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Action Plan Series

Action Plan for the Transient Killer Whale (*Orcinus orca*) in Canada

Transient Killer Whale



2021

Canada

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For copies of the Action Plan, or for additional information on species at risk, including Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Status Reports, residence descriptions, recovery strategies, and other related recovery documents, please visit the [SAR Public Registry](#).

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Preface

The federal, provincial, and territorial government signatories under the [Accord for the Protection of Species at Risk \(1996\)](#) 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, or 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 Species at Risk Public Registry.

The Minister of Fisheries and Oceans and the Minister responsible for Parks Canada Agency are the competent ministers under SARA for the Transient Killer Whale (Bigg's) and have prepared this Action Plan to implement the Recovery Strategy, as per section 47 of SARA. In preparing this Action Plan, the competent ministers have considered, as per section 38 of SARA, the commitment of the Government of Canada to conserving biological diversity and to the principle that, if there are threats of serious or irreversible damage to the listed species, cost-effective measures to prevent the reduction or loss of the species should not be postponed for a lack of full scientific certainty. To the extent possible, this Action Plan has been prepared in cooperation with Environment and Climate Change Canada, Transport Canada, the Department of National Defence, the Canadian Coast Guard, National Resources Canada, the US National Oceanic and Atmospheric Administration, and the province of British Columbia as per section 48(1) of SARA.

As stated in the preamble to SARA, 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 Fisheries and Oceans Canada, the Parks Canada Agency, or any other jurisdiction alone. The cost of conserving species at risk is shared amongst different constituencies. All Canadians are invited to join in supporting and implementing this Action Plan for the benefit of the Transient Killer Whale and Canadian society as a whole.

Under SARA, an action plan provides the detailed recovery planning that supports the strategic direction set out in the recovery strategy for the species. The plan outlines recovery measures to be taken by Fisheries and Oceans Canada, the Parks Canada Agency and other jurisdictions and/or organizations to help achieve the population and distribution objectives identified in the recovery strategy. Implementation of this Action Plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

Acknowledgments

This Action Plan was prepared by Sheila J. Thornton (Fisheries and Oceans Canada, Pacific Region). The development of the Action Plan was the result of collaborative efforts and contributions from many individuals and organizations. The Transient Killer Whale Action Plan Team (Appendix B) compiled the contributions from the scientific community, the Transient Killer Whale technical workshop (March 11–15, 2013), the Transient Killer Whale Recovery Team and feedback received during consultations on the draft Action Plan for the Transient Killer Whale (*Orcinus orca*) in Canada.

Executive Summary

The Transient Killer Whale (*Orcinus orca*) was listed as Threatened under the *Species at Risk Act* (SARA) in 2003. This Action Plan is considered one in a series of documents that are linked and should be taken into consideration together, including the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status report, a recovery potential assessment, the Recovery Strategy, and reports on the progress of recovery strategy implementation (2015 and 2020). The reasons for designation are that the population has a very small number of mature individuals, and is subject to threats from high levels of contaminants, acoustic and physical disturbance, and oil spills.

The Killer Whale (*Orcinus orca*) is the largest member of the family Delphinidae and one of the most widely distributed mammals. It has no natural predators. Killer Whales are found in all of the world's oceans and most seas, but are most commonly found in productive coastal waters in high latitude regions. Despite being a generalist predator as a species, different populations of Killer Whales often have highly specialized foraging strategies and diets. Three distinct assemblages, or lineages, of Killer Whales have been described in coastal waters of the northeastern Pacific Ocean. These lineages, named Transient, Resident and Offshore, differ in diet and foraging behaviour, acoustic behaviour, morphology, and genetic characteristics. Recent studies indicate that Transient Killer Whales are the most genetically divergent of these lineages and may warrant distinct species status. Transient Killer Whales – also known as Bigg's Killer Whales – specialize on marine mammal prey, although they occasionally kill and eat seabirds as well. There is no evidence from decades of field observations that they feed on fish.

Numerous anthropogenic threats have been identified for Transient Killer Whales. The primary threats are: 1) chemical contaminants (both legacy and emerging), and 2) physical and acoustical disturbance (both chronic and acute). However, they are also vulnerable to biological pollutants, trace metals, toxic spills, collision with vessels and the effects of reductions in prey populations (e.g., culls, commercial harvest, nuisance seal licenses).

This Action Plan outlines measures that provide the best chance of achieving the population and distribution objectives for the species, including the measures to be taken to address the threats and monitor the recovery of the species. The Recovery Strategy states that the overall recovery goal for the Transient Killer Whale is:

To attain long-term viability of the West Coast Transient Killer Whale population by providing the conditions necessary to preserve the population's reproductive potential, genetic variation, and cultural continuity.

Section 1.2 outlines the measures to be taken under the following broad strategies:

- *Monitor and refine knowledge of Transient Killer Whale population and distribution in Canadian Pacific waters*
- *Ensure that Transient Killer Whales have an adequate and accessible food supply to allow recovery*
- *Ensure that disturbance from human activities does not prevent the recovery of Transient Killer Whales*

- 1 • *Ensure that chemical and biological pollutants do not prevent the recovery of Transient*
2 *Killer Whale populations*
- 3
- 4 • *Protect critical habitat for Transient Killer Whales and identify additional areas for critical*
5 *habitat designation and protection*
- 6

7 The Action Plan further identifies 89 measures that were developed to achieve these five broad
8 strategies in support of recovery of the Transient Killer Whale in Canada.

9

10 For the Transient Killer Whale, partial critical habitat is identified to the extent possible, using the
11 best available information, in Section 8 of the draft amended Recovery Strategy. It is anticipated
12 that the protection of the species' critical habitat from destruction will be accomplished through a
13 SARA Critical Habitat Order made under subsections 58(4) and (5), which will invoke the
14 prohibition in subsection 58(1) against the destruction of the identified critical habitat (Section
15 2.3).

16

17 An evaluation of the socio-economic costs of the Action Plan and the benefits to be derived from
18 its implementation is provided in Section 3.

