includes an evaluation of the socio-economic costs of the action plan and the benefits to be derived from its implementation. The action plan is considered one in a series of documents that are linked and should be taken into consideration together. Those being the COSEWIC status report, the recovery strategy, and one or more action plans.

The Minister of Fisheries and Oceans Canada (DFO) and the Minister responsible for Parks Canada are the competent ministers under SARA for the Northern and Southern Resident Killer Whales and have prepared this action plan to implement the recovery strategy, as per section 47 of SARA. To the extent possible, it has been prepared in cooperation with Environment Canada, Transport Canada, the Department of National Defence, the Canadian Coast Guard, Natural Resources Canada, the Province of British Columbia, and the U.S. National Oceanographic and Atmospheric Administration (NOAA).

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions and actions set out in this action plan and will not be achieved by DFO or Parks Canada Agency, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this action plan for the benefit of the Northern and Southern Resident Killer Whales and Canadian society as a whole.

Fisheries and Oceans Canada is committed to implementing the measures assigned to itself; however, implementation of this action plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.
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[2] www.ec.gc.ca/media_archive/press/2001/010919_b_e.htm

Acknowledgments

The development of the action plan was the result of collaborative efforts and contributions from many individuals and organizations. The Northern and Southern Resident Killer Whale Action Plan Team (Appendix C) compiled the contributions from DFO Science, the Northern and Southern Killer Whale Prey and Disturbance workshop (March 8-10th, 2011), the NOAA/DFO bilateral workshop series on The Effects of Salmon Fisheries on Southern Resident Killer Whales (September 21-23rd, 2011, March 13-15th, 2012 and September 18-20th, 2012), and feedback obtained during consultations to develop the Action Plan for the Northern and Southern Resident Killer Whales (*Orcinus orca*) in Canadian waters.

Executive Summary

This action plan addresses recovery measures for the Northern and Southern Resident Killer Whale populations in Canadian Pacific waters. Through a series of technical workshops, consultations and meetings, recovery measures were developed to address the broad goals and objectives identified in the *Recovery Strategy for Northern and Southern Resident Killer Whales (*Orcinus orca*) in Canada* (DFO 2011).

This action plan outlines activities to be undertaken by Fisheries and Oceans Canada, but also those for which other jurisdictions, organization and individuals have a role to play. All Canadians are strongly encouraged to participate in the conservation of Northern and Southern Resident Killer Whales through undertaking priority recovery measures outlined in this action plan. The actions relate to the following objectives for recovery and form the broad strategies identified in the implementation table in this action plan:

- *Ensure that Resident Killer Whales have an adequate and accessible food supply to allow recovery.*
- *Ensure that chemical and biological pollutants do not prevent the recovery of Resident Killer Whale populations.*
- *Ensure that disturbance from human activities does not prevent the recovery of Resident Killer Whales.*
- *Protect critical habitat for Resident Killer Whales and identify additional areas for critical habitat designation and protection.*

The impacts of the recovery measures in this action plan are unknown but likely positive, providing benefits to Canadians. Additionally, some research and threat mitigation activities will result in benefits to other marine mammals and sea turtles, including a number of SARA listed species. The anticipated cost of DFO's contribution to recovery measures is low. The inclusion of financial and in-kind costs to partners will very likely push the overall costs of this action plan into the medium cost range on the national scale.

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1. Recovery Actions

1.1 Context and Scope of the Action Plan

Species Status and Background

Two distinct populations of fish-feeding 'resident' Killer Whales (*Orcinus orca*), known as the Northern and Southern Residents, occupy the waters off the west coast of British Columbia. Although the ranges of these two populations overlap, they are acoustically, genetically and culturally distinct from each other. In 2001, COSEWIC designated Southern Resident Killer Whales as 'endangered', and Northern Resident Killer Whales as 'threatened'. The species was reassessed by COSEWIC in 2009, and the designations were maintained. Both populations are listed in Schedule 1 of the *Species at Risk Act* (SARA).

Resident Killer Whale populations in British Columbia are presently considered to be at risk because of their small population size, low reproductive rate, and the existence of a variety of anthropogenic threats that have the potential to prevent recovery or to cause further declines. Principal among these anthropogenic threats are reductions in the availability or quality of prey, environmental contamination, and both physical and acoustic disturbance. Even under the most optimistic scenario (human activities do not increase mortality or decrease reproduction), the species' low intrinsic growth rate means that the time frame for recovery will be more than one generation (25 years).

