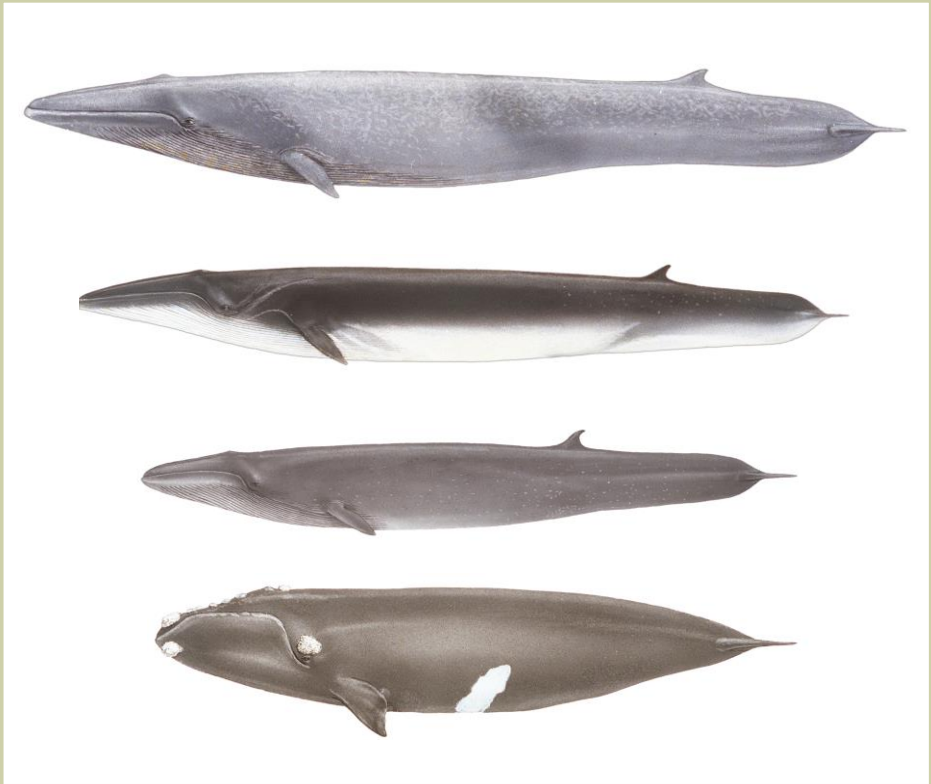
Species at Risk Act
Action Plan Series

Action Plan for Blue, Fin, Sei and North Pacific Right Whales (*Balaenoptera musculus, B. physalus, B. borealis,* and *Eubalaena japonica*) in Canadian Pacific Waters

Blue, Fin, Sei and North Pacific Right Whales



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For copies of this 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 Species at Risk Public Registry.

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From top to bottom: Blue, Fin, Sei and North Pacific Right Whales. A. Denbigh, Fisheries and Oceans Canada.

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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, 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 Species at Risk 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. 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, and the Minister responsible for the Parks Canada Agency are the competent ministers under SARA for Blue, Fin, Sei and North Pacific Right Whales in Canadian Pacific waters, 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 and Climate Change Canada, Transport Canada, the Department of National Defence, the Canadian Coast Guard, Natural Resources Canada, the Province of British Columbia, and the United States' National Oceanographic and Atmospheric Administration (NOAA).

Success in the recovery of these 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. All Canadians are invited to join in supporting and implementing this action plan for the benefit of Blue, Fin, Sei and North Pacific Right 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.

Acknowledgments

The development of this action plan was the result of collaborative efforts and contributions from many individuals and organizations. The 2012-13 Large Whale Action Plan Technical Team (Appendix C) led the development of this plan for Fisheries and Oceans Canada. Previous drafts, prepared by the 2006-2008 and 2009-2010 Action Planning Teams (Appendix C), greatly informed the foundation of this document.

This action plan benefitted from review by: Thomas Doniol-Valcroze, Jack Lawson and Veronique Lesage (DFO Science), and Randall Reeves (Okapi Wildlife Associates).

A thank you is also extended to Natural Resources Canada, NOAA's National Marine Fisheries Service, the Nuu-chah-nulth Tribal Council Fisheries, Parks Canada Agency, Raincoast Conservation Foundation and Transport Canada, who provided input to improving the 2006-2008 drafts of the action plan. Those technical experts, authors and all others who contributed to the development of the both the 2006-2008 and 2009-2010 drafts are also thanked for their dedicated efforts and generous contributions. Finally, the feedback received from all who participated in public consultation on this action plan is appreciated and has improved the document.

Executive Summary

This action plan addresses the entire set of populations of Blue, Fin, Sei and North Pacific Right Whales (*Balaenoptera musculus, B. physalus, B. borealis,* and *Eubalaena japonica*) in Canadian Pacific waters. It identifies recovery measures to implement the broad goals and objectives outlined in the *Recovery Strategy for Blue, Fin and Sei Whales in Pacific Canadian Waters* (Gregr *et al.* 2006), and the *Recovery Strategy for North Pacific Right Whales* (DFO 2011). All four species are being considered together because of their similar geographic distribution, common threats to survival, and the efficiency of integrating activities and resources required for recovery.

It is considered an action plan because current best available information is insufficient to identify critical habitat (DFO 2012). When sufficient information allows, critical habitat will be identified for one or more of the species in a later iteration of the action plan or an amended recovery strategy.

