

Action Plan for the Leatherback Sea Turtle (*Dermochelys coriacea*) in Canada (Pacific population)

Leatherback Sea Turtle



2019

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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 Leatherback Sea Turtle 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 Canada 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 and 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 Leatherback Sea Turtle 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 (DFO). The development of the action plan was the result of collaborative efforts and contributions from many individuals and organizations. The Leatherback Sea Turtle action plan team (Appendix B) compiled the contributions from the technical workshop (November 3rd and 4th, 2011) and the Canadian Science Advisory Secretariat (CSAS) assessment process on “Information relevant to the identification of critical habitat for Leatherback Sea Turtles (*Dermochelys coriacea*) in Canadian Pacific waters” (Gregg et al. 2015).

Executive summary

The Leatherback Sea Turtle (*Dermochelys coriacea*) was listed as Endangered 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, the recovery strategy, and the progress report on the recovery strategy. This document is considered a partial action plan because current best available information is insufficient to identify critical habitat (DFO 2014). Identification of the habitat necessary to support survival and recovery of the species may be addressed in an amendment to the recovery strategy at a later date.

The Leatherback Sea Turtle is the largest of the seven extant species of marine turtles, and is the sole living member of the family *Dermochelyidae*. The leatherback can easily be differentiated from other modern sea turtles, as it lacks a hard shell. The carapace is instead composed of a leathery, slightly flexible, fibrous tissue embedded with tiny bones (osteoderms). The carapace is teardrop shaped and has seven conspicuous longitudinal ridges. It is dark bluish-black, and the carapace, neck, head and front flippers are often covered with white, or bluish-white, blotches.

Leatherbacks are found in the tropical and temperate waters of the Atlantic, Pacific and Indian oceans, with a range extending from approximately 71°N to approximately 47°S. The Pacific population of Leatherback Sea Turtles has experienced particularly precipitous declines over the last two decades, with recent estimates indicating that 90% of the breeding females have been lost from the population (COSEWIC 2012). Major worldwide threats include: fisheries bycatch, legal and illegal harvest of eggs and nesting females, vessel strikes, ecosystem alteration (beach erosion and accretion), pollution (light pollution, marine debris, oil pollution), construction and development affecting nesting beaches.

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 population and distribution objectives for the Leatherback Sea Turtle (previously referred to as recovery goals and objectives) were utilized to form the following broad strategies for recovery:

1. conduct and support research that makes possible the development of measurable recovery criteria, within five years, for leatherback turtle population(s) that frequent Canadian Pacific waters
2. identify and understand threats to the leatherback turtle and its habitat resulting from human activities in Canadian Pacific waters
3. mitigate human-caused threats to leatherback turtles in Canadian Pacific waters and protect their critical migratory and foraging habitats
4. support the efforts of other countries to promote the recovery of the leatherback turtle population(s) that frequent Canadian Pacific waters
5. raise awareness of Pacific leatherbacks and engage Canadians in stewardship projects

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1. Recovery actions

1.1 Context and scope of the action plan

The Leatherback Sea Turtle (*Dermochelys coriacea*) was listed as Endangered under the Species at Risk Act (SARA) in 2003. Leatherback Sea Turtles were originally considered as a single unit by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). COSEWIC re-examined the species' status in May 2012 and, based on data indicating that the Atlantic and Pacific populations are discrete and evolutionarily significant, the population was split into two designatable units. Both populations retained the Endangered status.

This action plan is part of a series of documents regarding the Leatherback Sea Turtle, including the [COSEWIC status report](#) (COSEWIC 2012), the [recovery strategy](#) (DFO PLTRT 2007) and the [progress report](#) on recovery strategy implementation (DFO 2015) that should be taken into consideration together. Under SARA, an action plan provides the detailed recovery measures that support the strategic direction set out in a recovery strategy for the species. A recovery strategy also provides background information on the species and the threats to recovery.

The Leatherback Sea Turtle is the largest of the seven extant species of marine turtles, and is the sole living member of the family *Dermochelyidae*. The leatherback has a shell covered by a leathery, slightly flexible, fibrous tissue embedded with tiny bones (osteoderms). The carapace is teardrop shaped and has seven conspicuous longitudinal ridges. It is dark bluish-black, and the carapace, neck, head and front flippers are often covered with white, or bluish-white, blotches. The plastron is pinkish-white. Adults have a distinct pink spot on the top of the head. Adult Leatherback Sea Turtles attain a straight line carapace length of over 2 m, and a mass of 900 kg.