The Southern Resident Killer Whale population experienced declines of 3% per year between 1995 and 2001, and since then has shown little recovery, having 82 members in 2013. During the summer and fall, Southern Residents are primarily found in the trans-boundary waters of Haro Strait, Boundary Pass, the eastern portion of the Juan de Fuca Strait, and southern portions of the Strait of Georgia. This area is designated as 'critical habitat' based on consistent and prolonged seasonal occupancy. Some members of the population typically remain in the same general area in winter and spring, but others appear to range over much greater distances, and have been reported as far south as Monterey Bay, California, and as far north as Southeast Alaska. Winter and spring critical habitat has not been identified for the latter group. During the summer and fall, the principal prey of Southern Residents appears to be Chinook and Chum Salmon (*Oncorhynchus tshawytscha* and *O. keta*); little is known of their diet in the winter and spring. The lack of information about winter diet and distribution of the Southern Residents is a major knowledge gap that impedes our understanding of the principal threats facing the population.

The Northern Resident Killer Whale population experienced a decline of 7% between 1997 and 2003, and has since increased to 262 members in 2010. The population appears to spend the majority of its time from central Vancouver Island (both west and east coasts) and northwest to Dixon Entrance, but has been sighted as far south as Grays Harbor, Washington, and as far north as Glacier Bay, Alaska. A portion of the population is regularly found in Johnstone Strait and southeastern portions of Queen

Charlotte Strait (and adjoining channels) during the summer and fall, and this area is identified as critical habitat based on this consistent seasonal occupancy. Other areas are likely very important to Northern Residents during this time but they have yet to be clearly identified. Similarly, areas that may constitute critical habitat during the winter and spring are not yet known. Northern Residents also appear to feed primarily on Chinook and Chum Salmon during the summer and fall. However, like Southern Residents, very little is known of their winter distribution and diet, and this knowledge gap must be addressed to fully understand the principal threats affecting the population.

The population and distribution objective for these populations is as follows:

Ensure the long-term viability of Resident Killer Whale populations by achieving and maintaining demographic conditions that preserve their reproductive potential, genetic variation, and cultural continuity[3]*.*

In order to achieve this objective, the recovery strategy identified four principal objectives. These include:

Objective 1: Ensure that Resident Killer Whales have an adequate and accessible food supply to allow recovery.

Objective 2: Ensure that chemical and biological pollutants do not prevent the recovery of Resident Killer Whale populations.

Objective 3: Ensure that disturbance from human activities does not prevent the recovery of Resident Killer Whales.

Objective 4: Protect critical habitat for Resident Killer Whales and identify additional areas for critical habitat designation and protection.

Scope of the Action Plan

This action plan should be considered along with the Recovery Strategy for Northern and Southern Resident Killer Whales in Canada (DFO 2011). The recovery strategy provides the strategic direction and approaches for recovery of Resident Killer Whale populations, background information on the species, potential threats to the population and individuals, as well as information describing the location and features of critical habitat.

Measures to be Taken and Implementation Schedule

Success in the recovery of this species is not solely dependent on the actions of any single jurisdiction; rather it requires the commitment and cooperation of many different

[3] Culture refers to a body of information and behavioural traits that are transmitted within and between generations by social learning

constituencies that will be involved in implementing the directions and actions set out in this action plan.

The purpose of this action plan is to outline what needs to be done to achieve the population and distribution objectives for the Northern and Southern Resident Killer Whales in order to guide activities to be undertaken by DFO and those for which other jurisdictions, organizations and individuals have a role to play. DFO strongly encourages all Canadians to participate in the conservation of Northern and Southern Resident Killer Whales through undertaking priority recovery measures outlined in this action plan.

Recovery of Northern and Southern Killer Whales requires the commitment and cooperation of many different jurisdictions. Column 5 in the Implementation Table identifies measures to be led by DFO, in cooperation and consultation with other agencies, as well as opportunities for other jurisdictions, groups or individuals to participate in undertaking or contributing to one or more measures in support of recovery. Fisheries and Oceans Canada is committed to implementing the measures assigned to itself; however, implementation of this partial action plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

