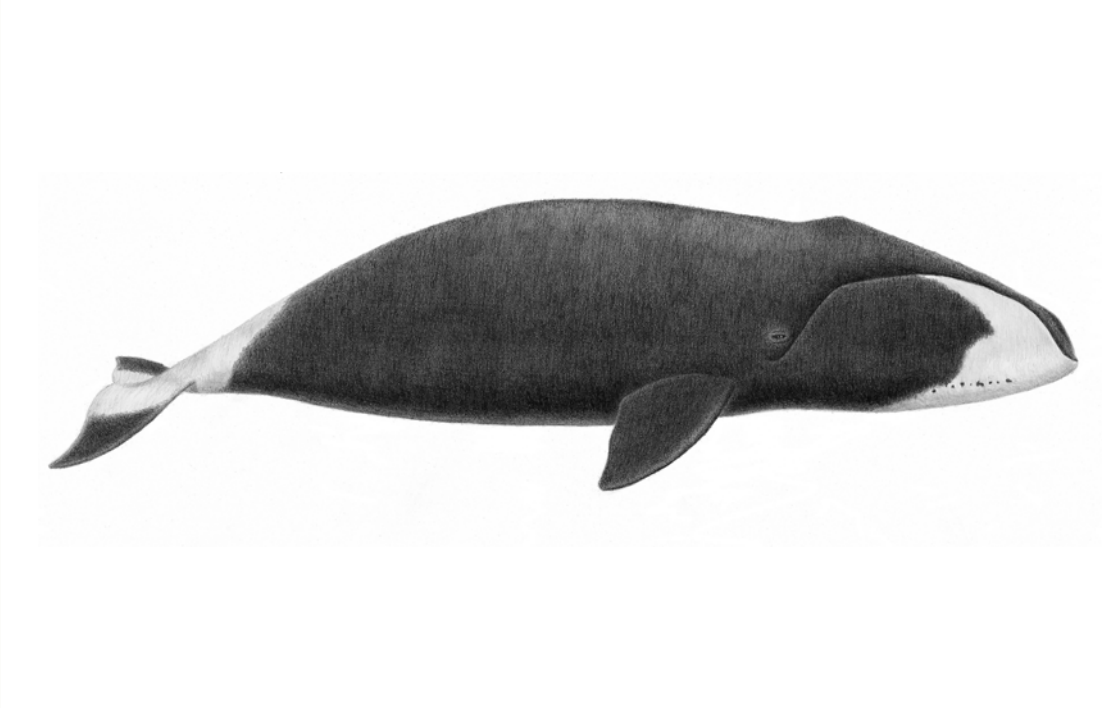
Species at Risk Act
Management Plan Series

Management Plan for the Bering-Chukchi-Beaufort population of Bowhead Whale (*Balaena mysticetus*) in Canada



2014

Canada

About the *Species at Risk Act* Management Plan Series

What is the *Species at Risk Act* (SARA)?

SARA is the Act developed by the federal government as a key contribution to the common national effort to protect and conserve species at risk in Canada. SARA came into force in 2003, and one of its purposes is "*to manage species of special concern to prevent them from becoming endangered or threatened*."

What is a species of special concern?

Under SARA, a species of special concern is a wildlife species that could become threatened or endangered because of a combination of biological characteristics and identified threats. Species of special concern are included in the SARA List of Wildlife Species at Risk.

What is a management plan?

Under SARA, a management plan is an action-oriented planning document that identifies the conservation activities and land use measures needed to ensure, at a minimum, that a species of special concern does not become threatened or endangered. For many species, the ultimate aim of the management plan will be to alleviate human threats and remove the species from the List of Wildlife Species at Risk. The plan sets goals and objectives, identifies threats, and indicates the main areas of activities to be undertaken to address those threats.

Management plan development is mandated under Sections 65–72 of SARA (http://www.sararegistry.gc.ca/approach/act/default_e.cfm).

A management plan has to be developed within three years after the species is added to the List of Wildlife Species at Risk. Five years is allowed for those species that were initially listed when SARA came into force.

What's next?

Directions set in the management plan will enable jurisdictions, communities, land users, and conservationists to implement conservation activities that will have preventative or restorative benefits. Cost-effective measures to prevent the species from becoming further at risk should not be postponed for lack of full scientific certainty and may, in fact, result in significant cost savings in the future.

The series

This series presents the management plans prepared or adopted by the federal government under SARA. New documents will be added regularly as species get listed and as plans are updated.

To learn more

To learn more about the *Species at Risk Act* and conservation initiatives, please consult the SARA Public Registry (http://www.sararegistry.gc.ca/)

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Additional copies:

Additional copies can be downloaded from the SARA Public Registry (http://www.sararegistry.gc.ca/).

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PREFACE

Management of the Bering-Chukchi-Beaufort population of bowhead whale is the responsibility of Fisheries and Oceans Canada. The *Species at Risk Act* (SARA, Section 65) requires the competent minister to prepare management plans for species listed as Special Concern. As this population of bowhead whale was originally placed on Schedule 2 of the *Act*, the management plan is due within 5 years of its listing (SARA Sections 130 and 133). The Bering-Chukchi-Beaufort population of bowhead whale was listed as a species of Special Concern under SARA in 2007. The development of this management plan was led by Fisheries and Oceans Canada – Central and Arctic Region, in cooperation and consultation with many individuals, organizations and government agencies, as indicated below. By necessity, this management plan concentrates on that area of the species range found in Canadian waters and therefore focuses on the Beaufort Sea.