The Leatherback Sea Turtle is found in the tropical and temperate waters of the Atlantic, Pacific and Indian oceans, with a range extending from approximately 71°N to approximately 47°S. The species usually nests at tropical latitudes on Caribbean and the Indo-Pacific islands, and along the shores of every continent except Europe and Antarctica.

There are two nesting populations of Pacific leatherbacks: one in the eastern Pacific, including beaches in Mexico and Costa Rica; and the other in the Western Pacific, utilizing beaches in the Solomon Islands, Malaysia, Papua New Guinea, Vanuatu and Indonesia. Individuals found in Canadian Pacific waters are believed to originate from the Western Pacific nesting population; therefore, this action plan focuses on the Western Pacific nesting population.

The majority of the adult life of the leatherback is spent in the marine environment. Foraging areas with high jellyfish biomass are critical for meeting the energy requirements of this endangered species. The coastal Pacific waters frequented by this species provide such foraging opportunities and are not only important to the survival of the individual, but also provide vital support for the recovery of the nesting populations.

The Pacific population of Leatherback Sea Turtles has experienced particularly precipitous declines over the last two decades, with recent estimates indicating that 90% of the breeding females have been lost from the population (COSEWIC 2012). Major worldwide threats include: fisheries bycatch, legal and illegal harvest of eggs and nesting females, vessel strikes, ecosystem alteration (beach erosion and accretion), pollution (light pollution, marine debris, oil pollution), and construction and development (beach armoring, beach sand placement, coastal

construction, dredging, oil and gas activities). Climate change and resulting loss of suitable nesting habitat and illegal poaching of eggs and nesting females are serious threats. Within Canadian Pacific waters, threats may exist from entanglement in both long-line and fixed-gear fisheries, marine debris, and offshore oil and gas production.

The recovery strategy defined the recovery goal for this species as follows:

The goal of this recovery strategy is the long-term viability of the leatherback turtle population(s) that frequent Canadian Pacific waters.

This action plan outlines the actions required to achieve the population and distribution objectives for the Leatherback Sea Turtle (Pacific population), and should be considered along with the Recovery Strategy for Leatherback Turtles (*Dermochelys coriacea*) in Pacific Canadian Waters (DFO PLTRT 2007). The recovery strategy provides the strategic direction and approaches for recovery of Leatherback Sea Turtles (Pacific population), background information on the species, and potential threats to the population and individuals. It also identifies the following objectives to guide the actions for recovery:

1. conduct and support research that makes possible the development of measurable recovery criteria, within five years¹, for leatherback turtle population(s) that frequent Canadian Pacific waters
2. identify and understand threats to the leatherback turtle and its habitat resulting from human activities in Canadian Pacific waters
3. mitigate human-caused threats to leatherback turtles in Canadian Pacific waters and protect their critical migratory and foraging habitats
4. support the efforts of other countries to promote the recovery of the leatherback turtle population(s) that frequent Canadian Pacific waters
5. raise awareness of Pacific leatherbacks and engage Canadians in stewardship projects

These objectives identified in the recovery strategy have been re-termed as broad strategies in this action plan. The recovery measures and broad strategies presented in this action plan support the recovery of the Leatherback Sea Turtle (Pacific population).

Under section 47 of SARA, the competent minister must prepare one or more action plans based on the recovery strategy. Therefore, action planning for species at risk recovery is an iterative process. The implementation schedule in this action plan may be modified in the future depending on progress towards recovery.

¹ This timeline refers to five years from the posting of the recovery strategy, which was published on the Species at Risk Registry in 2006.

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 Leatherback Sea Turtle, 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 Leatherback Sea Turtle through undertaking measures outlined in this action plan. Fisheries and Oceans Canada recognizes the important role of the recovery team for the Leatherback Sea Turtle and its member organizations and agencies in the implementation of measures for this species.

Table 1 identifies the measures to be undertaken by Fisheries and Oceans Canada to support the recovery of the Leatherback Sea Turtle. 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] office at sara@pac.dfo-mpo.gc.ca.

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

Broad strategies and approaches

Broad strategy 1: conduct and support research required to develop measurable recovery criteria, within five years, for Leatherback Sea Turtle populations that frequent Canadian Pacific waters

- Approach 1-1: conduct research in Canada to identify habitat important to the recovery of Leatherback Sea Turtles in Pacific waters.
- Approach: 1-2: contribute to and collaborate with projects on Leatherback Sea Turtles that are found in Canadian Pacific waters.
- Approach 1-3: contribute to projects on demographic parameters for the Leatherback Sea Turtle in order to predict the effectiveness of recovery measures.
- Approach 1-4: contribute to projects on the basic biology, physiology and behaviour of the Leatherback Sea Turtle.