Table 1. Implementation Schedule

#	Recovery Measures	Priority[4]	Threats or Concerns addressed	Category 1. DFO 2. DFO and other 3. Other	Timeline[5]
Broad Strategy 1: *Ensure that Resident Killer Whales have an adequate and accessible food supply to allow recovery*					
Approach 1: Determine the seasonal diet, feeding areas and energetic requirements of Northern and Southern Resident Killer Whales					
1	Undertake an annual census to monitor and assess Resident Killer Whale population dynamics (multi-species ship surveys and dedicated vessel surveys)	High	Prey availability	2	Annual; ongoing
2	Identify year round Resident Killer Whale distribution and diet using acoustic monitoring and dedicated vessel surveys	High	Prey availability	2	Annual; ongoing
3	Further identify Resident Killer Whales' prey preference (species/size/sex/stock)	High	Prey availability	2	Annual; ongoing
4	Examine the CANFIS/catch per unit effort (CPUE) records to assist in identifying areas of prey aggregation in order to anticipate Resident Killer Whale foraging grounds	High	Prey availability	2	Annual; ongoing
5	Use historical fishing records to identify potential Resident Killer Whale feeding areas	Medium	Prey availability	3	2 years

[4] "Priority" reflects the degree to which the action contributes directly to the recovery of the species or is an essential precursor to an action that contributes to the recovery of the species.
[5] "Timeline" indicates the anticipated year or time frame in which the measure will be accomplished. A timeline listed as "ongoing" indicates the importance that that measure be conducted regularly through the foreseeable future. A timeline listed as "unknown" does not mean that that particular measure is unimportant; rather, it means that the current paucity or complete lack of data for a given species does not allow us to state a certain timeline at this point.

#	Recovery Measures	Priority[4]	Threats or Concerns addressed	Category 1. DFO 2. DFO and other 3. Other	Timeline[5]
Approach 2: Determine Resident Killer Whale foraging success rates					
6	Undertake a catch per unit effort (CPUE) assessment of Resident Killer Whale foraging effort and success rate	High	Prey availability	2	Ongoing
7	Continue to monitor the role of Chinook abundance in the population dynamics of the Northern and Southern Resident Killer Whale populations	High	Prey availability	2	Ongoing
8	Assess Resident Killer Whale body condition using the best available technology	High	Prey availability	2	Annual; ongoing
Approach 3: Establish long term monitoring programs capable of detecting changes in abundance, distribution and quality of Resident Killer Whale prey					
9	Continue to monitor abundance, distribution and age specific composition of Chinook stocks and runs	High	Prey availability	2	Annual; ongoing
10	Identify and monitor natural and anthropogenic factors affecting Resident Killer Whale prey over the long term (e.g., climate change, Pacific Decadal Oscillation, El Nino)	High	Prey availability	2	Annual; ongoing
11	Identify features that define “quality” prey for Resident Killer Whales and determine a means of assessment (e.g., length, age, caloric value, lipid content)	Medium	Prey availability	2	5 years
12	Assess the quality of identified prey species on an annual basis	Medium	Prey availability	2	Annual; ongoing

#	Recovery Measures	Priority[4]	Threats or Concerns addressed	Category 1. DFO 2. DFO and other 3. Other	Timeline[5]
Approach 4: Develop potential actions to be taken during poor Chinook return years to ensure sufficient prey availability for Resident Killer Whales					
13	Take into account both the seasonal (acute) as well as the cumulative (chronic) effects of poor Chinook returns on Resident Killer Whales when considering Chinook management actions in support of recovery	High	Prey availability	2	Annual; ongoing
14	Investigate strategic fishery closures as a possible tool to reduce Resident Killer Whale prey competition in specific feeding areas (e.g. modeling, fishery closure tests)	High	Prey availability	2	Uncertain
15	Analyze historical data to identify environmental correlates with Chinook abundance and Resident Killer Whale mortality trends	Medium	Prey availability	3	Uncertain
16	Communication within and among government agencies to ensure that Resident Killer Whale needs are considered in agency initiatives (e.g., wild salmon policy, Pacific Salmon Treaty)	Low	Prey availability	2	Ongoing
Approach 5: Ensure that the populations and habitat of Resident Killer Whale prey species are adequately protected from anthropogenic factors such as exploitation and degradation, including contamination					
17	Protect and preserve the fresh water habitat of important Resident Killer Whale prey stocks	High	Prey availability	2	Ongoing
18	Continue to implement and support wild salmon policy and salmon recovery plans	High	Prey availability	2	Ongoing
19	Assess the potential impact of salmon enhancement and aquaculture operations on Resident Killer Whales, both directly and also through the	Low	Prey availability	3	Uncertain

#	Recovery Measures	Priority[4]	Threats or Concerns addressed	Category 1. DFO 2. DFO and other 3. Other	Timeline[5]
	effect on wild salmon populations				