Success in the conservation of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this plan and will not be achieved by Fisheries and Oceans Canada or any other party alone. This plan provides advice to jurisdictions and organizations that may be involved or wish to become involved in activities to conserve this species. In the spirit of the *Accord for the Protection of Species at Risk*, the Minister of Fisheries and Oceans invites all responsible jurisdictions and Canadians to join Fisheries and Oceans Canada in supporting and implementing this plan for the benefit of the Bering-Chukchi-Beaufort population of bowhead whale and Canadian society as a whole. The Minister will report on progress within five years.

RESPONSIBLE JURISDICTIONS

The responsible jurisdiction for the Bering-Chukchi-Beaufort population of bowhead whale is Fisheries and Oceans Canada.

The Fisheries Joint Management Committee is the co-management body in the Inuvialuit Settlement Region, and was established under the *Inuvialuit Final Agreement*, which was approved, given effect and declared valid by Parliament in the *Western Arctic (Inuvialuit) Claims Settlement Act*. The Committee is responsible for the co-management of bowhead whales in the Canadian Beaufort Sea. The Fisheries Joint Management Committee has approved this final management plan.

AUTHOR

This management plan was created by S.A. Stephenson (DFO-Species at Risk Program, Central and Arctic Region).

ACKNOWLEDGMENTS

Lois Harwood (DFO Arctic Science) provided information on the bowhead whale population and current research activities occurring in the Beaufort Sea. Jeff Adam (DFO Policy), Sheri Andres (DFO Policy), Susan Antpoehler (DFO Conservation and Protection), Scott Chiu (DFO SAR Program), Rob Gau (Wildlife Division, Government of the Northwest Territories), Steve Ferguson (DFO Arctic Science), Véronique Leblanc (DFO Resource Management), Simon Nadeau (DFO Science), Sherry Nugent (DFO Habitat), Ray Ratynski (DFO SAR Program) and Peter Ross (DFO Legal) provided additional input and reviewed this plan. Vic Gillman and Burton Ayles, Fisheries Joint Management Committee, provided input and reviewed several early drafts of this management plan.

STRATEGIC ENVIRONMENTAL ASSESSMENT

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.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that plans 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 on non-target species or habitats. The results of the SEA are incorporated directly into the plan itself, but are also summarized below.

This management plan will clearly benefit the environment by promoting the conservation of the Bering-Chukchi-Beaufort population of bowhead whale. The potential for the plan to inadvertently lead to adverse effects on other species was considered. The SEA concluded that this plan will clearly benefit the environment and will not entail any significant adverse effects. Measures to conserve the Bering-Chukchi-Beaufort population of bowhead whale from the effects of threats will likely have positive benefits for the conservation of other marine species. Further, efforts to promote the conservation of this population while in Canada may result in increased data on other whale and marine species as well as on oceanographic processes. The reader should refer to the following sections of the document in particular: description of the species' habitat and biological needs, ecological role, and limiting factors; effects on other species; and the management implementation actions.

EXECUTIVE SUMMARY

The bowhead whale (*Balaena mysticetus*) (Linnaeus 1758) is a large baleen whale of the family Balaenidae and possesses a nearly circumpolar distribution. Bowhead whales occur in Arctic and subarctic marine waters and in conditions ranging from open water to extensive pack ice. Two of the four recognized populations of bowhead whales are found in Canada. One of these populations, the Bering-Chukchi-Beaufort population, summers in the eastern Beaufort Sea and Amundsen Gulf and winters in the eastern and central Bering Sea.

Bowhead whales become sexually mature at approximately 25 years of age and give birth to a single calf approximately every 3-4 years. Longevity can exceed 150 years. The Bering-Chukchi-Beaufort population consists of about 5% calves (<6 m), 54% juveniles (6-13 m) and 41% adults (>13 m), with an approximately equal sex ratio. Age/stage-class segregation has been documented within the population. The spring and autumn migrations along northern Alaska are age-structured. Bowhead whales eat zooplankton, particularly euphausiids (krill) and copepods. Adaptations to their Arctic environment include longevity, massive energy storage capability, sophisticated acoustic capabilities for ice navigation and long-range communication, and a peaked head profile with a “crown” for pushing up through ice to breathe.

All populations of this species were severely depleted by intensive commercial whaling from the early 19th through the 20th century. The Bering-Chukchi-Beaufort population was probably the last to be commercially exploited and hunting ceased only when it became unprofitable in the early 20th century. In 2004 the Bering-Chukchi-Beaufort population was estimated at 12,361 whales (95% CI 7,900-19,700), excluding calves (Koski *et al*. 2010). Assuming a stock size of approximately 3,000 whales when commercial hunting ceased (Woodby and Botkin 1993), the current population estimate suggests there has been a significant increase since the end of the commercial hunt.

The bowhead whale is a large, long-lived species with low fecundity and high adult survival. It has a narrow feeding niche in high northern latitudes which can be affected by a range of human activities. There is concern that increased human activities in high latitudes (*e.g.*, shipping, offshore oil and gas development) will have negative effects on the Bering-Chukchi-Beaufort population. Climate change, which is influencing oceanography, may have major effects on bowhead prey availability although these are difficult to predict.

Following public consultations, the Bering-Chukchi-Beaufort population of bowhead whale was listed under the *Species at Risk Act* in 2007 as a species of Special Concern and therefore requires the creation of a management plan which applies to Canadian waters. The goals of this management plan are to maintain a healthy population of bowhead in the eastern Beaufort Sea, to protect bowhead whale and their habitat, and, to provide guidelines and information to assist the Government, the Environmental Impact Screening and Review Process and the Inuvialuit Lands Administration in their evaluation of development proposals which may affect bowhead and bowhead habitat.