Broad strategy 2: identify and understand threats to the leatherback turtle and its habitat resulting from human activities in Canadian Pacific waters.

- Approach 2-1: synthesize existing data on activities that potentially harm Leatherback Sea Turtles that frequent Canadian Pacific waters.

- Approach 2-2: implement programs to collect information on Leatherback Sea Turtle sightings in Canadian Pacific waters.

Broad strategy 3: mitigate human-caused threats to leatherback turtles in Canadian Pacific waters and protect their critical migratory and foraging habitats

- Approach 3-1: support mitigation measures to reduce identified threats to Leatherback Sea Turtles that use Canadian Pacific waters.
- Approach 3-2: develop and implement recovery procedures for strandings and/or entanglements, and, as appropriate, other emergency planning and response procedures (for example, spill response).
- Approach 3-3: Develop a protocol for disentanglement and a SARA permit/exception/exemption to allow fishers to legally disentangle Leatherback Sea Turtles.

Broad strategy 4: support the efforts of other countries to promote the recovery of the Leatherback Sea Turtle population(s) that frequent Canadian Pacific waters

- Approach 4-1: explore opportunities to participate in International efforts for the protection and recovery of the Leatherback Sea Turtle
- Approach 4-2: initiate agreements and collaborative projects with countries that share populations of Leatherback Sea Turtles that frequent Canadian Pacific waters

Broad strategy 5: raise awareness of Leatherback Sea Turtles (Pacific population) and engage Canadians in stewardship projects that support Leatherback Sea Turtle recovery in Canada

- Approach 5-1: develop a public awareness campaign on the Leatherback Sea Turtle that covers identification, ecology, threats, Canadian recovery efforts, and what individuals can do to minimize threats at home or abroad

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

#	Recovery measures	Broad strategy-approach	Priority ²	Threats or objective addressed	Timeline ³
1	Support and encourage reporting of and response to Leatherback Sea Turtle sightings and strandings through the Marine Mammal Response Program (MMRP)	2-2	High	Knowledge gaps - survey requirements; biological/ecological research; accidental capture and entanglement; ingestion of debris; collisions with boats	Ongoing
2	Develop a protocol for disentanglement and a SARA permit/exception/exemption to allow fishers to legally disentangle Leatherback Sea Turtles	3-3	High	Accidental capture and entanglement	3 years
3	Ensure that leatherback threat mitigation is incorporated into integrated fisheries management plans (IFMPs) and integrated management of aquaculture plans (IMAPs) where appropriate	5-1	High	Accidental capture and entanglement; collisions with boats; aquaculture	5 years
4	Develop information on turtle identification and reporting protocol for inclusion in the British Columbia tidal waters sport fishing guide	5-1	High	Knowledge gaps - survey requirements, raise awareness	5 years

* Note: the measures identified in table 1 apply to broad strategies # 2, 3, & 5

² "Priority" reflects the degree to which the measure contributes directly to the recovery of the species or is an essential precursor to a measure 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

³ "Timeline" is the timeframe from posting of the final document in which the measure will be accomplished. A timeline listed as "ongoing" indicates the importance that the measure be conducted regularly through the foreseeable future; "unknown" means that the current paucity or complete lack of data for a given species does not allow us to state a certain timeline at this point; "uncertain" indicates that the measure is led by a 3rd party and timelines have not yet been determined.

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

#	Recovery measures	Broad strategy-approach	Priority ⁴	Threats or objective addressed	Timeline (short, medium or long term)	Partner(s)
5	Undertake semi-annual jellyfish surveys to identify temporal and spatial distribution of medusae in Canadian Pacific waters	1-1	Medium	Knowledge gaps - biological/ecological research	Ongoing; semi-annual	Academia; industry
6	Model suitable habitat that would support Leatherback Sea Turtle foraging in Pacific waters	1-1	Medium	Knowledge gaps - biological/ecological research, critical habitat	2 years	Academia; other governments
7	Use the data from jellyfish surveys to revise the model predicting suitable Leatherback Sea Turtle foraging habitat	1-1	Medium	Knowledge gaps - biological/ecological research, critical habitat	3 years	Academia
8	Investigate means of evaluating the habitat model with Leatherback Sea Turtle sightings data	1-1	Medium	Knowledge gaps - biological/ecological research, critical habitat	5 years	Academia
9	Document the inter-annual variability of jellyfish abundance, biomass and distribution	1-1	Medium	Knowledge gaps - biological/ecological research	3 years	Academia; other governments
10	Undertake analysis of jellyfish as a forage species through caloric and nutritional assessment	1-1	Medium	Knowledge gaps - biological/ecological research	5 years	Academia