The action plan outlines not only activities to be undertaken by Fisheries and Oceans Canada (DFO), but also those for which other jurisdictions, organizations and individuals have a role to play. All Canadians are strongly encouraged to participate in the conservation of Blue, Fin, Sei and North Pacific Right Whales through undertaking priority recovery measures outlined in this action plan. The actions relate to the following broad strategies for recovery:

- Determine the population identities, abundance, seasonal and interannual distribution, migration patterns, and current and potential habitat use of Blue, Fin, Sei and North Pacific Right Whales that occur in Canadian Pacific waters.
- Mitigate threats so they do not significantly degrade or reduce current or potential habitat, or distribution of Blue, Fin, Sei and North Pacific Right Whales in Canadian Pacific waters. This also serves to promote the reoccupation of historical habitat of these species in Canadian Pacific waters.

The impacts of the recovery actions in this action plan to the four species are unknown but likely positive, providing benefits to Canadians. Additionally, some research and threat mitigation activities may result in benefits to various marine mammals, sea turtles and other species of interest. It is anticipated that the costs for this action plan will be low, but will extend into the long-term, for the actions that DFO will lead, excluding the implementation phase of actions that are dependent on other actions or partners. It is anticipated that most activities would be funded from existing government sources, while a number of potential partners and collaborators including other federal departments and agencies, environmental organizations, academic institutions and programs, First Nations and other national governments may also provide in-kind resources.

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1. Recovery Actions

1.1 Context and Scope of the Action Plan

Current best available information is insufficient to identify critical habitat (DFO 2012). SARA s. 49(1)(a) requires the identification of the species' critical habitat, to the extent possible, based on the best available information. When sufficient information allows, critical habitat will be identified for one or more of the species in a later iteration of the action plan or an amended recovery strategy.

Species status and background

Blue, Sei and North Pacific Right Whales (*Balaenoptera musculus, B. physalus, B. borealis,* and *Eubalaena japonica*) were assessed as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) due to the rarity of sightings throughout the eastern North Pacific (COSEWIC 2002, 2003, 2004). Blue and Sei Whales were confirmed as Endangered by COSEWIC in their respective 2012 and 2013 reassessments (COSEWIC 2012; 2013). Fin Whales were assessed as Threatened by COSEWIC because the population sizes in the eastern North Pacific appear to be increasing but remain below 50% of the pre-whaling levels (COSEWIC 2005).

These assessments were subsequently reflected in the listing of Blue and Sei Whales under the *Species at Risk Act* (SARA) in 2005, and Fin and North Pacific Right Whales in 2006. A joint *Recovery Strategy for Blue, Fin and Sei Whales in Pacific Canadian Waters* (Gregr *et al.* 2006) was posted to the SARA Public Registry in July 2006, and a *Recovery Strategy for North Pacific Right Whales* (DFO 2011) was posted in August 2011.

The species descriptions below complement the more extensive descriptions found in the above mentioned recovery strategies. For a detailed description of the species and further background information, the reader is encouraged to review the related recovery strategies.

Blue, Fin and Sei Whales belong to the family Balaenopteridae, while North Pacific Right Whales belong to the family Balaenidae; all four species are baleen whales (order Cetacea, suborder Mysticeti). Baleen whales are large, wide-ranging, long-lived (50 to 100 years) species, which have evolved to forage on concentrations of zooplankton or schooling fish. As such, recovery goals must span several generations and consider multiple trophic levels. Canadian Pacific waters are considered to be important for feeding purposes necessary to the recovery of eastern North Pacific populations of these species.

Blue, Fin, Sei and North Pacific Right Whale habitat in Canadian Pacific waters includes the continental shelf break, slope and oceanic areas beyond the shelf break. Fin Whales in British Columbia have also been observed in shallower, inshore waters (DFO 2012; Ford *et al*. 2010).

Blue Whales (*Balaenoptera musculus*) are the largest animals on Earth. They are “gulp” – or “lunge” – type feeders, taking discrete mouthfuls of water from which they filter their zooplankton prey.

Blue Whale populations were severely reduced in all the world’s oceans during the early 1900s. Protected in the North Pacific in 1966 by the International Whaling Commission (IWC), the eastern North Pacific population currently numbers about 3000 animals (Calambokidis and Barlow 2004) and is one of the few Blue Whale populations known to be stable or recovering. The summer range of this population extends from California to British Columbia and Alaska (Calambokidis *et al.* 2009).

The Fin Whale (*B. physalus*) is the second largest member of the balaenopterids. Like the Blue Whale, Fin Whales are “gulp” type feeders, engulfing large amounts of prey and water with discrete mouthfuls, facilitated by ventral pleats that expand the throat to accommodate large volumes. Fin Whales in Canadian Pacific waters feed mostly on euphausiids, but also consume copepods and small schooling fishes (e.g. herring, Pacific saury).

Fin Whales were hunted concurrently with Blue Whales in the North Pacific. The largest catches were in the 1950s and 1960s, resulting in significant population declines prior to their protection by the IWC in 1976. The population structure in the eastern North Pacific is unclear. A putative California/Washington/Oregon population is composed of over 3000 animals and is believed to be distinct from the population in Alaska. Fin Whales frequent Canadian Pacific waters year-round, with highest numbers seen from the spring to fall. However, it is not known to which population they belong. Some modeling of Fin Whale habitat and density estimates has been done from sightings data (Williams and Thomas 2007; Best and Halpin 2009).

The Sei Whale (*B. borealis*) is the third largest balaenopterid. Sei Whales are unique among baleen whales in having two modes of feeding; they are both “skimmers”, filtering zooplankton from the water while swimming with mouth held open near the surface, and “gulpers”, lunging at prey patches and taking a mouthful at a time. The fine fringes on their baleen plates allow them to skim the surface for small zooplankton, especially copepods that are only a few millimeters in size. When in gulping mode, Sei Whales mostly target small schooling fishes.