Broad Strategy 2: ***Ensure that chemical and biological pollutants do not prevent the recovery of Resident Killer Whale populations***

Approach 1: Investigate the health and reproductive capacity of Resident Killer Whales using scientific studies on free-ranging and stranded individuals, as related to chemical and biological pollution					
20	Investigate diseases in stranded Killer Whales and identify those caused by biological pollution (e.g. viruses, bacteria, fungi, parasites)	High	Environmental contaminants	2	Opportunistic; ongoing
21	Collate and summarize information on marine mammal necropsy and disease reports	High	Environmental contaminants	2	Annual; ongoing
22	Investigate and monitor priority pathogens of concern in marine mammals as a means to identify risk to Resident Killer Whales (e.g. *Morbillivirus* sp)	Medium	Environmental contaminants	2	Annual; ongoing
23	Evaluate the type and level of risk of biological pollutants from agricultural runoff, sewage effluent, wildlife rehabilitation facilities and other sources	High	Environmental contaminants	2	5 year
24	Develop, evaluate and apply new tools to assess the effect of contamination and pollution on the health of free-ranging Killer Whales	Medium	Environmental contaminants	3	Unknown
25	Conduct research in support of evaluating risks associated with disposal at sea operations in coastal waters (e.g. with a focus on emerging concerns such as PBDEs)	Medium	Environmental contaminants	2	2 years

#	Recovery Measures	Priority[4]	Threats or Concerns addressed	Category 1. DFO 2. DFO and other 3. Other	Timeline[5]
Approach 2: Monitor the chemical and biological pollutant levels in Resident Killer Whales, their prey, and their habitat					
26	Identify and monitor contaminants of concern, and conduct a risk-based assessment of different chemicals of concern in Killer Whales, their prey, and their habitat	High	Environmental contaminants	2	3 years
27	Evaluate trends in contaminant concentrations based on both published and new measurements of different contaminants in Killer Whales	High	Environmental contaminants	2	5 years
28	Quantify the current levels of contaminant concentration in Killer Whale prey and refine the analysis of contaminant intake by Killer Whales using current information on their feeding ecology	High	Environmental contaminants	3	Uncertain
Approach 3: Identify and prioritize the sources of key chemical and biological pollutants affecting Resident Killer Whales and their habitat					
29	Undertake a workshop to identify source of persistent bioaccumulative contaminants presenting a risk to Resident Killer Whales (Workshop 1)	High	Environmental contaminants	2	5 years
30	Undertake a workshop to identify source of biological pollutants presenting a risk to Resident Killer Whales (Workshop 2)	High	Environmental contaminants	2	5 years
31	Collate information on remediation efforts for land-based PCBs	High	Environmental contaminants	2	5 years
32	Work with the Federal Contaminated Sites Action Plan (FCSAP) to evaluate the potential contribution of persistent environmental contaminants to the contamination of Killer Whale habitat	High	Environmental contaminants	2	5 years
33	Evaluate the risks related to mercury (Hg) contamination in bioaccumulation in Resident Killer Whale food webs	Medium	Environmental contaminants	3	Uncertain

#	Recovery Measures	Priority[4]	Threats or Concerns addressed	Category 1. DFO 2. DFO and other 3. Other	Timeline[5]
Approach 4: Reduce the introduction into the environment of pesticides and other chemicals that have the potential to adversely affect the health of Resident Killer Whales and/or their prey, through measures such as municipal, provincial, national and international agreements, education, regulation and enforcement.					
34	Support new, proposed, or existing bans on the use of pesticides for cosmetic purposes	High	Environmental contaminants	3	Uncertain
35	Work with other government departments, non-governmental organizations, and industry to promote best practices, mitigation protocols and outreach efforts for the protection of Resident Killer Whales and their habitat from pollution (e.g., spill response protocols)	High	Environmental contaminants	2	5 years; ongoing
36	Work with provincial agencies and Health Canada's PMRA (Pest Management Regulatory Agency) to consider the effects on Killer Whales and their prey when developing, amending or implementing regulations on pesticide use	High	Environmental contaminants	2	5 years, ongoing
37	Evaluate the efficacy of the new regulations for PBDEs under the Canadian Environmental Protection Act (CEPA) by comparing trends in sentinel species in Killer Whale habitat	High	Environmental contaminants	2	5 years; possibly ongoing
Approach 5: Mitigate the impacts of currently and historically used "legacy" pollutants in the environment					
38	Continue to work with Environment Canada to ensure that Disposal at Sea practices consider risks related to Resident Killer Whales and their habitat	Medium	Environmental contaminants	2	Ongoing
39	Support the remediation of contaminated sites in a manner that will protect Resident Killer Whales and their habitat	High	Environmental contaminants	2	5 years