⁴ Priority" reflects the degree to which the measure contributes directly to the recovery of the species or is an essential precursor to a measure 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	Broad strategy-approach	Priority ⁴	Threats or objective addressed	Timeline (short, medium or long term)	Partner(s)
11	Enhance existing effort for Leatherback Sea Turtle sightings from on-water surveys	1-2	Medium	Knowledge gaps - survey requirements: biological/ecological research	Ongoing; annual	Other agencies; academia; ENGOs
12	Enhance existing effort for Leatherback Sea Turtle sightings from aerial surveys	1-2	Medium	Knowledge gaps - survey requirements; biological/ecological research	Ongoing; annual	Other agencies
13	Contribute to Leatherback Sea Turtle monitoring and census efforts at the nesting beaches	1-3	High	Knowledge gaps - survey requirements; biological/ecological research	Ongoing, biennial	Other agencies; academia
14	Support direct attachment of satellite tags to confirm migratory routes and timing of arrival on and departure from foraging grounds within and outside Canadian waters	1-4	Medium	Knowledge gaps - survey requirements; biological/ecological research	Opportunistic	Other agencies; academia
15	Identify the threats in the inter-nesting habitat of the Pacific Leatherback Sea Turtle population (for example, accidental entanglements and incidental catch)	2-1	High	Accidental capture or entanglement; ingestion of debris; collision with boats; directed fishery on adults and juveniles	5 years	Other agencies; academia
16	Identify fishing practices that may affect Leatherback Sea Turtles along the migratory route between nesting beaches and foraging areas	2-1	High	Directed fishery on adults and juveniles; harvest of eggs; increased human presence on nesting beach	5 years	Other agencies; academia

#	Recovery measures	Broad strategy-approach	Priority ⁴	Threats or objective addressed	Timeline (short, medium or long term)	Partner(s)
17	Assess fishing pressure and gear type in important foraging habitat areas throughout the range of Pacific Leatherback Sea Turtles	2-1	High	Accidental capture or entanglement; ingestion of debris; collision with boats	5 years	Other agencies; academia
18	Develop and distribute material to increase awareness of Leatherback Sea Turtles in Pacific waters and to encourage timely reporting of sightings	2-2	High	Accidental capture or entanglement; ingestion of debris; collision with boats; knowledge gaps - survey requirements	3 years	ENGOS; academia
19	Develop tissue collection protocol for Leatherback Sea Turtle strandings	2-2	High	Accidental capture or entanglement; ingestion of debris; collision with boats	1 year	Other agencies; ENGOS
20	Support necropsies and attendance at strandings to identify threats and life history of Leatherback Sea Turtles	2-2	High	Knowledge gaps - biological/ecological research	Ongoing	Other agencies; ENGOS
21	Obtain passive integrated tag scanners for Leatherback Sea Turtle strandings	2-2	Medium	Accidental capture or entanglement; ingestion of debris; collision with boats	2 years	Other agencies
22	Encourage communities to undertake regular patrols in areas identified as having a higher probability of strandings	2-2	Medium	Accidental capture or entanglement; ingestion of debris; collision with boats	5 years; ongoing	ENGOS
23	Consider Leatherback Sea Turtles and their prey in environmental assessments of projects and developments in Canadian Pacific waters	3-1	High	Accidental capture or entanglement; ingestion of debris; collision with boats	5 years	Other agencies; stakeholders

#	Recovery measures	Broad strategy-approach	Priority ⁴	Threats or objective addressed	Timeline (short, medium or long term)	Partner(s)
24	Develop educational material directed to stakeholders and fishers detailing the impact of derelict gear, ocean debris on Leatherback Sea Turtles, and mitigation measures for fishery interactions (for example, circle hooks, dehookers, turtle excluder devices)	3-1	High	Accidental capture and entanglement; ingestion of debris; collisions with boats; fisheries on adults and juveniles; harvest of eggs	3 years	ENGOS; other agencies
25	Work with international regulatory agencies to encourage implementation of mitigation measures in the industrial long line fishery to reduce impact on Leatherback Sea Turtles (for example, gear modifications, circle hooks, dehookers, disentanglement protocols)	3-1	High	Accidental capture and entanglement; collisions with boats; fisheries on adults and juveniles	Ongoing	Other agencies
26	Identify the effects of contaminants and dispersants on Leatherback Sea Turtles	3-2	High	Ingestion of debris; pollution and contamination	2 years	Academia; ENGOS
27	Ensure Leatherback Sea Turtles and their prey are considered in existing and upcoming spill response plans, including effects of dispersants	3-2	High	Ingestion of debris; pollution and contamination	3 years; ongoing	Other agencies
28	Develop an educational package that outlines activities to protect and recover Leatherback Sea Turtles for use in schools in nesting beach communities	4-1	High	Ingestion of debris; contamination and pollution	5 years	ENGOS
29	Assist local communities in protecting the nesting beaches from local threats, such as predation by dogs and feral pigs, development impacts, and habitat degradation	4-1	High	Harvest of eggs; predation and parasitism; increased human presence on nesting beach; habitat loss	Ongoing	ENGOS; other agencies; academia