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1. Recovery Actions

1.1 Context and Scope of the Action Plan

The Transient Killer Whale (*Orcinus orca*) was listed as Threatened under the *Species at Risk Act* (SARA) in 2003. This Action Plan is part of a series of documents regarding the Transient Killer Whale, including the [Committee on the Status of Endangered Wildlife in Canada \(COSEWIC\) Status Report](#) (COSEWIC 2008), the [Science Advisory Report from the Recovery Potential Assessment \(RPA\)](#) (DFO 2009) the [Recovery Strategy](#) (DFO 2007, amended in 2021), and Reports on the Progress of Recovery Strategy Implementation for the periods [2007-2012](#) and [2013-2018](#) (DFO 2015 and 2020, respectively), that should be taken into consideration together. Under SARA, an action plan provides the detailed recovery planning that supports the strategic direction set out in a recovery strategy for the species. A recovery strategy also provides background information on the species and its threats and critical habitat information.

The Killer Whale (*Orcinus orca*) is the largest member of the family Delphinidae and one of the most widely distributed mammals. It occurs in all the world's oceans and most seas, but is most commonly found in productive coastal waters in high latitude regions. The Killer Whale is the apex marine predator, capable of feeding on a great diversity of prey, from the largest whales to small schooling fish. It has no natural predators. Despite being a generalist predator as a species, different populations of Killer Whales often have highly specialized foraging strategies and diets.

Three distinct assemblages, or lineages, of Killer Whales have been described in coastal waters of the northeastern Pacific Ocean. These lineages, named Transient, Resident and Offshore, differ in diet and foraging behaviour, acoustic behaviour, morphology, and genetic characteristics. Despite having overlapping ranges, these lineages are socially and reproductively isolated from each other. Recent studies indicate that Transient Killer Whales are the most genetically divergent of these lineages and may warrant distinct species status. Transient Killer Whales – also known as Bigg's Killer Whales – specialize on marine mammal prey, although they occasionally kill and eat seabirds as well. There is no evidence from decades of field observations that they feed on fish. The "West Coast Transient" population of Killer Whales (*Orcinus orca*) is acoustically, genetically and culturally distinct from other Killer Whale populations known to occupy waters off the west coast of British Columbia.

Numerous anthropogenic threats have been identified for Transient Killer Whales. The primary threats are: 1) chemical contaminants (both legacy and emerging), and 2) physical and acoustical disturbance (both chronic and acute). However, they are also vulnerable to biological pollutants, trace metals, toxic spills, collision with vessels and the effects of reductions in prey populations (e.g., commercial harvest, culls, nuisance seal licences).

The Recovery Strategy outlines 14 objectives to address the identified knowledge gaps and threats. These objectives have been used to form the following five broad strategies for recovery in this Action Plan:

1. *Monitor and refine knowledge of Transient Killer Whale population and distribution in Canadian Pacific waters*
2. *Ensure that Transient Killer Whales have an adequate and accessible food supply to allow recovery*

- 1
- 2
- 3 3. *Ensure that disturbance from human activities does not prevent the recovery of*
- 4 *Transient Killer Whales*
- 5
- 6 4. *Ensure that chemical and biological pollutants do not prevent the recovery of Transient*
- 7 *Killer Whale populations*
- 8
- 9 5. *Protect critical habitat for Transient Killer Whales and identify additional areas for critical*
- 10 *habitat designation and protection*

11 The Action Plan further identifies 89 measures that were developed to achieve these five broad
12 strategies in support of recovery of the Transient Killer Whale in Canada.

13
14 The Recovery Strategy defined the recovery goal for the Transient Killer Whale as:

15
16 *To attain long-term viability of the West Coast Transient Killer Whale population by providing the*
17 *conditions necessary to preserve the population's reproductive potential, genetic variation, and*
18 *cultural continuity.*

19
20 Under section 47 of SARA, the competent minister must prepare one or more action plans
21 based on the recovery strategy. Therefore, action planning for species at risk recovery is an
22 iterative process. The Implementation Schedule in this Action Plan may be modified in the future
23 depending on the progression towards recovery.

1.2 Measures to be Taken and Implementation Schedule

Success in the recovery of this species is dependent on the actions of many different jurisdictions; it requires the commitment and cooperation of the constituencies that will be involved in implementing the directions and measures set out in this Action Plan.

This Action Plan provides a description of the measures that provide the best chance of achieving the population and distribution objectives for the Transient Killer Whale, including measures to be taken to address threats to the species and monitor its recovery, to guide not only activities to be undertaken by Fisheries and Oceans Canada and the Parks Canada Agency, but those for which other jurisdictions, organizations and individuals have a role to play. As new information becomes available, these measures and the priority of these measures may change. Fisheries and Oceans Canada strongly encourages all Canadians to participate in the conservation of the Transient Killer Whale through undertaking measures outlined in this Action Plan.

Table 1 identifies the measures to be undertaken by Fisheries and Oceans Canada to support the recovery of the Transient Killer Whale. Table 2 identifies the measures to be undertaken collaboratively between Fisheries and Oceans Canada and its partners, other agencies, organizations or individuals. Implementation of these measures will be dependent on a collaborative approach, in which Fisheries and Oceans Canada is a partner in recovery efforts, but cannot implement the measures alone. As all Canadians are invited to join in supporting and implementing this Action Plan, Table 3 identifies the remaining measures that represent opportunities for other jurisdictions, organizations or individuals to lead for the recovery of the species. If your organization is interested in participating in one of these measures, please contact the Species at Risk Pacific Region office at SARA.XPAC@dfo-mpo.gc.ca.

Implementation of this Action Plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

Table 1. Measures to be undertaken by Fisheries and Oceans Canada

Measures noted by an asterisk (*) have been identified in the Resident Killer Whale Action Plan as also likely to provide benefits to Transient and Offshore Killer Whales (6 of 13, or 46% of measures).