#	Recovery Measures	Priority[4]	Threats or Concerns addressed	Category 1. DFO 2. DFO and other 3. Other	Timeline[5]
40	Contribute to CEPA technical reviews on new or existing chemicals by evaluating risks to Resident Killer Whales, and to new regulations for chemicals of concern	High	Environmental contaminants	3	Uncertain
Approach 6: Reduce the introduction of biological pollutants, including pathogens and exotic species, into the habitats of Resident Killer Whales and their prey					
41	Work with municipal, provincial and federal agencies tasked with biological wastes related to domestic, agricultural and industrial pollutants (including ballast water)	Medium	Environmental contaminants	2	5 years
42	Work with individuals, industries, agricultural operations, and other sectors responsible for the release of biological pollutants of concern into Killer Whale habitat to mitigate these releases	Medium	Environmental contaminants	2	5 years

Broad Strategy 3: *Ensure that disturbance from human activities does not prevent the recovery of resident killer whales*

Approach 1: Determine baseline natural and anthropogenic noise profiles and monitor sources and changes in the exposure of Resident Killer Whales to underwater noise					
43	Expand coverage of calibrated hydrophone networks to quantify ocean noise budget throughout Resident Killer Whale range, with priority given to improving and utilizing existing hydrophone networks	High	Disturbance; noise pollution	2	10 years
44	Standardize protocol and methodology for data analysis, data presentation, and archiving of acoustic information	High	Disturbance; noise pollution	2	2 years
45	Compile metadata on acoustic recordings from existing archives and current available sources (e.g. Navy, government agencies, individuals,	Medium	Disturbance; noise	2	2 years

#	Recovery Measures	Priority[4]	Threats or Concerns addressed	Category 1. DFO 2. DFO and other 3. Other	Timeline[5]
	consultants); identify format, calibration, temporal and spatial distribution, data gaps, and data collection protocols		pollution		
46	Utilize Automatic Identification System (AIS) data in conjunction with hydrophone networks to identify vessel tracks and types and correlate sound signatures	High	Disturbance; noise pollution	2	5 years
47	Undertake systematic monitoring of ambient noise records for non-vessel related acute acoustic events; compute signatures and determine temporal occurrence	High	Disturbance; noise pollution	2	5 years
48	Determine acoustic profiles of vessel type and speed to noise output, and utilize sound propagation models to yield source patterns	High	Disturbance; noise pollution	2	5 years
49	Undertake outreach efforts detailing acoustic monitoring in order to get other funding agencies involved	Medium	Disturbance; noise pollution	3	Ongoing
50	Create a mechanism and protocol for communication with people on the water as an early warning system regarding acute events (e.g., acoustic disturbance, contaminant spills, accidents and incidents)	Medium	Disturbance; noise pollution	3	Ongoing
Approach 2: Determine the short and long-term effects of chronic and immediate forms of disturbance, including vessels and noise, on the physiology, foraging and social behaviour of Resident Killer Whales					
51	Undertake behavioural studies of Resident Killer Whales in the winter months	High	Disturbance; noise pollution; prey availability	2	Ongoing, long term
52	Utilize D-tag data to create a 3D model of the whale's immediate (received) acoustic environment	High	Disturbance; noise pollution	2	5 years; ongoing
53	Increase transboundary communication of research methods and objectives to address disturbance issues with counterpart agencies in the US	Medium	Disturbance; noise pollution	2	Ongoing
54	Develop an acoustic model that incorporates effects of increasing ambient noise levels on communication signals of Killer Whales	Medium	Disturbance; noise pollution	3	Unknown