Successful attainment of these goals will ensure subsistence harvesting opportunities by the Inuvialuit remain possible.

The following short-term objectives (over the next five years) have been established to assist in achieving the goals of the management plan:

i. To identify and protect important habitats of the Bering-Chukchi-Beaufort population of bowhead whales from disruptive uses;

ii. To evaluate threats to the species and its habitat and mitigate them if possible,

iii. To understand trends in population and habitat; and,

iv. To increase public awareness of the presence, threats and conservation of the Bering-Chukchi-Beaufort population of bowhead whale and its habitat, and its status as a Canadian species at risk.

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1. SPECIES INFORMATION

1.1. Species Assessment Information from COSEWIC

Assessment Summary - April 2009

Common name
Bowhead Whale - Bering-Chukchi-Beaufort population

Scientific name *Balaena mysticetus*

Status Special Concern

Reason for designation
The population was severely depleted by commercial whaling from 1848 until about 1915, a period of about 65-70 years. Since 1915, it has been subject to regular hunting for subsistence by Aboriginal people in Alaska (USA) and Chukotka (Russia) and occasional hunting by the Inuvialuit of the western Canadian Arctic. In the absence of commercial whaling, this population has been recovering and was estimated at 10,400 in 2001. Nevertheless, it is not yet clearly secure because of its life history (e.g., long generation time, very low natural growth rate) and the possible impacts of habitat changes. There is uncertainty about how bowheads will respond to the rapid changes in their habitat due to climate change and increasing human activities such as shipping and oil exploration in high latitudes. Such habitat changes have already begun to occur and will intensify over the next 100 years. In view of the species' life history, it is important that hunting continue to be monitored and managed to ensure against over-harvest.

Occurrence Arctic Ocean

Status history
The "Eastern and Western Arctic populations" were given a single designation of Endangered in April 1980. Split into two populations (Eastern Arctic and Western Arctic) to allow separate designations in April 1986. The Western Arctic population was designated Endangered in April 1986. The population was renamed to "Bering-Chukchi-Beaufort population" and designated Special Concern in May 2005. Status re-examined and confirmed in April 2009. Last assessment based on an update status report.

1.2. Description

The bowhead whale is one of the stockiest of the baleen whales, with a barrel-shaped body and a large head (about 30% of the total body length) (COSEWIC 2009). The upper jaw is bowed sharply upward, hence giving rise to its name. The flippers are small and paddle-shaped and there is no dorsal fin or ridge. The flukes are pointed at the tips and deeply notched on the rear margin. The body is basically black with white (nonpigmented) areas on or around the chin, eyelids, flipper insertions, ano-genital area, tail stock, and flukes (Haldiman and Tarpley 1993) (Fig. 1).

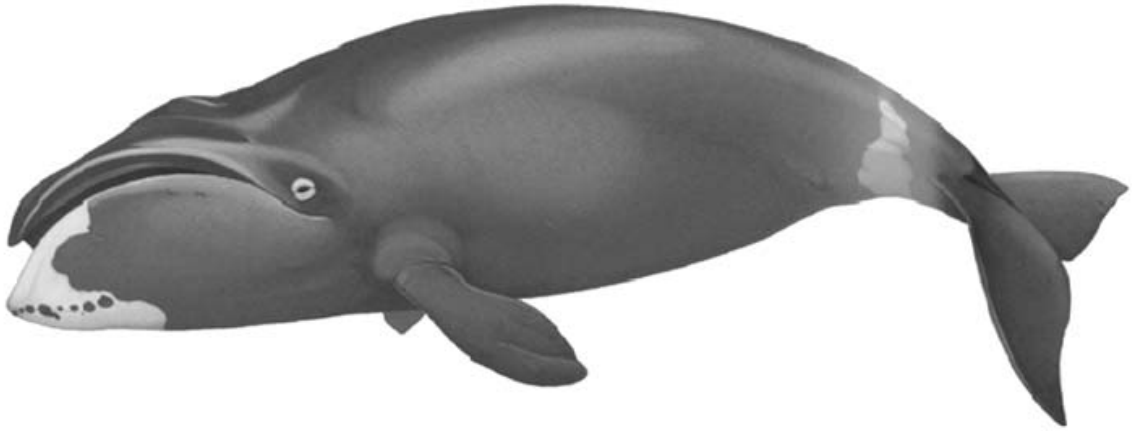

Figure 1. The bowhead whale (*Balaena mysticetus*) (© Martin Camm).

1.3. Populations and Distribution

1.3.1. Global Distribution

Bowhead whales have a nearly circumpolar distribution in the northern hemisphere, spanning latitudes 54°-75°N in the North Pacific and 60°-85°N in the North Atlantic (Moore and Reeves 1993). Physical barriers (land or impassable sea ice) have been thought to divide the world bowhead whale population into several populations. The Scientific Committee of the International Whaling Commission (IWC) recognizes four such populations: (1) Okhotsk Sea population, presumably confined to that sea year-round; (2) Bering-Chukchi-Beaufort population, which summers in the eastern Beaufort Sea and Amundsen Gulf and winters in the central and eastern Bering Sea; (3) the Eastern Canada-West Greenland population, which summers in Baffin Bay, the Canadian High Arctic, Foxe Basin, and northwestern Hudson Bay and winters in northern Hudson Bay, Hudson Strait, and along the ice edge in Davis Strait and off West Greenland; and (4) Svalbard (Spitsbergen) population, centred in the Barents and Greenland Seas. A recent study of nucleotide sequence variation in the mitochondrial control region of bowhead whales from the putative Svalbard and Bering-Chukchi-Beaufort populations found only minor differences in nucleotide and haplotype diversity, leading Borge *et al.* (2007) to question the current IWC scheme of population delineation.