#	Recovery Measures	Priority ¹	Threats or Concerns addressed	Timeline
Broad Strategy 1. Monitor and refine knowledge of Transient Killer Whale population and distribution in Canadian Pacific waters.				
Approach 1: Monitor abundance of West Coast Transient Killer Whales and refine knowledge of population identity and structure in Canadian Pacific waters.				
1	Undertake annual multi-species ship surveys and/or dedicated vessel surveys to monitor and assess the population dynamics of Transient Killer Whales showing the most fidelity to coastal waters (i.e., the putative 'inner coast' Transient Killer Whale cluster).	High	Population and distribution	Annual; ongoing
2	Assess the criteria for exclusion of California Transient Killer Whales from the West Coast Transient population (social segregation, distribution, acoustic dialects).	High	Population and distribution	5 years
3	Assess the criteria for inclusion of the putative 'outer coast' Transient Killer Whales (those infrequently encountered and showing less fidelity to inner coastal waters) in the West Coast Transient population.	High	Population and distribution	5 years

¹ "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.

- "High" priority measures are considered likely to have an immediate and/or direct influence on the recovery of the species.
- "Medium" priority measures are important but considered to have an indirect or less immediate influence on the recovery of the species.
- "Low" priority measures are considered important contributions to the knowledge base about the species and mitigation of threats.

#	Recovery Measures	Priority ¹	Threats or Concerns addressed	Timeline
4	Undertake focused surveys (photo ID, genetic analysis). to further knowledge of the status and abundance of the putative 'outer coast' Transient Killer Whales.	High	Population and distribution	Annual; ongoing
Broad Strategy 2. Ensure that Transient Killer Whales have an adequate and accessible food supply to allow recovery.				
Approach 2: Minimize the risk of prey population reductions from anthropogenic activities, until precise prey needs can be determined.				
5	Consider the needs of Transient Killer Whales when undertaking management actions that affect prey species (e.g. cull or commercial harvest, issuance of nuisance seal permit applications).	High	Prey availability	Ongoing, as required
6	Continue existing monitoring programs for pinniped population abundance and distribution to assess prey availability.	High	Prey availability	Ongoing
Broad Strategy 3. Ensure that disturbance from human activities does not prevent the recovery of Transient Killer Whales.				
Approach 3: Determine the short- and long-term effects of chronic and acute forms of disturbance, including vessels and noise, on the physiology, foraging and social behaviour of Transient Killer Whales.				
7*	Assess cumulative effects of potential anthropogenic impacts on Transient Killer Whales using an appropriate impact assessment framework for aquatic species.	High	Physical and acoustic disturbance	2 years

#	Recovery Measures	Priority ¹	Threats or Concerns addressed	Timeline
8*	Prioritize on-water enforcement efforts for compliance with regulations protecting Transient Killer Whales.	High	Acoustic disturbance	Ongoing
9*	Support Transient Killer Whale recovery during the planning, development, and implementation of marine protected areas by contributing to prey availability and threat abatement.	Medium	Acoustic disturbance Prey availability	Ongoing
10*	Institute a communications plan around the Marine Mammal Regulations and ensure the message is transboundary.	Medium	Acoustic disturbance	2 years
Approach 4: Develop and implement regulations, guidelines, sanctuaries or other measures to reduce or eliminate physical and acoustic disturbance of Transient Killer Whales.				
11*	Develop and recommend implementation of best practices, guidelines, regulations, or other measures to minimize or eliminate physical and acoustic disturbance to Transient Killer Whales.	High	Acoustic and physical disturbance	Ongoing
12	Continue to disallow acoustic harassment (deterrent) devices at fish farms and support the development of a general prohibition.	High	Acoustic disturbance	Ongoing
Broad Strategy 5: Protect critical habitat for Transient Killer Whales and identify additional areas for critical habitat designation and protection.				
Approach 5: Protect the access of Transient Killer Whales to their critical habitat.				

#	Recovery Measures	Priority ¹	Threats or Concerns addressed	Timeline
13*	Review and assess project impacts on Transient Killer Whales and their habitat, and provide advice on impact avoidance and mitigation measures as required.	High	Physical and acoustic disturbance	Ongoing

Table 2. Measures to be undertaken collaboratively between Fisheries and Oceans Canada and its partners

Measures noted by an asterisk (*) have been identified in the Resident Killer Whale Action Plan as also likely to provide benefits to Transient and Offshore Killer Whales (48 of 67, or 72% of measures).

#	Recovery Measures	Priority	Threats or Concerns addressed	Timeline	Partner(s)
Broad Strategy 1. Monitor and refine knowledge of Transient Killer Whale population and distribution in Canadian Pacific waters.					
Approach 1: Monitor abundance of West Coast Transient Killer Whales and refine knowledge of population identity and structure in Canadian Pacific waters.					
14	Expand and focus acoustic monitoring efforts to determine habitat use patterns of Transient Killer Whales in outer coast waters.	High	Population and distribution	Annual; ongoing	ENGOS Academia
15*	Incorporate Indigenous traditional knowledge (ITK) on the behaviour and distribution of Transient Killer Whales and their prey into measures for the recovery of the species.	Medium	Population and distribution Prey availability	Ongoing	Indigenous groups
Broad Strategy 2. Ensure that Transient Killer Whales have an adequate and accessible food supply to allow recovery.					
Approach 6: Determine the quantity, quality and distribution of Transient Killer Whale prey necessary to sustain or increase the current population level.					
16	Estimate the carrying capacity of Transient Killer Whale habitat (population modeling).	High	Prey availability	5 years	ENGOS Stakeholders
17	Continue existing monitoring programs for pinniped population abundance and distribution to assess prey availability.	High	Prey availability	Annual, ongoing	Other agencies