#	Recovery Measures	Priority[4]	Threats or Concerns addressed	Category 1. DFO 2. DFO and other 3. Other	Timeline[5]
55	Research the effects of other vessel-based impacts (e.g., fish finders, exhaust noise, disposal of waste and bilge water)	Medium	Disturbance; noise pollution	3	Unknown
56	Continue and expand existing behavioural monitoring programs involving vessel/whale interactions and increase support for data analysis and publication	Medium	Disturbance; noise pollution	3	Unknown
57	Develop a means of differentiating nutritional vs. disturbance-induced stress (via hormone response and other methods)	Medium	Disturbance; noise pollution	3	Unknown
Approach 3: Develop and implement regulations, guidelines, sanctuaries and other measures to reduce or eliminate physical and acoustic disturbance of Resident Killer Whales					
58	Investigate the methods and implementation of mitigating the risk of disturbance in important foraging and beach rubbing locations (such as Robson Bight and other identified locations).	High	Disturbance; noise pollution; prey availability	1	5 years
59	Ensure that projects and developments that may impact Resident Killer Whales are identified during the project review process.	High	Disturbance; noise pollution	2	Ongoing
60	Consider area-specific boating regimes (speed restrictions, restricted whale watching hours) to reduce acoustic impact as well as risk of collision.	Medium	Disturbance; noise pollution; prey availability	2	5 years
61	Integrate marine mammal legislation and guidelines into boater education and tourism programs (e.g., boater courses; marine safety courses, fishing licenses, vessel registration and licensing courses).	Medium	Disturbance; noise pollution	2	2 years
62	Improve public awareness of recovery activities for Resident Killer Whales through Parks Canada Agency's interpretive programs,(e.g., the BC Ferries Naturalist program)	Medium	Disturbance, noise pollution; prey availability	3	5 years
63	Dedicate funding for compliance and enforcement of regulations protecting Resident Killer Whales.	Medium	Disturbance; noise pollution	1	Ongoing

#	Recovery Measures	Priority[4]	Threats or Concerns addressed	Category 1. DFO 2. DFO and other 3. Other	Timeline[5]
64	Ensure appropriate training for enforcement personnel through collaboration with whale experts.	Medium	Disturbance; noise pollution	2	Ongoing
65	Promote responsible advertising and documentaries that reflect the Be Whale Wise guidelines and demonstrate appropriate viewing practices	Medium	Disturbance; noise pollution	2	2 years
66	Expansion of the Whale Wise flag program, used to notify other mariners when whales have been observed, in order to reduce risk of collision and acoustic disturbance	Medium	Disturbance; noise pollution	3	Ongoing
67	Institute a communications plan around the Marine Mammal Regulations and ensure the message is trans-boundary	Medium	Disturbance; noise pollution	1	2 years
68	Evaluate and revise whale watching guidelines and/or regulations to reflect most recent understanding of effects of chronic physical disturbance	Medium	Disturbance; noise pollution	2	Ongoing

Broad Strategy 4: ***Protect critical habitat for Resident Killer Whales and identify additional areas for critical habitat designation and protection.***

Approach 1: Identify key feeding areas and other critical habitat of Resident Killer Whales intra and inter-annually					
69	Identify additional areas of habitat that support functions critical to the survival and recovery of Resident Killer Whales	High	Prey availability	2	Ongoing
70	Identify and account for the likelihood that changes in the relative strength of major salmon stocks may cause corresponding shifts in the geographic location of critical habitat for Resident Killer Whales	High	Prey availability	2	Ongoing
71	Refine our understanding of the functions, features and attributes of Killer Whale habitat and identify what may constitute critical habitat	Medium	Prey availability; Disturbance; Noise	2	Ongoing

#	Recovery Measures	Priority[4]	Threats or Concerns addressed	Category 1. DFO 2. DFO and other 3. Other	Timeline[5]
	destruction		pollution		
Approach 2: Protect the access of Resident Killer Whales to their critical habitat					
72	Continue efforts outlined in Broad Strategy 3 to ensure disturbance from human activities does not prevent access of Resident Killer Whales to their critical habitat	High	Disturbance; Noise pollution	2	Ongoing
Approach 3: Encourage trans-boundary cooperation in the identification and protection of critical habitat					
73	Continue dialogue with the National Oceanic and Atmospheric Administration (NOAA) to encourage transboundary consistency of critical habitat protection	Medium	Disturbance; Noise pollution	2	Ongoing

1.2 Critical Habitat

Critical Habitat for this species was identified within the Recovery Strategy for the Northern and Southern Resident Killer Whales (*Orcinus orca*) in Canada and is not being modified in this action plan. There are likely other areas that are necessary for survival or recovery of Killer Whales, but these have not yet been studied in sufficient detail to be identified with confidence. The recovery strategy contains details about the identified critical habitat including geographic extent and biophysical features, functions and attributes. Examples of activities likely to destroy critical habitat are included in section 3.2 of the Recovery Strategy.