Sei Whales were hunted by modern whalers primarily after the preferred larger baleen whale species had been seriously depleted. Most populations of Sei Whales were reduced by whaling in the 1950s through the early 1970s. North Pacific Sei Whales were not protected from whaling by the IWC until 1976. The Sei Whale is the least studied of the large whales in the North Pacific, and the current status of most populations is not known. The existence of an eastern North Pacific population is assumed, but its range is unknown.
Though North Pacific Right Whales (*Eubalaena japonica*) are approximately the same size as Sei Whales, they are distinguished by a stocky body and lack the pleated,

expandable throats typical of other baleen whales. They have a large mouth with long baleen plates edged with very fine bristles for filtering small prey using a “skimming” mode of foraging. Their diet is dominated by copepods, but they may also take larger zooplankton such as euphausiids.

North Pacific Right Whales were hunted intensively from 1835 to 1900, but only seven were taken by coastal whalers between 1900 and 1951 in British Columbia waters. Though they were protected in 1931 by the Convention for the Regulation of Whaling, North Pacific Right Whales were subject to illegal Soviet whaling between 1961 and 1979. The species has shown very few signs of recovery, likely because of the relatively recent end of illegal Soviet whaling. The population size of North Pacific Right Whales in the eastern North Pacific is unknown, however Wade *et al*. (2010) estimated a population of approximately 30 individuals from surveys in the eastern Bering Sea and Aleutian Islands.

The most recent confirmed sightings of North Pacific Right Whales in Canadian waters was in June and October 2013, off the west coast of Haida Gwaii and southwest Vancouver Island, respectively (Ford pers. comm. 2013a,b). Before that, the last confirmed sighting happened in1951, when whalers caught one off of northwest Vancouver Island. Remaining individuals are observed most frequently in the Bering Sea and Gulf of Alaska in the summer, and winter sightings have been reported as far south as central Baja California in the eastern North Pacific (DFO 2011).

Threats to the species

Commercial whaling has historically been a major threat and largely responsible for population declines of these four species in the eastern North Pacific, but is not a threat to these species today. The following major current threats to Blue, Fin, Sei and North Pacific Right Whales are addressed in this action plan; a full list of current threats and their perceived priorities can be found in the species’ respective recovery strategies:

- vessel strikes and physical disturbance due to vessel presence;
- acute and chronic anthropogenic noise causing disturbance and/or physical injury;
- entanglement in fishing gear and debris;
- pollution; and
- changes in foraging habitat due to changes in ocean climate or trophic structure.

This action plan addresses all listed threats, except for changes in foraging habitat. These changes are largely functions of broad-scale oceanic processes that are outside the scope of this action plan. That does not however discount the potential significance of these threats, or what Canada and other nations should do to mitigate them.

For a complete discussion of the threats to these species, refer to the associated recovery strategies. The paragraphs below expand on a few of the threats for which new information has become available since their original description in the recovery strategies.

Over the past decade, vessel strikes have been recognized as a serious threat to cetaceans globally (Laist *et al*. 2001; Panigada *et al*. 2006; Berman-Kowaleski *et al*. 2010). In British Columbia, vessel strikes are the only human interaction-related incidents on record for these species in DFO's Pacific Marine Mammal Response Program's database. As they re-inhabit Canadian Pacific waters, the likelihood of strikes is expected to increase (Williams and O'Hara 2010), unless ship design and transit strategies are developed to minimize the likelihood and severity of strikes.

Changes in prey abundance as a result of anthropogenic activities, including direct competition from krill and forage fish fisheries, are recognized as possible threats to recovering large baleen whale populations (Gregr *et al*. 2006; Surma and Pitcher 2015). Development or significant expansion of fisheries for zooplankton or forage fish that comprise the primary diets of these large baleen whales should be evaluated in advance to assess the impact such fisheries might have on foraging habitat and prey availability needed by these recovering populations.

There is a growing concern about the increasing pervasiveness and concentration of plastic pollution in the world's oceans (Moore 2008; Barnes *et al*. 2009; UNEP 2009). Because plastics are highly resistant to decomposition, broken down plastics (micro-plastics) are of particular concern (Thompson *et al*. 2004; Browne *et al*. 2007; Zarfl *et al*. 2011). As well, there are indications that plastic pollution is a considerable problem in Canadian Pacific waters (Avery-Gomm *et al*. 2012). Plastics affect marine animals through ingestion or entanglement (Derraik 2002; Gregory 2009; Simmonds 2012), and could affect large baleen whales by interfering with their feeding (i.e. entanglement with baleen) or through gastrointestinal blockage. As stated in the Blue, Fin and Sei Whale Recovery Strategy (Gregr *et al.* 2006), the consequences of marine debris interfering with feeding have not been quantified.

Being neutrally or positively buoyant, many plastics are subject to oceanographic processes (e.g. currents, fronts), concentrating them in areas of higher productivity (Moore *et al*. 2001) where these whales often feed. It has been shown that Fin Whale distributions overlap with concentrations of plastic, at least in areas inshore of the Pacific shelf-break (Williams *et al*. 2011). Given the increasing concentration of plastics, this form of pollution might be an increasing threat to Blue, Fin, Sei and North Pacific Right Whales.

Oil spills were identified as a minor threat in the recovery strategy. Research has focused on larger, catastrophic spills and their potential effects. There has been little research associating impacts from exposure to both intentional and accidental small-scale discharges that occur at a much higher frequency (NRC 2003; O'Hara pers. comm. 2012). Oil pollution potentially affects whales through contaminated prey ingestion, skin and eye irritation, inhalation of fumes, and abandonment of polluted foraging areas (Clapham *et al*. 1999). There are few data on direct impacts of oil discharges of any size to these large cetaceans, nonetheless, indirect effects, such as

habitat degradation and reduced prey populations are a considerable concern (Geraci 1990; Clapham *et al*. 1999; NRC 2003).