#	Recovery Measures	Priority	Threats or Concerns addressed	Timeline	Partner(s)
18	Assess and monitor population and distribution of known prey species, including small cetaceans and other non-pinnipeds in Transient Killer Whale diet.	High	Prey availability	Annual, ongoing	Other agencies ENGOS
19	Determine the contribution of alternate prey species in Transient Killer Whale diet (e.g., Northern Fur Seals, squid, baleen whales).	High	Prey availability	Annual, ongoing	Other agencies ENGOS
20	Refine understanding of partial or selective prey consumption during foraging (e.g., quantity of blubber, muscle, etc. consumed) to inform energetic modeling.	High	Prey availability	Annual, ongoing	ENGOS Academia
21	Determine day and night feeding activity (e.g., through acoustic monitoring) to inform energetic modeling.	High	Prey availability	Annual, ongoing	ENGOS Academia
22	Determine the ratio of Transient Killer Whale caloric intake versus foraging effort for different prey species.	High	Prey availability	5 year	ENGOS
23	Collect information on Transient Killer Whale foraging behaviour and predation events when receiving sightings reports.	Low	Prey availability	Ongoing	ENGOS Stakeholders

Approach 2: Minimize the risk of prey population reductions from anthropogenic activities, until precise prey needs can be determined.					
24	Work with industry and others to reduce anthropogenic marine mammal mortality through improved management practices, education programs, and enforcement.	High	Contaminants Prey availability	Annual, ongoing	Stakeholders
25	Develop plans to recognize and if possible, respond to disease outbreaks and other factors causing significant negative impacts on prey populations.	High	Contaminants Prey availability	Annual, ongoing	Other agencies
26	Determine incidental catch and mortality of Transient Killer Whale prey species in fisheries.	Medium	Prey availability	Annual, ongoing	Stakeholders
27	Encourage implementation of measures to mitigate potential impacts and risks from oil and gas industry activities on prey species.	Medium	Contaminants Prey availability	Ongoing	Stakeholders Other agencies
Broad Strategy 3. Ensure that disturbance from human activities does not prevent the recovery of Transient Killer Whales.					
Approach 7: Determine baseline natural and anthropogenic noise profiles and monitor sources and changes in the exposure of Transient Killer Whales to underwater noise.					
28*	Expand transboundary coverage of calibrated hydrophones to quantify ocean noise budget throughout Transient Killer Whale range, giving priority to improving and utilizing existing hydrophone networks.	High	Acoustic disturbance	10 years	NOAA ENGOS Stakeholders Other agencies

29*	Standardize protocols and methodologies for data analysis, data presentation, and archiving of acoustic information obtained from hydrophones in the Transient Killer Whale range.	High	Acoustic disturbance	2 years	NOAA, ENGOs Stakeholders Other agencies
30*	Investigate Transient Killer Whale use of marine Navy ranges, geographically and temporally in order to help inform decisions around Naval exercise planning.	High	Acoustic disturbance	5 years; ongoing	ENGOs
31*	Undertake systematic monitoring of ambient noise records for non-vessel related acute acoustic events that may cause harm to Transient Killer Whales.	High	Acoustic disturbance	5 years; ongoing	Stakeholders ENGOs
32*	Develop an acoustic model that incorporates effects of increasing ambient noise levels on communication signals of Transient Killer Whales.	Medium	Acoustic disturbance	5 years	Stakeholders Academia
33*	Compile metadata on acoustic recordings from existing archives and current available sources (e.g., Navy, government agencies, individuals, consultants); identify format, calibration, temporal and spatial distribution, data gaps, and data collection protocols.	Medium	Acoustic disturbance	2 years	Stakeholders ENGOs
34	Collate existing data on anthropogenic sonar use and identify frequency and location of use.	Medium	Acoustic disturbance	5 years	Other agencies Stakeholders ENGOs
Approach 3: Determine the short- and long-term effects of chronic and acute forms of disturbance, including vessels and noise, on the physiology, foraging and social behaviour of Transient Killer Whales.					
35	Investigate how Transient Killer Whale foraging efficiency is affected by noise.	High	Acoustic disturbance	5 years	ENGOs Stakeholders

36	Evaluate the relative importance of visual vs acoustic foraging methodologies in the Transient Killer Whale to assess the impacts of acoustic masking.	High	Acoustic disturbance	5 years	ENGOS Academia
37	Evaluate the effect of vessel disturbance on Transient Killer Whale behaviour and foraging success.	High	Acoustic and physical disturbance	Annual; ongoing	Stakeholders
38*	Continue and expand existing behavioural monitoring programs involving vessel/whale interactions and increase support for data analysis and publication.	High	Acoustic and physical disturbance	5 years; ongoing	Stakeholders Academia ENGOS
Approach 4: Develop and implement regulations, guidelines, sanctuaries or other measures to reduce or eliminate physical disturbance of Transient Killer Whales.					
39*	Link hydrophone detected noise events with vessel presence using the Automatic Identification System (AIS) for real-time detection of acoustic disturbance in Transient Killer Whale habitat, and implement a response mechanism to mitigate potential impacts.	High	Acoustic disturbance	5 years	Other agencies Stakeholders ENGOS
40*	Encourage the development and use of methodologies that mitigate acoustic impacts (e.g., bubble curtains, ship quieting technologies).	High	Acoustic disturbance	Ongoing	Stakeholders
41*	Maintain and improve the existing 24-hour hotline (BCMMRN/ORR) for acoustic incidents as a mechanism for timely response.	Medium	Acoustic disturbance	Ongoing	ENGOS

42*	Increase transboundary communication of research methods and objectives to address disturbance issues with counterpart agencies in the US.	Medium	Acoustic disturbance	Ongoing	NOAA
43*	Review and improve 1) thresholds for disturbance and injury, and 2) measures to mitigate marine mammal impacts from acute noise (e.g., seismic surveys, sonar use, pile driving and at-sea detonation); and implement through inclusion in Standards and Statements of Practice (e.g., Naval Orders Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment).	High	Acoustic disturbance	Ongoing	NOAA Stakeholders Other agencies
44*	Develop a means to assess individual ship noise and determine response strategies as necessary.	High	Acoustic disturbance	5 years	Other agencies Stakeholders
45*	Develop a communication strategy to inform foreign vessel operators of the Canadian regulations protecting marine mammals and Canadian acoustic mitigation protocols.	High	Acoustic disturbance	Ongoing	Other agencies
46	Assess potential habitat loss and disturbance from marine kinetic energy developments (e.g., wind, wave, tidal).	High	Physical disturbance	Ongoing, as required	Other agencies
47*	Improve boater education and tourism programs using the latest marine mammal regulations and guidelines (e.g., boater courses, marine safety courses, fishing licences, vessel registration and licensing courses).	Medium	Acoustic and physical disturbance	2 years	NOAA Stakeholders Other agencies