1.3 Measures to Protect Critical Habitat

Pursuant to subsection 58(4) of the *Species at Risk Act*, an order to protect Resident Killer Whale critical habitat has been in place since February 2009.

2. Evaluation of Socio-Economic Costs and of Benefits

The *Species At Risk Act* requires that an action plan include an evaluation of the socio-economic costs of the action plan and the benefits to be derived from its implementation (SARA 49(1)(e)). This evaluation addresses only the incremental socio-economic costs of implementing this action plan from a national perspective as well as the social and environmental benefits that would occur if the action plan were implemented in its entirety, recognizing that not all aspects of its implementation are under the jurisdiction of the federal government. Its intent is to inform the public and to guide decision making on implementation of the action plan by partners.

The protection and recovery of species at risk can result in both benefits and costs. The Act recognizes that "*wildlife, in all its forms, has value in and of itself and is valued by Canadians for aesthetic, cultural, spiritual, recreational, educational, historical, economic, medical, ecological and scientific reasons*" (SARA, preamble). Self-sustaining and healthy ecosystems with their various elements in place, including species at risk, contribute positively to the livelihoods and the quality of life of all Canadians. A review of the literature confirms that Canadians value the preservation and conservation of species in and of themselves. Actions taken to preserve a species, such as habitat protection and restoration, are also valued. In addition, the more an action contributes to the recovery of a species, the higher the value the public places on such actions (Loomis and White, 1996; DFO., 2008). Furthermore, the conservation of species at risk is an important component of the Government of Canada's commitment to conserving biological diversity under the *International Convention on Biological Diversity*. The Government of Canada has also made a commitment to protect and recover species at risk through the *Accord for the Protection of Species at Risk*. The specific costs and benefits associated with this action plan are described below.

Efforts for Recovery to date

The Action Plan for this species captures activities from 2013 onwards. However, efforts for Killer Whale recovery have been underway prior to listing under SARA. Since 1973, an annual census has been undertaken to locate, photograph, and identify individual Killer Whales found in Canadian waters. Since 2002, to determine recovery status and further the understanding of distribution, abundance and seasonal occurrence of these whales, DFO's Cetacean Research Program (CRP) has completed over 2,000 hours of dedicated ship-based surveys. In addition, collaborations with other groups, organizations and partners have provided significant advances in acoustic monitoring networks, sightings, identification methods and identification of important habitat (e.g., the BC Parks warden program at the Robson Bight (Michael Bigg) Ecological Reserve). First Nations have contributed to recovery efforts through stewardship and guardian programs, and identification efforts. Finally, education, stewardship and enforcement programs have also contributed to recovery efforts.

Benefits

The impacts of the recovery measures in this plan on Resident Killer Whale populations are unknown but likely positive. As indicated above, Canadians value such actions for a number of reasons, including non-market benefits (i.e. existence, bequest and option values). Activities that positively affect the recovery of these species may result in positive benefits to Canadians.

The recovery measures are also likely to provide broader benefits, as some of the threats to this species are common to other marine mammals and sea turtles. Actions that mitigate those threats may also provide benefits to other species. As well, this plan supports a number of on-going programs and activities that are not species-specific such as the British Columbia Marine Mammal Response Network (BCMMRN) and the BC Cetacean Sightings Network (BCCSN). These programs and activities provide information on, and assistance to, numerous species. In addition, ocean research surveys generally collect information on other marine mammals, sea turtles and other species of interest when encountered, if feasible and appropriate. In particular, Transient and Offshore Killer Whales, as well as other species of whales may benefit from the research activities in this plan, specifically research related to acoustic disturbance and contaminants. Consequently, many of the activities identified in this action plan will have positive impacts on other SARA listed species and provide overall benefits to the aquatic ecosystem.

Costs

The Implementation Schedule on page 8 identifies three categories of recovery measures. Category 1 and 2 are measures that DFO will undertake, either solely lead or co-lead through collaboration with partners. This includes all measures labelled in the Implementation Table as number 1 (DFO) and 2 (DFO and other). Category 3 activities

are those that are important for species recovery but for which limited information is available in terms of participants, activities and timelines.

Very few of the identified costs are associated with recovery measures that would be completed in the short-term (2017). The majority of the recovery measures will result in some level of annual costs over the anticipated timeframe for the plan (i.e. >25 years) and they do not have specified completion dates. This long-term level of costs is similar to expenditures in support of these species prior to this plan.