#	Recovery measures	Broad strategy-approach	Priority ⁴	Threats or objective addressed	Timeline (short, medium or long term)	Partner(s)
30	Support actions to decrease threats to Leatherback Sea Turtles during migration and foraging (for example, development and use of mitigation measures for incidental catch, entanglement)	4-1	Medium	Accidental capture and entanglement; ingestion of debris; pollution and contamination; knowledge gaps - survey requirements; biological/ecological research	5 years; ongoing	ENGOS; other agencies
31	Support protection programs to counter the illegal harvest and distribution of Leatherback Sea Turtles and their eggs (for example, community stewardship initiatives, beach patrols, CITES)	4-1	Medium	Harvest of eggs; fisheries on adults and juveniles; increased human presence	5 years	Other agencies; ENGOS
32	Support government-led nesting beach protection efforts in Indonesia and other Leatherback Sea Turtle nesting locations	4-2	High	Nesting environment - harvest of eggs; nest predation and parasitism; increased human presence; contamination and pollution	5 years; ongoing	Other agencies; academia
33	Make use of existing bilateral and multilateral funding programs to support collaborative research, training, and awareness, including community participation in leatherback recovery	4-2	High	Knowledge gaps - survey requirements; biological/ecological research requirements	5 years	Other agencies; ENGOS
34	Contribute to the Leatherback Sea Turtle satellite tagging effort in the Pacific Northwest	4-2	Medium	Knowledge gaps - survey requirements; biological/ecological research requirements	5 years; ongoing	Other agencies

#	Recovery measures	Broad strategy-approach	Priority ⁴	Threats or objective addressed	Timeline (short, medium or long term)	Partner(s)
35	Provide Canadian expertise and other support to protect nesting Leatherback Sea Turtles, their eggs, and nesting beaches (for example, public education, law enforcement, monitoring of coastal construction, alteration/reduction of artificial lighting, measures to improve hatching success)	4-2	Medium	Nesting environment - harvest of eggs; nest predation and parasitism; increased human presence; contamination and pollution	Ongoing	Other agencies
36	Continue to work with BC Cetaceans Sightings Network and expand outreach activities involving Leatherback Sea Turtles	5-1	High	Knowledge gaps - survey requirements; biological/ecological research requirements	Ongoing; 1 year	ENGOS
37	Develop and distribute an education and awareness package for the general public for use in schools and at public events (for example, dockside interpretive programming, boat shows)	5-1	High	Ingestion of debris; collision with boats; environmental contamination; knowledge gaps - survey requirements	3 years	ENGOS
38	Develop Leatherback Sea Turtle outreach content for use by agencies such as Parks Canada, BC Parks (marine) and others to reach boaters, fishers, fishing guides, and the public with information on actions to take in support of Leatherback Sea Turtle recovery	5-1	Medium	Ingestion of debris; collision with boats; environmental contamination; knowledge gaps - survey requirements	3 years	Other agencies
39	Promote the jellyfish sightings network (jellywatch.org) in Leatherback Sea Turtle information packages	5-1	Medium	Knowledge gaps - biological/ecological research	Ongoing	Academia; ENGOS