Scope of the Action Plan

This action plan addresses the entire set of populations of Blue, Fin, Sei and North Pacific Right Whales in Canadian Pacific waters. It identifies recovery measures to implement the broad goals and objectives outlined in the *Recovery Strategy for Blue, Fin and Sei Whales in Pacific Canadian Waters* (Gregr *et al.* 2006) and the *Recovery Strategy for the North Pacific Right Whale in Pacific Canadian Waters* (DFO 2011). The four species were grouped together in this action plan because of similarities in their geographic distribution, common threats to their survival, and the efficiency of integrating activities and resources required for recovery.

The recovery goals outlined in the associated recovery strategies are:

- To attain a long-term viable population of Blue Whales that use Canadian Pacific waters.
- To attain a long-term viable population of Fin Whales that use Canadian Pacific waters.
- To attain a long-term viable population of Sei Whales that occasionally use Canadian Pacific waters.
- Increase the probability of survival, and attain long-term viability, of the North Pacific Right Whale in Canadian waters.

The original, overlapping objectives from the two recovery strategies were amalgamated to create the Broad Strategies in Table 1 and 2 of this action plan. The objective to confirm Sei Whale presence in Canadian Pacific waters is not included in the Broad Strategies as this objective was recently achieved (DFO 2012).

Critical habitat identification for Blue, Fin, Sei and North Pacific Right Whales is beyond the scope of this action plan, because best available information is insufficient to be able to identify it at this time (DFO 2012). Identification of critical habitat to meet the population and distribution objectives will be addressed in a later iteration of the action plan or an amended recovery strategy.

Once critical habitat is identified for one or more of the Pacific populations of Blue, Fin, Sei and North Pacific Right Whales, or significant new information is brought to light regarding current or new threats to one or more of the species, a subsequent iteration of the action plan or amended recovery strategy will be developed and posted to the Species at Risk Public Registry, addressing the critical habitat and/or new information about a threat(s).

Due to the trans-boundary movement of these species, their protection also falls under the authority of other jurisdictions in the North Pacific, including but not limited to the United States of America and Mexico. Though the geographic focus of this action plan is in Canadian Pacific waters, inter-jurisdictional collaboration with several research and

mitigation efforts is likely necessary to meet recovery objectives, for example through collaboration on NOAA's International Marine Mammal Action Plan (2012) and guidance documents led by the International Maritime Organization.

1.2 Measures to be Taken and Implementation Schedule

Success in the recovery of these species is not solely dependent on the actions of any single jurisdiction; rather it requires the commitment and cooperation of many different 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 Blue, Fin, Sei and North Pacific Right Whales in Canadian Pacific waters, to guide not only activities to be undertaken by Fisheries and Oceans Canada, but also those for which other jurisdictions, organizations and individuals have a role to play. Fisheries and Oceans Canada strongly encourages all Canadians to participate in the conservation of Blue, Fin, Sei and North Pacific Right Whales through undertaking priority recovery measures outlined in this action plan. Where appropriate, Fisheries and Oceans Canada seeks to engage with organizations or individuals and enter into a Conservation Agreement under section 11 of SARA to implement the relevant recovery measures.

Table 1 identifies the recovery measures to be led by Fisheries and Oceans Canada, in cooperation and consultation with other agencies, organizations and individuals as appropriate, to support the recovery of Blue, Fin, Sei and North Pacific Right Whales. The footnotes at bottom of the first page of the table give important context to the Priority and Timeline columns of the table.

Table 2 identifies measures to support the recovery of Blue, Fin, Sei and North Pacific Right Whales that could be undertaken voluntarily by other jurisdictions, groups and individuals interested in participating in the recovery of these species. Other jurisdictions, groups and individuals interested in undertaking or contributing to one or more specific measures to support the recovery of these whales are encouraged to contact the Pacific Region Species at Risk office (sara@pac.dfo-mpo.gc.ca), so that implementation of the measures can be tracked for reporting and planning purposes.

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.

Table 1. Implementation Schedule – Recovery measures to be led by Fisheries and Oceans Canada

Measure #	Recovery Measures	Priority[1]	Threats or Concerns Addressed	Timeline[2]
Broad Strategy: Determine the population identities, abundance, seasonal and interannual distribution, migration patterns, and current and potential habitat use of Blue, Fin, Sei and North Pacific Right Whales that occur in Canadian Pacific waters.				
1	Undertake rotating (among sub-regions) systematic line-transect surveys – including offshore areas – on dedicated aerial or ship-board platforms, to advance efforts to estimate abundance and determine coast-wide distributions in association with habitat characteristics. Coordinate surveys with those in adjacent U.S. waters when they are conducted. Use ship-board surveys to efficiently advance the following efforts: a) Determine abundance, investigate seasonal and interannual site fidelity and movement patterns of individuals using photo identification techniques, and identify populations and their distributions by comparing photographs of individuals in Canadian Pacific waters to photographs taken in other areas of the North Pacific; b) Assess distribution and movement patterns, and investigate seasonal and interannual site fidelity using telemetry studies (e.g.	High	Knowledge Gaps	Ongoing

[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 those most likely to have an immediate and/or direct influence on attaining the recovery objective for species. Medium priority measures may have a less immediate or less direct influence on reaching the recovery population and distribution objectives, but are still important for recovery of the population. Low priority recovery measures will likely have an indirect or gradual influence on reaching the recovery objectives, but are considered important contributions to the knowledge base and/or public involvement and awareness of species.