All populations of this species were severely depleted by intensive commercial whaling prior to and during the early 20th century. The Bering-Chukchi-Beaufort population was among the last to be commercially exploited and hunting ceased only in the early 20th century when it became unprofitable to continue. Assuming the stock numbered 3,000 at the cessation of commercial whaling, the size of the Bering-Chukchi-Beaufort population before commercial whaling began has been

estimated as being between 10,400 to 23,000 whales (Woodby and Botkin 1993). In 2001, the Bering-Chukchi-Beaufort population was estimated at 10,470 whales (95% CI 8,100-13,500), with an estimated annual rate of increase of 3.4% (95% CI 1.7-5.0%) (George *et al.* 2004). In 2004, the population was estimated at 12,361 whales (95% CI 7,900-19,700), excluding calves (Koski *et al*. 2010). These estimates suggest that the Bering-Chukchi-Beaufort population has increased greatly since the end of commercial whaling. The International Union for Conservation of Nature and Natural Resources lists the status of all bowhead whale populations at its lowest level; Least Concern (IUCN 2011).

Bowheads from the Bering-Chukchi-Beaufort population winter (November to April) in the western and central Bering Sea amongst broken pack ice. In spring (April through June) the whales migrate north and east along the northern coast of Alaska to the eastern Beaufort Sea, initially appearing in western Amundsen Gulf in offshore lead areas (>200 m in depth) as break-up is under way in late May. In recent years feeding aggregations of bowheads in the south-eastern Beaufort have formed approximately two weeks earlier than in the 1980s (Harwood *et al.* 2010).

Their summer (June to September) distribution is centred in the southeastern Beaufort Sea, along the southern and western coasts of Banks Island, in Amundsen Gulf, along the waters offshore of the Tuktoyaktuk Peninsula (generally in waters approximately 20-50 m in depth), the Yukon coastal waters, the shelf break and the Mackenzie and Kugmallit Canyon areas (Harwood *et al.* 2010) (Fig. 2). Recent satellite tracking indicates that they also occur around northwestern Banks Island and into M'Clure Strait (ADFG 2007; Harris *et al.* 2007). Sightings in the eastern Chukchi Sea and western Beaufort Sea in June (Braham *et al.* 1980; Carroll *et al.*1987), along the Chukotka Peninsula (Russia) throughout the summer (Bogoslovskaya *et al.* 1982) and in the Alaskan Beaufort Sea in August (Moore *et al.* 1989, Goetz *et al.* 2008) demonstrate that not all animals in this population summer in the eastern Beaufort Sea. In the fall (September and October), bowheads migrate west from the Canadian Beaufort Sea into the Alaskan Beaufort Sea and the Chukchi Sea, and then back into the Bering Sea.

1.3.2. Population Size, Status and Trends

Several methods have been used to estimate the size of the Bering-Chukchi-Beaufort population (summarized in Zeh *et al.* 1993). The 2001 ice-based census in northern Alaska was 10,470 whales (95% CI 8,100-13,500) (George *et al.* 2004). In 2004 the Bering-Chukchi-Beaufort population was estimated at 12,361 whales (95% CI 7,900-19,700), excluding calves (Koski *et al*. 2010). The IWC recently accepted and endorsed the spring 2011 estimate of 16,892 whales (95% CI 15,704-18,928) (IWC 2013). The estimated annual rate of increase (net recruitment), based on quasi-annual ice-edge censuses from 1978-2004, was 3.5% (95% CI 2.2-4.8%) (Zeh and George 2012).