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

#	Recovery measures	Broad strategy-approach	Priority ⁵	Threats or objective addressed	Suggested other jurisdictions or organizations
40	Identify the locations of early life stages of prey species to better understand the population dynamics and distribution of jellyfish	1-1	Low	Knowledge gaps - biological/ecological research	Academia
41	Refine understanding of Western Pacific Leatherback Sea Turtle hatchling dispersal, juvenile and adult distribution in order to identify site-specific threats throughout their range	1-2	High	Knowledge gaps - survey requirements; biological/ecological research	Academia; other agencies; ENGOs
42	Undertake metabolic and foraging efficiency studies of the Pacific population of Leatherback Sea Turtles	1-4	Medium	Knowledge gaps - survey requirements; biological/ecological research	Academia; other agencies
43	Achieve a greater understanding of migration intervals to predict attendance of Leatherback Sea Turtles in Canadian Pacific waters (for example, stable isotope studies, passive integrated transponder (PIT) tags, satellite tags)	1-4	Low	Knowledge gaps - survey requirements; biological/ecological research	Academia; other agencies
44	Identify threats related to the artisanal fishery near the nesting beaches and identify frequency and incidence	2-1	High	Accidental capture and entanglement; ingestion of debris; collisions with boats; fisheries on adults and juveniles	Other agencies; ENGOs

⁵ Priority" reflects the degree to which the measure contributes directly to the recovery of the species or is an essential precursor to a measure 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	Broad strategy-approach	Priority ⁵	Threats or objective addressed	Suggested other jurisdictions or organizations
45	Identify factors that could potentially affect jellyfish abundance in Canadian Pacific waters	2-1	Medium	Knowledge gaps - survey requirements; biological/ecological research	Academia
46	Utilize drift models in order to guide monitoring effort and recovery of Leatherback Sea Turtle carcasses	2-2	Low	Accidental capture or entanglement; ingestion of debris; collision with boats	Academia; ENGOs

* Note: the measures identified in table 3 apply to broad strategies # 1 & 2

2. Critical habitat

2.1 Identification of the species' critical habitat

2.1.1 General description of the species' critical habitat

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

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

The best available information on Canadian Pacific habitat is insufficient to support identification of critical habitat for Leatherback Sea Turtles at this time. The [Advice relevant to the identification of critical habitat for Leatherback Sea Turtles \(Pacific population\)](#) (DFO 2014) provides information on studies required to refine the critical habitat advice. Identification of the habitat necessary to support survival and recovery of the species may be addressed in an amendment to the recovery strategy at a later date. Once critical habitat is identified, effective protections will be put in place to safeguard its features and functions.

[The Report on the Progress of Recovery Strategy Implementation for Leatherback Sea Turtles \(*Dermochelys coriacea*\) in Canadian Pacific Waters for the Period 2007 to 2012](#) outlines measures that have been taken to address knowledge gaps, including those related to critical habitat identification. A subsequent report for the 2013 to 2017 is under development and will be posted to the Species at Risk Registry upon completion.

3. Evaluation of socio-economic costs and of benefits

Section 49(1)(e) of SARA requires that an action plan include an evaluation of the socio-economic costs of the action plan and the benefits to be derived from its implementation (SARA 49(1)(e), 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 the federal government may be better placed for implementation of certain aspects of the 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" (Species at Risk Act, S.C. 2002, c. 29). 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 (1996)⁶. The specific costs and benefits associated with this action plan are described below.

Benefits of implementing this action plan

The benefits of recovery actions to support the long-term viability of Leatherback Sea Turtle population(s) that frequent Canadian Pacific waters are unknown but likely positive. As indicated above, Canadians value species for a number of reasons including indirect use values (for example viewing) and non-market benefits (that is, existence, bequest and option values)⁷. While indirect use values in Canadian waters are unlikely, Canadians do participate in viewing activities in other countries and receive individual benefits from the activity. A recent study in the United States identified the willingness-to-pay by Americans for Leatherback Sea Turtle recovery (Wallmo and Lew 2012). Willingness-to-pay can provide a measure of the total value individuals have for a species. The mean value was \$72.10 (2014 CD\$) per household per year for recovery, with a lower value of \$40.27 (2014 CD\$) to move the species from Endangered to Threatened.⁸ These values are not directly transferable as there are demographic differences between Canadians and Americans, the value is for all Leatherback Sea Turtle populations not just the population(s) that frequent Canadian Pacific waters, and it is not certain to what degree the actions in this plan would result in recovery or an improvement of status of all Leatherback Sea Turtle populations. However, it is likely that Canadians would be willing to pay some amount to recover the Leatherback Sea Turtle population(s) that frequent Canadian Pacific waters, implying that there would be positive benefits to Canadians from the actions in this plan that support recovery.

The recovery measures to mitigate threats and increase our understanding of threats to Leatherback Sea Turtles population(s) are also likely to provide broader benefits to other sea turtles and marine mammals that share similar threats in Canadian Pacific waters. The action plan includes support for ongoing programs and activities that are not species-specific (for example, B.C. Cetacean Sightings Network and Pacific Marine Mammal Response Program (MMRP), ocean research surveys), that provide assistance to, and information on, numerous species including marine mammals and sea turtles. Consequently, many of the activities identified in this action plan will have positive impacts on species in addition to Leatherback Sea Turtle Pacific population(s).