[2] "Timeline" indicates the year by which the measure is expected to be accomplished. A timeline listed as "ongoing" indicates that it is important for that measure to be conducted regularly through the foreseeable future, until the knowledge gap no longer exists, regular repetition of the measure is no longer needed, or the threat is mitigated to a point where it is no longer considered a threat. Where different timelines are necessary for different species, the species are abbreviated as: **B = Blue Whale; F = Fin Whale; S = Sei Whale; and NPR = North Pacific Right Whale**. A timeline listed as "uncertain" does not mean that that particular measure is unimportant; rather, it means that the current paucity of data for a given species does not allow us to state a certain timeline at this point.

	satellite-linked tags), also helping to direct survey efforts; c) Determine population identities using DNA analysis (e.g. from skin biopsies), and apply genetic and chemical methods to biopsies and fecal samples in order to investigate diet and habitat use; and d) Determine distribution of prey species and their densities, using hydroacoustics, net sampling, video and other techniques.			
2	Maintain and expand collaborations and data sharing with researchers in other organizations, both nationally and internationally, to help further the goals of this action plan.	High	Knowledge Gaps	Ongoing
3	Collaborate on the development of a trained core of observers to provide reliable sightings information from offshore platforms of opportunity, and continue to support the British Columbia Cetacean Sightings Network (BCCSN).	High	Knowledge Gaps	2017 (and continuing thereafter)
4	Record and analyse data from passive acoustic monitoring devices to further investigate extent of occurrence, and advance the determination of population identities, of Blue, Fin, Sei and North Pacific Right Whales. Collaborate with other ocean acoustic projects, such as NEPTUNE Canada, where possible.	High	Knowledge Gaps	B, F, S - 2022; NPR - Uncertain
Broad Strategy: Mitigate threats so they do not significantly degrade or reduce current or potential habitat, or distribution of Blue, Fin, Sei and North Pacific Right Whales in Canadian Pacific waters. This also serves to promote the reoccupation of historical habitat of these species in Canadian Pacific waters.				
Approach: Identify and assess the magnitude of threats through information compiled by Fisheries and Oceans Canada's Pacific Marine Mammal Response Program (Pacific MMRP).				
5	Utilize the Pacific MMRP to: a) continue to solicit and collect data on incidents involving Blue, Fin, Sei and North Pacific Right Whales in Canadian Pacific waters (e.g. live strandings; dead, sick or injured animals; entanglements; vessel strikes); b) continue to develop, train, and equip response teams to attend to Blue, Fin, Sei and North Pacific Right Whales found in distress, and provide assistance (e.g. attempt to disentangle), where feasible; c) continue to determine the cause of death of recovered Blue, Fin,	High	Vessel strikes; entanglement; pollution	Ongoing

	Sei and North Pacific Right Whales via necropsy, incident investigation and gear recovery, when possible; and d) continue to analyse Pacific MMRP data and identify the sources and locations of human-caused injury or mortality when possible, and further knowledge on the demographics of affected animals, as well as frequency and seasonality of such occurrences in British Columbia.			
Approach: Assess the frequency, severity and type of vessel strikes.				
6	Photograph whales during surveys conducted in conjunction with Measure #1, and examine photographs for evidence of vessel strikes (e.g. wounds, propeller scars).	High	Vessel strikes	Ongoing
7	Identify areas of high risk of interactions through the continued development of spatial analysis of potential whale distribution with respect to ship traffic data.	High	Vessel strikes	F - 2017 (and continuing thereafter); B, S, NPR - Uncertain
Approach: Investigate techniques to reduce the occurrence of vessel strikes.				
8	After review of mitigation measures that have been effective in other jurisdictions, and appropriate laws and infrastructure needed to enable changes in shipping operations, engage in discussions with other agencies about techniques to reduce the occurrence of vessel strikes.	High	Vessel strikes	2022, if changes are required based on Measure #7
Approach: Investigate measures to protect against potential adverse impacts on whales from exposure to acute or chronic anthropogenic noise.				
9	Continue to review applications for projects that involve production of noise (e.g. geophysical surveys; potential oil and gas exploration and extraction; coastal development; industrial activities) and provide activity-specific requirements for monitoring and mitigation.	High	Noise	Ongoing
10	Collaborate with DND in the review of the *Marine Mammal Mitigation Procedures* policy (DND 2008), to reduce impacts to these whales.	High	Noise	2017

11	Review and improve as necessary, mitigation strategies for the use of seismic sound in marine environments (e.g. *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment* (DFO 2007)).	Medium	Noise	Ongoing
Approach: Collect information on the frequency, severity, and type of fishing gear entanglements.				
12	Photograph whales during surveys conducted in conjunction with Measure #1, and examine photographs for evidence of entanglement.	Medium	Entanglement	Ongoing
13	Continue development of spatial analysis of whale distribution with respect to fishing effort, derelict gear and/or entanglement data, to identify areas of high risk of interactions.	Medium	Entanglement	F - 2017 (and continuing thereafter); B, S, NPR - Uncertain
Approach: Investigate measures to reduce the occurrence of fishing gear entanglements.				
14	Collaborate on the review, development, and implementation of adaptive management options designed to reduce the occurrence of entanglements.	Low	Entanglement	2022, if adaptive management options are required based on Measure #5d
Approach: Assess the extent of threats from chronic and acute sources, and the effects, of chemical and biological pollution. Compare with results found in other species and other areas.				
15	Monitor and analyse the indicators of stress and animal health in Blue, Fin, Sei and North Pacific Right Whales (e.g. through photo-identification, and biopsy and fecal sampling conducted in conjunction with Measure #1). Analyse biopsy and fecal samples for identity and sources of contaminants and biological pollutants.	Medium	Pollution	B, F - 2022 (and continuing thereafter); S, NPR - Uncertain
Approach: Reduce impacts from chronic and acute pollution.				
16	Review proposals and recommend mitigation measures in the context of	Low	Pollution	Ongoing