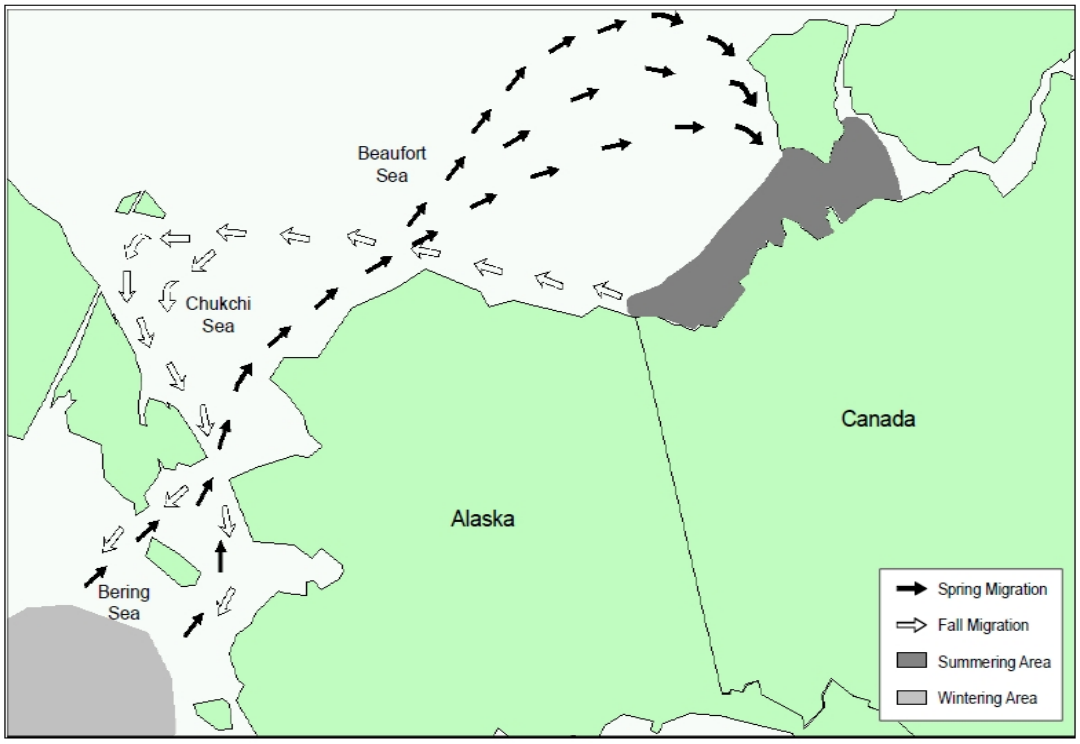

Figure 2. Generalized seasonal occurrence and migration corridor for the Bering-Chukchi-Beaufort Sea bowhead whale population (from COSEWIC 2009).

1.4. Needs of the Bowhead Whale

1.4.1. Habitat and Biological Needs

Bowhead whales occur in conditions ranging from open water to thick and extensive, but unconsolidated, pack ice. Like other right whales (Balaenidae), they are specialized filter feeders evolved to exploit aggregations of euphausiids (krill), copepods, amphipods and mysids (Lowry 1993; Laidre *et al.* 2007). However, they may choose habitat that provides protection from predators, especially killer whales (*Orcinus orca*), either by evading predators, such as by entering ice cracks or ice filled areas, or by enabling their defence strategies, such as tight grouping and splashing to drive off attacks (Ford and Reeves 2008). Differing ways of exhibiting these defensive movements by different ages or sexes might explain the spatial segregation of age and sex classes that has been observed in bowhead whales.

Once bowheads arrive on their summering grounds, they engage in a variety of activities including feeding. Presumably, habitat selection during this time is principally related to the distribution of their primary food source (zooplankton), which can be affected by temperature, salinity, nutrient availability, light intensity,

bathymetry, and physical ocean processes (Mackas *et al.* 1985; Simard *et al.* 1986; Castel and Veiga 1990; Griffiths and Thomson 2001).

On the summering grounds, bowheads of the Bering-Chukchi-Beaufort population appear to aggregate over continental shelf waters such as offshore the Tuktoyaktuk Peninsula in waters 20-50 m deep (Harwood *et al*. 2010). Some bowhead are also found to the east of the Mackenzie Delta (Richardson *et al.* 1987), where they form large, loose groups where ocean conditions concentrate prey (along the shelf break seaward of the shelf; in marine canyon areas such as Mackenzie Canyon and upwelling areas along the Yukon coast) (Harwood and Smith 2002; Harwood *et al.* 2008; Stephenson and Hartwig 2009). Slightly different aggregation areas are used by bowheads each year, presumably due to annual variation in ocean conditions (Harwood *et al.* 2010).

Subadults (<10 m long) are the dominant group in shallow (<20 m) near shore areas during the fall migration in the Alaskan Beaufort Sea, with progressively fewer small subadult whales and more large subadults and adults as water depth increases (Koski and Miller 2001). Whales tend to select inner shelf waters (≤50 m) and light ice conditions in the autumn (Moore *et al.* 2000). They select shallow inner-shelf waters (≤50 m) under moderate and light ice conditions and deeper slope habitat (200-2000 m) under heavy ice conditions (Moore 2000). Some adults may summer far offshore in pack ice or at the ice edge (Richardson *et al.* 1987).

1.4.2. Ecological Role

Recent studies have shown that in some areas bowheads concentrate their feeding on pre-ascension stage epibenthic copepods in high density patches (Laidre *et al.* 2007). Bowheads may, to some extent, influence the amount of prey available to other species in the Arctic by removing up to 22% of the pelagic biomass in the upper 50 m of the water column (Laidre *et al.* 2007).

The killer whale is the only known predator of bowheads, besides man. However, of 195 bowheads examined during the Alaskan subsistence harvest (1976-92), only eight bore evidence of encounters with killer whales (George *et al.* 1994). The frequency of attacks on bowhead whales in the Bering-Chukchi-Beaufort population is thought to be low (George *et al.* 1994), although it is not possible from the available data to assess this in a quantitative way (Shelden and Rugh 1995). Attacks on bowheads may be much higher in their winter range.

1.4.3. Limiting Factors

The depletion of bowhead populations due to historic commercial whaling is the main reason the species had been listed as endangered throughout much of its range. However, recent subsistence hunting in eastern Russia, the United States (Alaska) and Canada appears to have been within sustainable limits and has not slowed continued population recovery. There is, however, concern that increased

human activities in high latitudes (*e.g.*, offshore oil and gas development, shipping, commercial fishing) may have negative effects on some bowhead populations.

Climate change, which is influencing ice conditions, may also have major effects on bowheads although these effects are difficult to predict (Tynan and DeMaster 1997). George *et al.* (2009) found a correlation between increased body condition and light sea ice within the eastern Beaufort Sea suggesting possible benefits in reduced ice, at least in the short-term. Climate change occurs naturally, but is known to have increased in rate due to man's activities (Stott *et al.* 2001).