⁶ <https://www.canada.ca/en/environment-climate-change/services/species-risk-act-accord-funding/protection-federal-provincial-territorial-accord.html>

⁷ Non-market benefits include bequest values (the value placed on conservation for future generations), existence values (the value people place on the existence of a species) and option values (the amount someone is willing to pay to keep open the option of future use of the species).

⁸ Values have been adjusted from 2011 US dollars to 2014 Canadian dollars per household for each of the next 10 years.

Socio-economic costs of implementing this action plan

Overall the incremental costs for this action plan are anticipated to be low.⁹ The implementation schedule in this plan identifies three categories of recovery measures. Table 1 measures are those that Fisheries and Oceans Canada (DFO) will undertake, table 2 measures are those that DFO will undertake collaboratively with others, while table 3 identifies measures that others may undertake.

Measures identified in tables 1 and 2 are either ongoing for the life of the action plan or are newly derived and are scheduled to begin within the first five years of implementation. The incremental costs for table 1 activities are minimal as many of the actions are already undertaken as part of DFO's mandate. The majority of incremental costs for DFO are for activities identified in table 2, the costs of which are expected to be low. Direct, indirect and/or in-kind costs are also expected for partners, other agencies, organizations or individuals that participate in measures identified in table 2 or 3. These costs could not be estimated; however, based on the types of activities described and the scale of the costs that could be estimated, it is likely that total costs for these measures would be low. Costs for international organizations are not considered.

The majority of the estimated costs (tables 1 and 2) are associated with measures that result in ongoing annual or biennial costs and do not have specified completion dates. Between 70% and 90% of the annual estimated costs for DFO are related to research and monitoring. All the table 3 measures are related to research efforts. DFO research costs are very low, as, given the elusive nature of this species and its generally remote distribution, the majority research activities are linked to other existing activities. The remaining estimated costs are primarily for stewardship, engagement and educational activities, both domestically and abroad. The costs of measures to develop protocols, guidance and protection are very small in the first few years (<\$10,000), as the activities are largely incorporated into ongoing work by DFO and other federal agencies. Funding sources for these activities are likely to 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 the implementation schedule identifies DFO as the lead or co-lead for the activities analyzed, the extensive distribution of this species necessitates the involvement of numerous partners for research and stewardship activities. A number of potential partners and collaborators were identified and/or have participated in similar activities in the past. These partners include other federal departments and agencies, environmental organizations, academic institutions and programs, Indigenous Groups and other national governments. Such activities may result in direct financial contributions as well as in-kind support from partners and collaborators in terms of staff time and resources for discussion, meetings and research.

In summary, the majority of the actions outlined in tables 1 and 2 include annual cost estimates for DFO that are expected to be low over the next ten years. Cost estimates for contributions by others towards activities identified in table 2 and table 3 are uncertain, as information on project

⁹ Low: \$0 to \$1 million per year, medium: \$1 to \$10 million per year, high: >\$10 million per year based on the scale in the triage statement form from the Treasury Board of Canada Secretariat. Available at: <https://www.canada.ca/en/treasury-board-secretariat/services/federal-regulatory-management/guidelines-tools/triage-statement-form.html>

specifics, participants and/or timelines are not available. Therefore, the overall costs and benefits of this action plan are unknown, although the benefits are likely to be positive and costs are likely to be low.

4. Measuring progress

The performance indicators presented in the associated recovery strategy provide a way to define and measure progress toward achieving the population and distribution objectives. A [Report on the Progress of Recovery Strategy Implementation for Leatherback Sea Turtles \(*Dermochelys coriacea*\) in Canadian Pacific Waters for the Period 2007 to 2012](#) is posted on the SARA Registry (DFO 2015).

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

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

5. References

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2012. COSEWIC assessment and status report on the Leatherback Sea Turtle *Dermochelys coriacea* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

xv + 58 pp. (https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/cosewic/sr-LeatherbackSeaTurtle-v00-2012-eng.pdf).

DFO PLTRT (Fisheries and Oceans Canada Pacific Leatherback Turtle Recovery Team). 2007. Recovery Strategy for Leatherback Turtles (*Dermochelys coriacea*) in Pacific Canadian Waters. In Species at Risk Act Recovery Strategy Series. Vancouver. Fisheries and Oceans Canada. v + 41 pp.