	risk to Blue, Fin, Sei and North Pacific Right Whales to pollution exposure.			
17	Collaborate on the development and implementation of pollution response plans for marine mammals, and include Blue, Fin, Sei and North Pacific Right Whales.	Low	Pollution	2017
	Approach: Minimize direct or indirect anthropogenic interaction with and disturbance of Blue, Fin, Sei and North Pacific Right Whales.			
18	Promote and distribute marine mammal viewing guidelines and enforce Marine Mammal Regulations against disturbance. Revise guidelines as necessary to incorporate relevant findings from new research.	Low	Vessel strikes; noise; disturbance due to vessel presence	Ongoing

It is important to note that Measures 1, 4, 6, 12, and 15 in Table 1 can be undertaken concurrently on a dedicated research vessel, thus maximizing the use of time and resources, and achieving significant efficiencies in the implementation of the set of measures as a whole.

As well, a number of measures that utilize the same technique appear under more than one Broad Strategy or Approach. For example, photography is used to achieve measures 1a, 6, 12, and 15. The multiple benefits stemming from a single technique add value to that given technique, and those complementary measures.

Table 2. Recovery measures that could be taken voluntarily by other agencies, organizations and individuals who wish to contribute to the recovery of Blue, Fin, Sei and North Pacific Right Whales in Canadian Pacific waters.

Measure #	Recovery Measures	Priority[3]	Threats or Concerns Addressed
Broad Strategy: Determine the population identities and structure, abundance, seasonal and interannual distribution, extent of migrations, and current and potential habitat use of Blue, Fin, Sei and North Pacific Right Whales that occur in Canadian Pacific waters.			
19	Supplement DFO's efforts by undertaking systematic surveys – including offshore areas – on aerial or ship-board platforms, to advance efforts to estimate abundance and determine coast-wide distributions in association with habitat characteristics. Use ship-board surveys to efficiently advance the following efforts: a) Determine abundance, investigate seasonal and interannual site fidelity and movement patterns of individuals using photo identification techniques, and identify populations and their distributions by comparing photographs of individuals in Canadian Pacific waters to photographs taken in other areas of the North Pacific; b) Assess distribution and movement patterns, and investigate seasonal and interannual site fidelity using telemetry studies (e.g. satellite-linked tags), also helping to direct survey efforts; and c) Determine population identities using DNA analysis (e.g. from skin biopsies), and apply genetic and chemical methods to biopsies and fecal samples in order to investigate diet and habitat use.	High	Knowledge Gaps
20	Use predictive modeling of prey distributions to identify potential whale distribution and within-season movements, and to help direct DFO's and others' survey efforts.	Medium	Knowledge Gaps
21	Develop analytical approaches to determine optimal coast-wide distribution of passive acoustic	Medium	Knowledge Gaps

[3] "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 those most likely to have an immediate and/or direct influence on attaining the recovery objective for species. Medium priority measures may have a less immediate or less direct influence on reaching the recovery population and distribution objectives, but are still important for recovery of the population. Low priority recovery measures will likely have an indirect or gradual influence on reaching the recovery objectives, but are considered important contributions to the knowledge base and/or public involvement and awareness of species.

	monitoring devices. Subsequently support the expansion of, or deploy equipment to complement, DFO's acoustic monitoring system, to further investigate seasonal and interannual distribution throughout Canadian Pacific waters.		
22	Develop analytical methods to estimate relative abundance from acoustic data collected by DFO's passive acoustic monitoring network.	Medium	Knowledge Gaps
Broad Strategy: Mitigate threats so they do not significantly reduce current or potential habitat, or distribution of Blue, Fin, Sei and North Pacific Right Whales in Canadian Pacific waters. This also serves to promote the reoccupation of historical habitat of these species in Canadian Pacific waters.			
Approach: Identify and assess the magnitude of threats through information compiled by Fisheries and Oceans Canada's Pacific Marine Mammal Response Program (Pacific MMRP).			
23	Support DFO's Pacific MMRP to: a) continue to solicit and collect data on incidents involving Blue, Fin, Sei and North Pacific Right Whales in Canadian Pacific waters (e.g. live strandings; dead, sick or injured animals; entanglements; vessel strikes); b) continue to develop, train, and equip response teams to attend to Blue, Fin, Sei and North Pacific Right Whales found in distress, and provide assistance (e.g. attempt to disentangle), where feasible; c) continue to determine the cause of death of recovered Blue, Fin, Sei and North Pacific Right Whales via necropsy, incident investigation and gear recovery, when possible; and d) continue to analyse Pacific MMRP data and encourage international cooperation to identify the sources and locations of human-caused injury or mortality when possible, and further knowledge on the demographics of affected animals, as well as frequency and seasonality of such occurrences in British Columbia.	High	Vessel strikes; entanglement; pollution
Approach: Determine the potential for adverse impacts of anthropogenic noise on whales.			
24	Use area- and time-specific acoustic propagation models to better determine levels of sound exposure, in relation to current and potential whale distribution.	Medium	Noise
25	Use passive acoustic monitoring data to better characterize the underwater soundscape, and noise trends over time, in whale habitat.	Medium	Noise