The majority of activities in the plan focus on research with approximately 95% of DFO costs for Categories 1 and 2 related to research and over 80% of activities identified in Category 3 related to research efforts. The coast-wide distribution of these populations requires extensive survey effort resulting in higher costs than for more localized populations. Research and monitoring activities to reduce threats are closely linked to cooperation and engagement activities with a number of partners providing in-kind support to meetings and discussions. Education and engagement may include in-kind support from environmental organizations. Compliance promotion and enforcement activities would likely be funded through a re-allocation of existing government funds.

Cost estimates for DFO activities for Category 1 and 2 recovery measures are expected to be low, subject to appropriations, priorities, and budgetary constraints.[6] Cost estimates for partner contribution towards Category 2 activities and cost estimates for Category 3 activities are not known with a reasonable level of certainty as information on project specifics, participants and/or timelines are not available. While annual DFO costs related to Category 1 and 2 are low on the national scale, the cost is just slightly under the medium threshold. The inclusion of financial and in-kind costs to partners for Category 2 and Category 3 activities will very likely push the overall costs of this action plan into the medium cost range on the national scale. Therefore, the overall costs of this Action Plan are likely in the Medium Range.

While DFO is identified as the lead for many recovery measures in the Implementation Table, a number of potential partners and collaborators were identified and/or have participated in similar activities in the past. These partners include other federal departments and agencies, environmental organizations, academic institutions and programs, First Nations and other national governments. While DFO is identified as the sole participant and lead in Category 1 recovery measures, there may potentially be in-kind support from partners. Potential funding sources for DFO costs for Category 1 and 2 activities include existing federal resources, subject to resource availability, as well as supplemental funds from annual programs such as the Habitat Stewardship Program (HSP). Supplemental funding support may also be possible from collaborators and partners.

[6] Guidance provides scales in terms of present values, as well as annualized values. The annualized scale is: Low $0-$1 million, Medium $1-$10 million, High >$10 million. Source: Government of Canada. *Guidelines for Completing Action Plan Templates (Federal)*. Draft (2.2.). June 2012.

3. Measuring Progress

The performance indicators presented in the associated recovery strategy provides a way to define and measure progress toward achieving the population and distribution objectives.

Reporting on implementation of the action plan (under s. 55 of SARA) will be done by assessing progress towards implementing the broad strategies.

Reporting on the ecological and socio-economic impacts of the action plan (under s. 55 of SARA) will be done by assessing the results of monitoring the recovery of the species and its long term viability, and by assessing the implementation of the action plan.

4. References

Fisheries and Oceans Canada. 2011. Recovery Strategy for the Northern and Southern Resident Killer Whales (*Orcinus orca*) in Canada. *Species at Risk Act* Recovery Strategy Series, Fisheries & Oceans Canada, Ottawa ix + 80 pp.

Fisheries and Oceans Canada. 2008. Estimation of the Economic Benefits of Marine Mammal Recovery in the St. Lawrence Estuary. Policy and Economics Regional Branch, Quebec 2008.

Loomis, J.B. & White, D.S (1996). Economic Benefits of Rare and Endangered Species: Summary and Meta-analysis. Ecological Economics, 18: 197-206. (en anglais seulement)

Appendix A: Effects on the Environment and Other Species

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making and to evaluate whether the outcomes of a recovery planning document could affect any component of the environment or achievement of any of the Federal Sustainable Development Strategy's[7] (FSDS) goals and targets.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that implementation of action plans may inadvertently lead to environmental effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non-target species or habitats. The results of the SEA are incorporated directly into the action plan itself, but are also summarized below in this statement.

This action plan will benefit the environment by promoting the recovery of the Northern and Southern Resident Killer Whale populations, thereby positively contributing to Goal 4 (Conserving and Restoring Ecosystems) of the FSDS. As the recovery measures will address threats that affect sea turtles and many marine mammal species, significant benefits to other species will be realized through the implementation of this action plan. Maintaining biodiversity within Pacific Canadian waters encourages resiliency in the Pacific Ocean ecosystem, providing a positive contribution to the FSDS' Goal 4.

The potential for the action plan to result in adverse effects on other species and the environment was considered. The SEA concluded that the recovery measures in this plan will benefit the environment and other species, and will not result in any significant adverse effects.

[7] www.ec.gc.ca/dd-sd/default.asp?lang=En&n=F93CD795-1

Appendix B: Record of Cooperation and Consultation

Inserted after regional consultations are complete.

Appendix C: Teams and Processes Contributing to the Development of this Action Plan

2011-2013 Northern and Southern Resident Action Plan Team

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