48*	Promote awareness of guidelines, and compliance with regulations, to reduce acoustic impacts and vessel interactions (e.g., minimum approach distances specified under the Marine Mammal Regulations, Be Whale Wise guidelines, stewardship programs, on-the-water education).	Medium	Acoustic and physical disturbance	2 years; ongoing	NOAA Stakeholders ENGOS
49*	Investigate new methodologies and technologies to aid in compliance and enforcement of Marine Mammal Regulations and SARA.	Medium	Physical and acoustic disturbance	5 years; ongoing	NOAA Other agencies
50*	Ensure that the development and delivery of SARA enforcement training for DFO fishery officers includes content from whale experts.	Medium	Acoustic and physical disturbance	Ongoing	Academia ENGOS
51*	Evaluate and revise whale watching guidelines and/or regulations to reflect most recent understanding of the effects of chronic physical disturbance.	Medium	Acoustic and physical disturbance	Ongoing	NOAA Academia Other agencies
52*	Evaluate the efficacy of a licence program and conditions for commercial whale watching as a means of mitigating potential disturbance (e.g., training standards for boat operators and naturalists, number and/or type of vessels, standards of practice).	Medium	Physical and acoustic disturbance	2 years	Stakeholders
53*	Promote responsible advertising and documentaries that reflect the Be Whale Wise guidelines and demonstrate appropriate viewing practices.	Medium	Acoustic and physical disturbance	2 years	NOAA Stakeholders ENGOS

Broad Strategy . Ensure that chemical and biological pollutants do not prevent the recovery of Transient Killer Whales.					
Approach 8: Develop a greater understanding of the impacts of contaminants and other biological and non-biological pollutants on Transient Killer Whales.					
54	Expand the Marine Mammal Response Program to ensure adequate response to strandings (e.g., necropsies, sampling, disentanglements).	High	Prey availability contaminants	Annual, ongoing	ENGOS
55*	Investigate diseases in stranded Transient Killer Whales and identify those caused by biological pollution (e.g., viruses, bacteria, fungi, parasites).	High	Contaminants	Opportunistic Ongoing	NOAA Other agencies ENGOS
56*	Collate and summarize information on marine mammal necropsy and disease reports.	High	Contaminants	Annual; ongoing	NOAA Other agencies ENGOS
57*	Evaluate the type and level of risk of biological pollutants from agricultural runoff, sewage effluent, wildlife rehabilitation facilities and other sources.	High	Contaminants	5 years	Other agencies
58*	Quantify the background levels of natural and anthropogenic hydrocarbons to provide a baseline for assessing spill impacts in Transient Killer Whale habitat.	High	Contaminants	5 years	ENGOS Other agencies

59*	Identify and monitor contaminants of concern (e.g., flame retardants, pharmaceuticals and personal care products, PBTs, hydrocarbons) and conduct a risk-based assessment of different chemicals of concern in Transient Killer Whales, their prey, and their habitat.	High	Contaminants	3 years; ongoing	ENGOs Other agencies
60*	Evaluate contaminant concentration trends in Transient Killer Whales, based on both published and new measurements of different contaminants.	High	Contaminants	5 years	ENGOs Other agencies
61*	Develop a monitoring program for pathogens and biological pollutants to evaluate long-term trends in Transient Killer Whales and their prey.	High	Contaminants	5 years	ENGOs Other agencies
62*	Undertake a workshop to identify source of persistent bioaccumulative contaminants presenting a risk to Transient Killer Whales.	High	Contaminants	5 years	ENGOs Stakeholders Other agencies
63*	Undertake a workshop to identify source of biological pollutants presenting a risk to Transient Killer Whales.	High	Contaminants	5 years	ENGOs Stakeholders Other agencies
64*	Investigate and monitor priority pathogens of concern in marine mammals as a means to identify risk to Transient Killer Whales (e.g., Morbillivirus spp.).	Medium	Contaminants	Annual; ongoing	NOAA Other agencies

Approach 9: Minimize the exposure of Transient Killer Whales to legacy and emergent pollutants.					
65*	Pursue an interagency contaminants working group to identify roles and responsibilities with respect to potential impacts of contaminants on Transient Killer Whales and their environment.	High	Contaminants	2 years	Other agencies
66*	Collate information on remediation efforts for land-based PCBs.	High	Contaminants	5 years	Other agencies
67*	Work with the Federal Contaminated Sites Action Plan (FCSAP) to evaluate the potential contribution of persistent environmental contaminants to the contamination of Transient Killer Whale habitat.	High	Contaminants	5 years	Other agencies
68*	Incorporate knowledge of distribution, foraging behaviour and contaminant bioaccumulation in Transient Killer Whales into pesticide and chemical regulation development and implementation overseen by provincial agencies, Health Canada and Environment and Climate Change Canada.	High	Contaminants	5 years; ongoing	Other agencies
69*	Determine the efficacy of the new regulations for PBDEs under the Canadian Environmental Protection Act (CEPA) taking into account trends in indicator species in Transient Killer Whale habitat, and develop additional source control strategies if warranted.	High	Contaminants	5 years; ongoing	Other agencies
70*	Identify and support programs that identify and mitigate small scale and/or chronic contaminant spills and leaks.	High	Contaminants	5 years; ongoing	NOAA Other agencies Stakeholders