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

DFO. 2014. Advice relevant to the identification of critical habitat for Leatherback Sea Turtles (Pacific population). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2013/075.

DFO. 2015. Report on the Progress of Recovery Strategy Implementation for Leatherback Sea Turtles (*Dermochelys coriacea*) in Canadian Pacific Waters for the Period 2007-2012. Species at Risk Act Recovery Strategy Report Series. Fisheries and Oceans Canada, Ottawa. v + 12 pp.

Gregg, E.J., Gryba, R., James, M.C., Brotz, L., and Thornton, S.J. 2015. Information relevant to the identification of critical habitat for Leatherback Sea Turtles (*Dermochelys coriacea*) in Canadian Pacific waters. DFO Can. Sci. Advis. Sec. Res. Doc. 2015/079. vii + 32p.

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

NMFS (National Marine Fisheries Service) and FWS (U.S. Fish and Wildlife Service). 1998. Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle (*Dermochelys coriacea*). National Marine Fisheries Service, Silver Spring, MD.

Wallmo, K. and Lew, D. K. 2012. Public Willingness to Pay for Recovering and Downlisting Threatened and Endangered Marine Species. *Conservation Biology*, 26: 830–839.

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 to mitigate threats or increase our understanding of threats are also likely to provide broader benefits as some of the threats to these Leatherback Sea Turtle population(s) that frequent Canadian Pacific waters are common to other sea turtles and marine mammals. As well, this plan includes support for ongoing programs and activities that are not species-specific (that is, B.C. Cetacean Sightings Network and Pacific Marine Mammal Response Program (MMRP)). These programs 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, 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 Leatherback Sea Turtle Pacific population(s).

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 technical iterative document development, interagency involvement, and consultation with interested and affected parties to seek input to the development of this action plan. Information on participation is included below.

Initiation of the action plan development process

At the initiation of the Leatherback Sea Turtle action planning process, letters were sent to all coastal Indigenous Groups, inviting their participation in the development of the action plan. Letters of invitation were sent to Parks Canada Agency, Environment and Climate Change Canada, Province of British Columbia, Department of National Defence, and Transport Canada, requesting their participation in the process.

Action plan development

Action plan team meetings were held throughout the planning process and a proposed action plan was developed. The development of the action plan was the result of collaborative efforts and contributions from many individuals and organizations. The Leatherback Sea Turtle action plan team compiled the contributions from the technical workshop (November 3 and 4, 2011) and the Canadian Science Advisory Secretariat assessment process (December 5, 2012) on “Information relevant to the identification of critical habitat for Leatherback Sea Turtles (*Dermochelys coriacea*) in Canadian Pacific waters”(Gregr et al. 2015).

The draft action plan was reviewed by Parks Canada Agency, Environment and Climate Change Canada and the Province of B.C. prior to targeted external consultation in June of 2016.

Targeted external consultation of the draft action plan - June 1 to June 30, 2016

A targeted external peer-review of the draft action plan for the Leatherback Sea Turtle (Pacific population) in Canada was conducted. Letters inviting feedback were sent via email to interested stakeholders, international government contacts, and five Wildlife Management Boards. Feedback from two organizations was received. Province of British Columbia, Environment and Climate Change Canada and Parks Canada were also invited to provide input on the draft action plan.

Additional stakeholder, First Nations, and public input was sought through the publication of a proposed document on the Species at Risk Public Registry for a 60 day public comment period from September 8 to November 7, 2017.

Two submissions were received during the comment period, including questions from a citizen and comments from an NGO. Feedback was supportive of the proposed action plan overall, and offered suggestions on threats and timelines. The feedback also queried the status of critical habitat identification and affirmed the importance of recovery measures relating to the identification of critical habitat. Comments did not result in any changes to the action plan.

All comments received were considered in the finalization of the action plan.

Appendix C: 2011 to 2016 Leatherback Sea Turtle action plan team

Team Members	Organizations Represented
Sheila Thornton, Chair	Fisheries and Oceans Canada
John Ford	Fisheries and Oceans Canada
Lisa Spaven	Fisheries and Oceans Canada
Bill Crawford	Fisheries and Oceans Canada
Mike James	Fisheries and Oceans Canada
Scott Benson	National Oceanic and Atmospheric Administration
Pippa Shepherd	Parks Canada Agency
Cliff Robinson	Parks Canada Agency
Resource Personnel	
Lucas Brotz	University of British Columbia
Ed Gregr	SciTech Consulting, Vancouver, BC
Louvi Nurse	Fisheries and Oceans Canada