	Approach: Investigate measures to protect against potential adverse impacts on whales from exposure to acute or chronic anthropogenic noise.		
26	Assess the potential impacts of new and emerging acoustic technologies on these whales, and develop mitigation measures as necessary.	Medium	Noise
27	Develop techniques to mitigate exposure to anthropogenic noise.	Low	Noise
	Approach: Assess the extent of threats from chronic and acute sources, and the effects of chemical and biological pollution. Compare with results found in other species and other areas.		
28	Identify sources of chemical or biological pollutants affecting whales.	Low	Pollution
	Approach: Reduce impacts of chronic and acute chemical and biological pollution.		
29	Develop and implement prevention and mitigation measures to reduce the impacts of pollution on Blue, Fin, Sei and North Pacific Right Whales.	Low	Pollution

1.3 Critical Habitat

1.3.1 Identification of the species' critical habitat

Critical habitat identification for Blue, Fin, Sei and North Pacific Right Whales is beyond the scope of this action plan, because information is insufficient to be able to identify it at this time (DFO 2012). Identification of critical habitat to meet the population and distribution objectives will be addressed in a later iteration of the action plan or an amended recovery strategy.

Section 9.4.1 of the Blue, Fin and Sei Whale Recovery Strategy (Gregr *et al.* 2006) gives a schedule of studies necessary to complete the identification of critical habitat for Blue, Fin and Sei Whales. Section 2.7.2 of the North Pacific Right Whale Recovery Strategy (DFO 2011) gives a schedule of studies necessary to complete the identification for North Pacific Right Whales. A more recent document (DFO 2012) provides further and updated advice on identifying critical habitat. Research identified in these documents is continued and complemented by the measures outlined in Table 1 and 2 of this action plan.

The challenge associated with characterizing critical habitat(s) for these species is largely a function of the vast size and offshore extent of their potential habitat. Despite conducting nearly 40,000km of survey effort over the past 10 years, and deploying remote acoustic monitoring stations to record whale calls, resources have limited most of the effort to continental shelf waters (Ford *et al*. 2010; Nichol and Ford 2012). The distribution of historical whaling catch indicates that fewer than 20% of the whales were encountered on the continental shelf (Gregr *et al*. 2000; see Figs 5, 9 and 10 in Nichol and Ford 2012).

Recent observations have been largely limited to on-shelf waters. Fin Whales have been observed most frequently of the four species. Their presence on the continental shelf of Canadian Pacific waters represents a portion of their habitat and population. Some modeling of Fin Whale distribution and occurrence has been done; whether these modeled areas are critical to life history is unknown. Research is underway to examine fine-scale movements, and seasonal and interannual patterns of habitat use.

Blue and Sei Whales have been sighted extremely rarely in Canadian Pacific waters since their protection from commercial whaling. Without a better idea of their local distribution and abundance, the definition of critical habitat for Blue and Sei Whales will likely be a difficult and lengthy process (DFO 2012). With only two recent sightings in Canadian Pacific waters since 1951, addressing critical habitat for the North Pacific Right Whale will potentially pose the greatest challenge.

Considering the difficulty of systematically surveying and gathering data from very large and often distant areas, this action plan largely focuses on efforts to fill knowledge gaps and facilitate recovery of these species.

2. Evaluation of Socio-Economic Costs and of Benefits

The *Species at Risk Act* requires that an action plan include an evaluation of its socio-economic costs, and the benefits to be derived from its implementation (SARA 49(1)(e), 2003). 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 organizations or agents other than of the federal government may be better placed for implementation of certain aspects of this action plan. The intent of this evaluation 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 2003). 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.

Benefits

The impacts of the recovery actions in this action plan on Blue, Fin, Sei and North Pacific Right 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)[4]. Activities that positively affect the recovery of these species may result in positive benefits to Canadians.

The recovery actions are also likely to provide broader benefits as some of the threats to these whales 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 includes a number of ongoing programs and activities that are not species-specific, such as the Pacific Marine Mammal Response Program (MMRP) and the British

[4] 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).

Columbia Cetacean Sightings Network (BCCSN). These programs and activities provide assistance to, and information on, numerous species. As well, ocean research surveys generally collect information on various marine mammals, sea turtles and other species of interest when encountered, if feasible and appropriate. In particular, Killer Whales and Humpback Whales may benefit from the research activities in this plan. Consequently, many of the activities identified in this action plan will have positive impacts on species in addition to the four whale species that are the focus of this action plan.

Costs

Two sets of actions are presented, those for which DFO will lead (Table 1) and those actions that may be undertaken voluntarily by other jurisdictions, groups or individuals (Table 2). While it is recognized that the actions in Table 2 are important to the recovery of the species, the level of uncertainty in terms of project specifics, participants and timelines means that they could not be included in this analysis. In addition, costs could not be assessed for those components of actions in Table 1 that address implementation of new or improved measures, options, plans or strategies, since information is not available on what these would involve. While the full costs associated with this plan cannot be assessed, cost estimates are available for many of the actions in Table 1 for which DFO has committed to.

Most of the actions in Table 1 will result in some level of annual cost over the anticipated timeframe for the plan (i.e. greater than 20 years). Approximately 8% of the identified costs are associated with actions that would be completed in the short-term (2015), 5% are for actions to be completed in the medium-term (2021) and 4% are for actions to be completed in the medium-long term (2031). The remainder of the costs (approximately 83%) have no 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. The elusive nature of these whale species and their generally remote distribution results in moderate research costs, however the annual costs remain low on a national scale[5]. In addition, minimal costs would be associated with activities: to develop strategies to reduce threats; for collaboration, cooperation and engagement with domestic and international partners; for education; for stewardship; for monitoring and assessment; and for compliance promotion and enforcement. Likely funding sources for these activities include existing federal resources, as well as supplemental funds from annual programs such as the Habitat Stewardship Program (HSP). Supplemental funding from unspecified collaborators and partners may also be possible.