Despite their long life (up to 100+ years), late maturity (20+ years) and calving interval of 3-5 years (COSEWIC 2009), these factors do not appear to be limiting bowhead whale recovery.

1.5. Threats

Historic commercial whaling is the main reason the species has been listed as endangered throughout much of its range. However, recent and continued subsistence hunting in eastern Russia, Alaska and Canada appear to have been within sustainable limits and has not slowed continued population recovery. As an example, despite recent allowable harvests of up to 75 animals a year in Alaska, the population continues to grow. There are concerns that increasing human activities in high latitudes may have negative effects on some bowhead populations. All threats to the population while in Canada exist to a similar or greater extent when they are outside Canadian waters.

1.5.1. Threat Classification

Table 1 summarizes known and suspected current threats to the bowhead whale in Canada. In general, the threats have been listed in order of perceived impact. The severity of the threats and the overall level of concern may vary depending on the location of individuals and the time of year. The threat classification parameters are defined as follows:

Extent – the spatial extent of the threat (widespread/localized);
Occurrence – indicates if the threat is present or expected (current, imminent, anticipated);
Frequency – the frequency with which the threat occurs (seasonal/continuous);
Causal Certainty – the level of certainty that it is a threat to the species (high, medium, low);
Severity – the severity of the threat (high, medium, low); and,
Overall Level of Concern – the composite level of concern regarding the threat to the species (high, medium, low).

Table 1. Threat classification table for bowhead whale.

1	Noise	Threat Information	
Threat Category	Disturbance or persecution/habitat loss or degradation	**Extent**	Widespread
General Threat	Underwater noise	**Occurrence**	Current and anticipated
		Frequency	Seasonal
Specific Threat	Behaviour and social disruption as well as physical harm	**Causal Certainty**	Medium
		Severity	Medium
Stress	Increased physiological stress, energy loss and displacement from preferred habitat	**Overall Level of Concern**	Medium - High
2	**Climate Change**	**Threat Information**	
Threat Category	Changes in ecological dynamics or natural processes	**Extent**	Widespread
General Threat	Climate change by way of warming and ice reduction	**Occurrence**	Current and anticipated
		Frequency	Continuous
Specific Threat	Altered ice patterns and prey base	**Causal Certainty**	Medium
		Severity	Unknown
Stress	Reduced productivity or changed distribution	**Overall Level of Concern**	Low - Medium
3	**Ship Collisions**	**Threat Information**	
Threat Category	Accidental mortality	**Extent**	Widespread
General Threat	Marine traffic	**Occurrence**	Anticipated
		Frequency	Seasonal
Specific Threat	Ship strikes	**Causal Certainty**	Low
		Severity	Low
Stress	Death or injury	**Overall Level of Concern**	Low
4	**Toxins (Pollution)**	**Threat Information**	
Threat Category	Habitat loss or degradation	**Extent**	Widespread
General Threat	Contaminants, oils or fuel spills, garbage dumping, etc.	**Occurrence**	Anticipated
		Frequency	Unknown
Specific	Direct exposure,	**Causal Certainty**	Low

Threat	contaminated prey and alteration of habitat characteristics	**Severity**	Unknown
Stress	Reduced productivity or changed distribution	**Overall Level of Concern**	Low
5	**Entanglement**	**Threat Information**	
Threat Category	Accidental mortality	**Extent**	Localized
General Threat	Entanglement with stationary fishing gear	**Occurrence**	Unknown
		Frequency	Seasonal
Specific Threat	Entanglement with stationary fishing gear	**Causal Certainty**	Low
		Severity	Low
Stress	Death or injury	**Overall Level of Concern**	Low
6	**Predation**	**Threat Information**	
Threat Category	Natural Processes	**Extent**	Widespread
General Threat	Killer whale attacks	**Occurrence**	Unknown
		Frequency	Unknown
Specific Threat	Killer whale attacks	**Causal Certainty**	Low
		Severity	Low
Stress	Death or injury	**Overall Level of Concern**	Low
7	**Ice Entrapment**	**Threat Information**	
Threat Category	Natural Processes	**Extent**	Localized
General Threat	Ice movement	**Occurrence**	Unknown
		Frequency	Seasonal
Specific Threat	Ice entrapment	**Causal Certainty**	Low
		Severity	Low
Stress	Death of individuals	**Overall Level of Concern**	Low

1.5.2. Description of Threats

None of the threats described, with the exception of noise, appear to be particularly severe at this time although several have the potential to negatively affect bowhead whale health or disrupt annual movements as well as use of specific areas. Mitigation or removal of some of these threats would benefit not

only bowhead whales, but the environment in general and, perhaps, other marine mammals.

1) Noise

Although it has been long known that marine mammals, including the bowhead whale, use vocalizations to communicate, it is not well understood exactly what these vocalizations are communicating (*e.g.*, Richardson *et al.* 1995). However, the masking effects of anthropogenic noises may have both short and long-term consequences on the fitness of individuals and this population if the noise restricts the ability of whales to locate food or mates or simply communicate. Because noise can originate from many sources and interfere with so many activities, it is considered the largest single threat to bowhead whales while they are in the Canadian Beaufort Sea.