71*	Reduce the risk of lifetime contaminant exposure in Transient Killer Whales by incorporating knowledge of distribution, foraging behaviour and their food web into assessment and remediation plans for contaminated sites.	High	Contaminants	5 years	Other agencies Stakeholders
72*	Work with other government departments, non-governmental organizations, and industry to promote best practices, green design, mitigation protocols and outreach efforts for the protection of Transient Killer Whales and their habitat from urban pollution (e.g., sewage treatment, source control, combined sewer overflows, runoff).	High	Contaminants	5 years; ongoing	NOAA Other agencies ENGOS Stakeholders
73*	Work with individuals, industries, agricultural operations, and other sectors to reduce the release of agricultural chemicals of concern into the habitat of Transient Killer Whales and their prey.	High	Contaminants	5 years; ongoing	NOAA Other agencies Stakeholders ENGOS
74*	Ensure that the protection of Transient Killer Whales and their habitat is included as a high priority in spill response and monitoring protocols within the Canadian Coast Guard's Incident Command Structure.	High	Contaminants	1 year; ongoing	Other agencies
75*	Prepare for oil or chemical spills to minimize impacts to Transient Killer Whales through the development of a spill response plan, including deterrence methods, training, drills and equipment.	High	Contaminants	1 year; ongoing	NOAA Other agencies Stakeholders

76*	Review and, if appropriate, recommend refinement of policies and best management practices for ocean dredging and disposal at sea.	Medium	Contaminants	Ongoing	Other agencies
77*	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	Contaminants	2 years	Other agencies
78*	Reduce the release of biological pollutants into the habitat of Transient Killer Whales and their prey by working with municipal, provincial and federal agencies tasked with domestic, agricultural and industrial discharges (including ballast water).	Medium	Contaminants	5 years	Other agencies Stakeholders ENGOS
79*	Mitigate the release of biological pollutants into the habitat of Transient Killer Whales and their prey by working with individuals, industries, agricultural operations, and other source sectors to develop or improve protocols and guidance.	Medium	Contaminants	5 years	NOAA Other agencies Stakeholders ENGOS
80*	Refine and expand existing monitoring programs of municipal and industrial waste to minimize Transient Killer Whale exposure to legacy and emergent pollutants.	Medium	Contaminants	Ongoing	Other agencies

Table 3. Measures that represent opportunities for other jurisdictions, organizations or individuals to lead

Measures noted by an asterisk (*) have been identified in the Resident Killer Whale Action Plan as also likely to provide benefits to Transient and Offshore Killer Whales (8 of 9, or 88% of measures).

#	Recovery Measures	Priority	Threats or Concerns addressed	Timeline	Suggested Other Jurisdictions or Organizations
Broad Strategy 2. Ensure that Transient Killer Whales have an adequate and accessible food supply to allow recovery.					
Approach 2: Minimize the risk of prey population reductions from anthropogenic activities, until precise prey needs can be determined.					
81	Mitigate acoustic disturbance that may cause displacement of Transient Killer Whale prey.	Medium	Prey availability Acoustic disturbance	Ongoing, as required	Stakeholders
Broad Strategy 3. Ensure that disturbance from human activities does not prevent the recovery of Transient Killer Whales.					
Approach 3: Determine the short- and long-term effects of chronic and acute forms of disturbance, including vessels and noise, on the physiology, foraging and social behaviour of Transient Killer Whales.					
82*	Research the effects of other vessel-based impacts (e.g., fish finders, air quality issues related to engine exhaust, disposal of waste and bilge water).	Medium	Acoustic disturbance Contaminants	Uncertain	Stakeholders Academia

Approach 4: Develop and implement regulations, guidelines, sanctuaries or other measures to reduce or eliminate physical disturbance of Transient Killer Whales.					
83*	Expand the Be Whale Wise flag program to notify other mariners when whales have been observed in order to reduce risk of collision and acoustic disturbance.	Medium	Physical and acoustic disturbance	Ongoing	Stakeholders ENGOS
84*	Improve public awareness of recovery activities for Transient Killer Whales through Parks Canada Agency’s educational programs (e.g., the BC Ferries Coastal Naturalist Program).	Medium	Physical and acoustic disturbance	5 years	Parks Canada Agency
Broad Strategy 4. Ensure that chemical and biological pollutants do not prevent the recovery of Transient Killer Whales.					
Approach 9: Minimize the exposure of Transient Killer Whales to legacy and emergent pollutants.					
85*	Quantify the current levels of contaminant concentrations in Transient Killer Whale prey and refine the analysis of contaminant intake by Transient Killer Whales using current information on their feeding ecology.	High	Contaminants	Uncertain	Stakeholders ENGOS
86*	Support new, proposed, or existing bans on the use of pesticides for cosmetic purposes and re-establish a comprehensive pesticide sales and use inventory for British Columbia.	High	Contaminants	Uncertain	ENGOS General public

87*	Incorporate knowledge of Killer Whale distribution, foraging behaviour and contaminant bioaccumulation into federal technical reviews on chemicals of concern.	High	Contaminants	Uncertain	Other agencies
88*	Develop, evaluate, and apply new tools to assess the effects of contamination and pollution on the health of Transient Killer Whales.	Medium	Contaminants	Uncertain	Other agencies ENGOS Academia
89*	Evaluate the risks of bioaccumulation related to mercury (Hg) contamination in Transient Killer Whale food webs.	Medium	Contaminants	Uncertain	Stakeholders Other agencies ENGOS

1 **2. Critical Habitat**

2
3 **2.1 Identification of the Species' Critical Habitat**

4
5 **2.1.1 General Description of the Species' Critical Habitat**

6
7 Critical habitat is defined in SARA as "...*the habitat that is necessary for the survival or recovery*
8 *of a listed wildlife species and that is identified as the species' critical habitat in a recovery*
9 *strategy or in an action plan for the species.*" [s. 2(1)]

10
11 Also, SARA defines habitat for aquatic species as "... *spawning grounds and nursery, rearing,*
12 *food supply, migration and any other areas on which aquatic species depend directly or*
13 *indirectly in order to carry out their life processes, or areas where aquatic species formerly*
14 *occurred and have the potential to be reintroduced.*" [s. 2(1)]

15
16 Critical habitat for the Transient Killer Whale is identified to the extent possible in Section 8 of
17 the draft amended Recovery Strategy (DFO 2021). The Recovery Strategy also contains details
18 about the identified partial critical habitat including geographic location and biophysical
19 functions, features and attributes. It is unknown whether the critical habitat identified in the
20 Recovery Strategy is sufficient to achieve the species' population and distribution objectives, as
21 it may not encompass all habitat of special importance to the infrequently encountered portion of
22 the population (i.e., the putative 'outer coast' portion of the population) (Ford et al. 2013). The
23 Recovery Strategy contains a schedule of studies outlining the research required to identify
24 additional critical habitat if necessary, and to acquire more detail about the critical habitat
25 identified, in order to achieve the species' population and distribution objectives. Additional
26 critical habitat may be identified in future amendments to this Recovery Strategy.