While DFO is identified as the lead for the activities analyzed, a number of potential partners and collaborators were identified and/or have participated in similar activities in

[5] 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.

the past. These partners include other federal departments and agencies, environmental organizations, academic institutions and programs, First Nations and other national governments. Such activities may result in in-kind support from partners and collaborators in terms of staff time and resources for discussion, meetings and research. It is anticipated that education and stewardship activities would be funded from existing government sources, with the possibility of in-kind and financial support from partners. The development of strategies to reduce threats is closely linked to cooperation and engagement activities, with a number of partners providing in-kind support for meetings and discussions. Monitoring and assessment activities occur as part of the review of activities proposed by proponents, and may include in-kind support from government partners. Compliance promotion and enforcement activities would be funded through a re-allocation of existing government funds and may include in-kind support from environmental organizations.

3. Measuring Progress

The performance indicators presented in the associated recovery strategies provide a way to define and measure progress toward achieving the population and distribution objectives. Methods to monitor the recovery of the species, including monitoring its population and distribution, are outlined in Table 1, particularly Measure 1.

Reporting on implementation of this 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 their long term viability, and by assessing the implementation of the action plan.

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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 (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 clearly benefit the environment by promoting the recovery of Blue, Fin, Sei, and North Pacific Right Whales, thereby positively contributing to Goal 5 (Wildlife Conservation) of the FSDS. Because of shared threats, and similar techniques used to fill knowledge gaps and complement existing knowledge, the majority of actions contained in this plan can also benefit other marine mammal and sea turtle species, and recovery planning initiatives for those that are species at risk. Maintaining biodiversity within Canadian Pacific waters helps to encourage the resiliency of various North Pacific Ocean ecosystems. As such, the action plan also positively contributes to the FSDS' Goal 6 (Ecosystem/Habitat Conservation and Protection).

The potential for the action plan to inadvertently lead to adverse effects on the environment and other species was considered. The SEA concluded that this plan will benefit the environment and other species, and will not entail any significant adverse effects. The benefits stemming from the use of airplanes and ships to perform research outweigh the relatively small negative impacts that action plan-specific use of those research platforms have on air pollution (FSDS Goal 2), water quality (FSDS Goal 3), anthropogenic noise and disturbance due to vessel presence.

Appendix B: Record of Cooperation and Consultation

Blue, Fin, Sei and North Pacific Right Whales were respectively listed as Endangered (2005), Threatened (2006), Endangered (2005) and Endangered (2006) under SARA. As these whales occupy territorial waters off the coast of British Columbia, and have either been seen in or could possibly occupy waters administered by the Parks Canada Agency, the Minister of Fisheries and Oceans, and the Minister responsible for the Parks Canada Agency are the competent ministers for these species according to SARA. DFO therefore established a small internal working group of technical experts to develop the draft of this action plan, including individuals from Parks Canada Agency and Environment and Climate Change Canada. See Appendix C of this document for a list of Technical Team members.

On initiation of the development of the draft action plan, letters were sent out to all coastal First Nations soliciting participation in the action plan's development. The initial draft of the action plan was sent to the Canadian Coast Guard, Department of National Defence, Environment and Climate Change Canada, Natural Resources Canada, Parks Canada Agency, Transport Canada, the Province of British Columbia, and the U.S. National Oceanographic and Atmospheric Administration for review and comment.

The draft action plan was posted to the DFO Pacific Region Consultation website (http://www.pac.dfo-mpo.gc.ca/consultation/sara-lep/cal-fra.html) for a public comment period from April 17 – May 17, 2013. A draft of the action plan, along with a discussion guide and feedback form, was made available on the website. The consultation was primarily web-based, and included mail-outs of hard copy letters, emails and faxes to Wildlife Management Boards, Joint Fisheries Committees and all coastal First Nations, soliciting input and feedback on the draft action plan, as well offering bilateral meetings as required. Notification was also sent by electronic mail to a distribution list of stakeholders and environmental non-government organizations (ENGOs), to former Action Planning Team members, and government agencies who had been involved in prior review.

Six feedback forms were received, including comments from academic and ENGO representatives, and secondary school students. Four letters were received, containing feedback from First Nations, ENGO and industry representatives. Feedback largely followed these themes: strengthening existing actions and including suggestions of new actions, particularly around anthropogenic noise and vessel strikes; expanding the set of actions and identifying critical habitat, specifically for Fin Whales; tightening timelines for some actions; increasing public engagement in the recovery of the species; clarifying parts of the socio-economic analysis; encouraging coordination of efforts and collaboration; and offering contributions to the implementation of the action plan.

The proposed version of the action plan was posted to the Public Consultation page on the Species at Risk Public Registry website for a final comment period from June 15 – August 14, 2016, where Canadians were invited to provide feedback on the document by letter or email. Wildlife Management Boards, Joint Fisheries Committees, all coastal

First Nations, stakeholders, ENGOs, and those involved in the development and review of prior drafts of the action plan were directly notified of this consultation in advance of the comment period.

Three submissions were received during the final comment period, including comments from a citizen, and ENGO and industry representatives. Feedback was largely supportive of the proposed Action Plan, and offered: suggestions to strengthen existing actions; additional information around the threat of changes in foraging habitat; and support in the implementation of recovery measures.

Where appropriate, feedback received during the above noted consultation periods has been incorporated into the action plan.

Appendix C: Teams Contributing to Drafts of This Action Plan

2012 – 2013 Large Whale Action Plan Technical Team:

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2006 – 2008 Action Planning Team:

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