The main sources of anthropogenic noise pollution are ships, seismic exploration, marine construction, drilling, low flying aircraft and motor boats (Richardson and Malme 1993). Most of the research on bowhead reactions to industrial activities has been done on the Bering-Chukchi-Beaufort population. Bowhead whales are known to react to anthropogenic sources of underwater noise by avoiding the area where the noise originates. Reactions appear to vary by season, habitat and behavioural state (Richardson *et al.* 1985; Richardson and Malme 1993) and likely by age-sex reproductive class. Inuit hunters from the eastern Alaskan Beaufort Sea reported that noise affected whale behaviour when there was seismic activity in the area (Galginaitis and Koski 2001). They observed that the whales moved further offshore, and that they were easily spooked when the hunters did see them.

Some Inuit report that bowheads react negatively to noise from snowmobiles and small motorized boats, although many Inuit have also reported that bowheads do not seem to be adversely affected by these same noises (NWMB 2000). With an increasing number of motorized boats, both from tourism and local recreational or subsistence activities, the potential for interference with bowhead activities increases (Moshenko *et al.* 2003). Moshenko *et al.* (2003) ranked anthropogenic noise from tourism and recreation as a high threat to bowheads in the eastern arctic. Stephenson and Hartwig (2009) ranked noise, especially those generated by activities related to the oil and gas industry, as one of the greatest potential threats to bowhead whales in the Yukon North Slope area.

2) Climate Change

Climate change occurs naturally, but its' rate has increased due to man's activities (Stott *et al.* 2001) and therefore is included here as an anthropogenic threat. Direct effects of climate change on arctic marine mammals include the loss of ice associated habitat (Tynan and DeMaster 1997). Indirect effects include regional or seasonal shifts in prey availability, which can affect nutritional status, reproductive success, and geographic range. It may also alter the timing or patterns of migrations, which may produce changes in species distributions

and population structure of bowheads (Tynan and DeMaster 1997) including the distribution of bowhead predators. Schell (2000) found isotopic evidence that the Bering Sea ecosystem underwent a reduction of between 30-40% in average seasonal primary productivity from 1966 to 1997, likely due to climate changes.

Large changes to climate would affect the bowhead population by altering the food web, although it is unknown whether this would be a positive or negative effect. In the high Arctic, the base of the food chain consists of ice algae (Alexander 1995) formed on the underside of the ice at the ice-seawater interface. With spring warming and ice melt, algal cells are sloughed off into the surrounding water column, where a seasonal bloom of phytoplankton is initiated. Ice edge habitat generates a restricted zone of high productivity (Sakshaug *et al.* 1994). Many species of copepods (one of the preys of bowhead) reproduce under the ice before the phytoplankton bloom and feed on sedimenting ice algae (Drolet *et al.* 1991). With a loss in ice habitat, there would be less ice algae produced and possibly less food for copepods.

Given the coupling between the ice-edge habitat and the prey of many species of arctic marine mammals, Tynan and DeMaster (1997) speculated that a sufficient reduction in the extent of the ice edge, and its associated community, may have deleterious consequences for marine mammals that have evolved with these unique systems. In the Bering-Chukchi-Beaufort population, bowhead whales stay with the ice edge as it advances and retreats each year (Goering and McRoy 1974). Reductions in the southern extent of seasonal sea ice could displace southern ranges of bowheads northward. Inter-annual changes in the onset and severity of seasonal sea ice may affect the length of feeding seasons, timing of migration, fecundity, and survivorship of marine mammal species (Tynan and DeMaster 1997). Inuit hunters from the eastern Alaskan Beaufort Sea report more whales migrate later in the season than they used to (Galginaitis and Koski 2001). It is not possible at this time to determine the impact (whether positive or negative) of climate change on the bowhead population.

3) Ship Collisions

George *et al.* (1994) examined bowhead whales of the Bering-Chukchi-Beaufort population harvested by Alaskan Eskimos for scars from ship-collision injuries. They estimated that the frequency of scars from ship-collisions was about 1%. These low numbers suggests that the incidence of ship collisions with bowheads is quite low, probably because few vessels pass through most of the bowhead's range. However, it may also be that bowheads do not survive the collision (Kraus 1990). It is likely that few bowheads come in contact with ships in any portion of their range due to the low number of ships that enter arctic waters and because bowhead are often associated with ice whereas ships would generally travel in the ice-free areas. While Moshenko *et al.* (2003) ranked ship collisions as a low threat to bowheads in the eastern arctic, increased shipping activity due to greater use of the Northwest Passage or oil and gas activity in the Beaufort Sea could increase the frequency of ship strikes in the western Arctic (Stephenson

and Hartwig 2009). Currently, much of the shipping activity in the Canadian Beaufort is limited to research ships and community resupply barges and therefore pose a limited risk. Infrequent seismic programs or transits of the Northwest Passage by smaller tourist ships also pose a limited risk of striking whales. It is still debatable if there will be an increase in large ship traffic through the Northwest Passage as ice cover continues to diminish (*e.g.*, Lasserre and Pelletier 2011; Reeves *et al*. 2014) and therefore the overall risk of ship strikes may remain low.

Richardson *et al.* (1987) reported that most bowheads show avoidance reactions to approaching ships more than 1 km distant in the eastern Canadian Beaufort Sea, which would reduce the likelihood of a ship collision. However, they found these reactions were short-term and suggest that summering bowheads could habituate to an ongoing stimulus, especially when they are feeding. Habituation to ship sounds could delay avoidance of ships resulting in a greater number of collisions. Nowacek's *et al.* (2004) study of North Atlantic right whales (*Eubalaena glacialis*) found that they tended to ignore approaching ships when feeding, perhaps due to the high energy costs of surfacing and leaving a known food patch. The same may be true for bowhead whales.