27
28 **2.2 Activities likely to Result in the Destruction of Critical Habitat**

29
30 Examples of activities likely to result in destruction of critical habitat are found in Section 8.3 of
31 the draft amended Recovery Strategy (DFO 2021).

32
33 **2.3 Proposed Measures to Protect Critical Habitat**

34
35 Under SARA, critical habitat must be legally protected from destruction within 180 days of being
36 identified in a final recovery strategy or action plan. For the Transient Killer Whale critical
37 habitat, it is anticipated that this will be accomplished through a SARA Critical Habitat Order
38 made under subsections 58(4) and (5), which will invoke the prohibition in subsection 58(1)
39 against the destruction of the identified critical habitat.

40
41 **3. Evaluation of Socio-Economic Costs and of Benefits**

42
43 The *Species at Risk Act* requires that an action plan include an evaluation of the socio-
44 economic costs, and the benefits to be derived from its implementation (SARA 49(1)(e), 2003).
45 This evaluation addresses only the incremental socio-economic costs of implementing this
46 Action Plan from a national perspective as well as the social and environmental benefits that
47 would occur if the Action Plan were implemented in its entirety, recognizing that organizations or

1 agents other than the federal government may be better placed for implementation of certain
2 aspects of the Action Plan. The intent of this evaluation is to inform the public and to guide
3 decision making on implementation of the Action Plan by partners.
4

5 The protection and recovery of species at risk can result in both benefits and costs. The Act
6 recognizes that “*wildlife, in all its forms, has value in and of itself and is valued by Canadians for*
7 *aesthetic, cultural, spiritual, recreational, educational, historical, economic, medical, ecological*
8 *and scientific reasons*” (SARA 2003). Self-sustaining and healthy ecosystems with their various
9 elements in place, including species at risk, contribute positively to the livelihoods and the
10 quality of life of all Canadians. A review of the economics literature confirms that Canadians
11 value the preservation and conservation of species in and of themselves. Actions taken to
12 preserve a species, such as habitat protection and restoration, are also valued. In addition, the
13 more an action contributes to the recovery of a species, the higher the value the public places
14 on such actions (Loomis and White 1996; DFO 2008). Furthermore, the conservation of species
15 at risk is an important component of the Government of Canada’s commitment to conserving
16 biological diversity under the *International Convention on Biological Diversity*. The Government
17 of Canada has also made a commitment to protect and recover species at risk through the
18 [Accord for the Protection of Species at Risk](#). The specific costs and benefits associated with this
19 Action Plan are described below.

20 **Efforts for Recovery to date**

21 The Action Plan for this species captures activities from 2019 onwards; however, efforts for
22 recovery have been underway prior to 2019. Since 1973, an annual census has been
23 undertaken to locate, photograph, and identify individual Killer Whales found in Canadian
24 waters. Since 2002, DFO’s Cetacean Research Program (CRP) has completed over 2,000
25 hours of dedicated ship-based surveys to determine recovery status and further the
26 understanding of distribution, abundance and seasonal occurrence of these whales. Key
27 investments made by the Government of Canada, including the Oceans Protection Plan and the
28 Whales Initiative, as well as emergency measures for the Southern Resident Killer Whale, have
29 advanced many actions that are also necessary for the recovery of Transient Killer Whale. In
30 addition, collaborations with other groups, organizations and partners have provided significant
31 advances in acoustic monitoring networks, sightings, identification methods and identification of
32 important habitat. First Nations have contributed to recovery efforts through stewardship and
33 guardian programs, and identification efforts. Finally, education, stewardship and enforcement
34 programs have also contributed to recovery efforts.

35 **Benefits**

36 The impacts of the recovery actions in this Action Plan on Transient Killer Whales are unknown
37 but likely positive. As indicated above, Canadians value such actions for a number of reasons,
38 including non-market benefits (i.e. existence, bequest and option values).² Activities that
39 positively affect the recovery of these species may result in positive benefits to Canadians.
40

41 The recovery measures are also likely to provide broader benefits, as some of the threats to this
42 species are common to other marine mammals and sea turtles. Actions that mitigate those
43 threats may also provide benefits to other species. As well, this plan supports a number of on-

² Non-market benefits include existence values (the value people place on the existence of a species), bequest values (the value placed on conservation for future generations) and option values (the amount someone is willing to pay to keep open the option of future use of the species).

1 going programs and activities that are not species-specific such as the Marine Mammal
2 Response Program and the BC Cetacean Sightings Network (BCCSN). These programs and
3 activities provide information on, and assistance to, numerous species. In addition, ocean
4 research surveys generally collect information on other marine mammals, sea turtles and other
5 species of interest when encountered, if feasible and appropriate. In particular, approximately
6 two-thirds of all the activities in the Plan are common to the Action Plan for Resident Killer
7 Whales, and may also benefit Offshore Killer Whales and other species of whales, specifically
8 research related to acoustic disturbance and contaminants. Consequently, many of the activities
9 identified in this Action Plan may have positive impacts on other SARA-listed species and
10 provide overall benefits to the aquatic ecosystem.

11 **Costs**

12 The Implementation Schedule separates recovery measures into three tables. Table 3 activities
13 are not assessed in this evaluation. The activities in Table 3 are identified as important for
14 species recovery; however, there is insufficient information available on participants, activities
15 and timelines to assess costs.

16 The majority of the recovery measures in this plan will result in annual costs and do not have
17 completion dates specified. The longer-term costs are similar to expenditures in support of this
18 species prior to this plan. Some of the measures have completion dates within the first five
19 years of the plan; these measures account for less than 10% of the annual cost.

20 The majority of activities in the plan involve: research, workshops and management in support
21 of monitoring and assessment; development of protocols, regulations and guidelines; threat
22 abatement; and, cooperation and engagement of partners. Many of the activities in the plan
23 involve cooperation with a number of partners, which provide direct and in-kind support.
24 Research activities account for approximately 90% of the direct costs identified in the plan. The
25 coast-wide distribution of these populations and their prey requires extensive ship-based survey
26 effort as well as acoustic monitoring, which are both costly. Workshop activities are expected to
27 be low-cost for the Department, but would involve in-kind support from partners and
28 participants. On-going management activities by DFO and partners are anticipated to be part of
29 existing activities, with small direct costs identified for communications, engagement and
30 contract support. The cooperative nature of many of these activities may also include in-kind
31 support from environmental organizations. A number of actions identify implementation of new
32 or improved measures or requirements. Costs could not be assessed for those components of
33 such actions in Tables 1 and 2, since information is not available on what these would involve.

34 Annual cost estimates for DFO activities for Table 1 and 2 recovery measures are expected to
35 be low.³ There is substantial overlap in threats and activities for recovery of cetaceans in
36 Canada's Pacific coast. While care has been taken to minimize the possibility of double
37 counting costs across species, it is possible that costs may be lower than those identified. Sixty-
38 two percent of the activities in Tables 1 & 2 are common to the Action Plan for Resident Killer
39 Whales. However, many of these common actions are low cost or are part of ongoing activities.
40 Consequently, even when the common actions are fully costed, depending on year, 60% to 70%
41 of the cost estimate is attributable to activities specific to Transient Killer Whales. Also, there is
42

³ 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. *Triage Statement Form*. Available at: <http://www.tbs-sct.gc.ca/hgw-cgf/priorities-priorites/rtrap-parfa/guides/temp-gabar/tsf-fet-eng.asp> Last modified: 2014-07-03.

1 the possibility of synergies across activities and species that could result in cost savings, in
2 addition to the co-benefits identified above. Cost estimates for partner contribution towards
3 Table 2 activities, as well as cost estimates for Table 3 activities, are not known with a
4 reasonable level of certainty. Information on project specifics, participants and/or timelines is not
5 yet available to fully identify the costs, and information on in-kind support is not available.
6 However, it is unlikely that the activities identified would increase the total annual cost above the
7 threshold for low cost.

8
9 For the majority of the recovery measures in the Implementation Schedule, a number of
10 potential partners and collaborators are identified and/or have participated in similar activities in
11 the past. These partners include other federal departments and agencies, environmental
12 organizations, academic institutions and programs, First Nations and other national
13 governments. Potential funding sources for DFO costs for Table 1 and 2 activities include
14 existing federal resources including the Oceans Protection Plan and the Whales Initiative, as
15 well as supplemental funds from annual programs such as the Habitat Stewardship Program
16 (HSP). Supplemental funding support may also be possible from collaborators and partners.

19 **4. Measuring Progress**

20
21 The performance indicators presented in the associated recovery strategy provide a way to
22 define and measure progress toward achieving the population and distribution objectives.

23
24 Reporting on implementation of the Action Plan (under s. 55 of SARA) will be done by
25 assessing progress towards implementing the broad strategies.

26
27 Reporting on the ecological and socio-economic impacts of the Action Plan (under s. 55 of
28 SARA) will be done by assessing the results of monitoring the recovery of the species and its
29 long-term viability, and by assessing the implementation of the Action Plan.

5. References

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Appendix A: Effects on the Environment and Other Species

In accordance with the [Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals](#) (2010), SARA recovery planning documents incorporate strategic environmental assessment (SEA) considerations throughout the document. 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](#) goals and targets.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that strategies may also 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.

The recovery measures are 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 threats to the aquatic environment (acoustic disturbance, contaminants) may also provide benefits to other 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. All cetacean species, and Resident and Offshore Killer Whales in particular, will likely benefit from measures identified in this Action Plan. 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.

Appendix B: Record of Cooperation and Consultation

Action plans are to be prepared in cooperation and consultation with other jurisdictions, organizations, affected parties and others as outlined in SARA section 48. DFO has utilized a process of a Technical Workshop (2013) and a Recovery Team to seek input to the development of this Action Plan. Information on participation is included below.

Transient Killer Whale Recovery Team

Name	Organizations Represented
Sheila Thornton, Chair	Fisheries and Oceans Canada
Brian Reader	Parks Canada Agency
Pippa Shepherd	Parks Canada Agency
Paul Cottrell	Fisheries and Oceans Canada
Graeme Ellis	Fisheries and Oceans Canada
John Ford	Fisheries and Oceans Canada
Sheena Majewski	Fisheries and Oceans Canada
Linda Nichol	Fisheries and Oceans Canada
Lisa Spaven	Fisheries and Oceans Canada
Jared Towers	Fisheries and Oceans Canada
Joe Knight	Fisheries and Oceans Canada
Lance Barrett-Lennard	Vancouver Aquarium

In addition, consultation on the draft Action Plan occurred between August 31 and September 30, 2016. Consultation activities included:

- On-line posting of the draft Action Plan and draft amended Recovery Strategy, background information and a comment form;
- Letters, e-mails and faxes with information on the consultations and offering opportunities for further discussions sent to treaty and coastal First Nation organizations;
- E-mails regarding the consultations were also sent to stakeholders including industry, academia, environmental non-government organizations, environmental consultants, and government representatives (municipal, regional, provincial, federal and United States federal and state); and
- Social media notifications of consultations with links to the online postings.

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Five comment forms were received. All feedback received was reviewed and considered in the development of the Action Plan.

In follow-up to the 2016 regional consultation, regional engagement with Indigenous groups and stakeholders will occur in 2021, where any new information gained since 2016 and pertaining to the Action Plan will be sought. Additional Indigenous, stakeholder, and public input will be sought following the posting of the proposed Action Plan on the Species at Risk Public Registry for a 60-day public comment period. Comments received will inform the final document.