4) Toxins (pollution/contaminants)

Jayko *et al.* (1990) developed a model to quantify the probability of bowhead whales encountering spilled oil in Alaskan waters. Their spill scenarios resulted in the oiling of an average of 0.1-2.0% of the Bering-Chukchi-Beaufort bowhead population indicating that oil spills in the Beaufort Sea were unlikely to affect a significant portion of the population (Jayko *et al.* 1990). There was no evidence that any of the large spills to date had a significant impact on a baleen whale population (Geraci and St. Aubin 1990). St. Aubin *et al.* (1984) stated that oil fouling of the fringes of the baleen reduces feeding efficiency, but that the impact would be short-term if the animal did not remain in an affected area. However, if a spill took place in or near an important feeding area, bowheads might be reluctant to leave and the consequences to some individuals could be severe. Bowhead populations and the amount of oil exploration have increased since these studies suggesting that a spill could be more harmful than originally modelled.

Baleen whales generally have lower tissue contaminant levels than the toothed whales (O'Shea and Brownell 1994). Chemical pollutants are believed to accumulate at low concentration levels due to the low trophic level of bowhead (O'Hara *et al.* 1998). Bratton *et al.* (1993) describe various aspects of contaminants, but data and understanding of physiological mechanisms are limited. The limited available information suggests that current contaminant exposure poses no threat to bowheads although productivity damage by chemical contaminants on planktonic food resources could potentially affect them.

5) Entanglement

There are no data to estimate the number of entanglement fatalities that occur among bowhead whales, although smaller bowheads are more likely to die from entanglement than larger whales because they may not be powerful enough to break the ropes or have the stamina to drag the gear (Philo *et al.* 1992). Reports of bowhead whales entangled in harpoon lines or ropes from fishing gear have occurred (summarized in Philo *et al.* 1992), but are rare. The effect of entanglement mortality on the Bering-Chukchi-Beaufort bowhead population is unknown, but is likely small, especially while whales are in the eastern Beaufort. Stephenson and Hartwig (2009) ranked gear entanglement as a low threat to bowhead whales in western Canadian waters due to the absence of commercial fisheries and only rare use of seal nets by aboriginal hunters. However, any emerging fishery in Canadian waters or outside the Canadian Exclusive Economic Zone could increase negative interactions with fishing gear.

6) Predation

Killer whales were never seen during the 15 years of ice-based censusing in spring at Barrow, Alaska (George *et al.* 1994) and only a few sightings have been reported recently from the Canadian Beaufort Sea (S. Ferguson, pers. comm.). George *et al.* (1994) examined bowhead whales of the Bering-Chukchi-Beaufort population harvested by Alaskan Inuit for scars from killer whale injuries and estimated that the frequency of scars from killer whale attacks ranged from 4.1% to 7.9%. This low frequency of bite marks on the Bering-Chukchi-Beaufort population reflects a low frequency of killer whale attacks and predation pressure, although bowheads that are successfully killed may go unrecorded (George *et al.* 1994).

Predation by killer whales on bowhead may increase in the future if the refuge provided by ice coverage is reduced and killer whales expand their range further into the Arctic. Currently, killer whales do not represent a serious threat to bowheads while in the Canadian Beaufort.

7) Ice-entrapment

The close association of bowheads with ice places them at occasional risk of entrapment. Inuit have observed ice-entrapped bowhead whales on a few occasions (NWMB 2000) although this has not been observed in the western Arctic. Inuit report that bowheads avoid areas where the ice cover is very extensive (NWMB 2000). Ice-entrapment is likely one of the lowest natural threats to bowheads due to their ability to navigate through extensive ice fields and punch holes up through the ice in order to breathe. Thinning ice in the Arctic in recent years has likely also diminished this potential threat.

1.6. Actions Already Completed or Underway

Surveys

Aerial surveys to estimate the number of bowhead whales using the southeast Beaufort Sea occur on a fairly regular basis in the area of Barrow, Alaska approximately every 4 years (L. Harwood, pers. comm.). Nine areas in the Canadian Beaufort where bowheads are known to aggregate on a consistent, annual basis have been identified and are used to monitor distribution and abundance from year to year (Harwood *et al.* 2010). These areas may require additional consideration with regards to the permitting of industrial activities which might negatively impact bowhead whale use of the areas. A satellite tagging study led by the Alaska Department of Fish and Game which documents movements of bowhead whales and helps identify important migratory routes and feeding areas in the Bering-Chukchi-Beaufort population has Canadian involvement (*i.e.*, Quakenbush *et al*. 2013).

1.7. Knowledge Gaps

While individual anthropogenic activities may affect bowhead whale movement, behaviour or feeding, cumulative effects as a result of multiple activities are likely the greatest threat to bowhead whales in the Canadian Beaufort Sea. Anthropogenic threats which may affect bowheads to varying degrees that require further clarification through study and may contribute to cumulative impacts include;

- The effects of seismic programs and producing oil platforms (*e.g.*, noise from operation and construction, physical presence) on bowhead whale migration, feeding and overall distribution.

- The effects of increased ship traffic (*e.g.*, noise, possible strikes) through feeding areas which may arise if the Northwest Passage becomes a well-used shipping route or if oil and gas exploration, production and shipping of product or ship based tourism increases.

As the distribution of sea ice changes, the amount and distribution of zooplankton may also change. Forage is closely linked to upwellings of nutrients in currents and therefore may not be drastically affected by changes to sea ice cover. However, understanding these potential changes to forage may result in the avoidance of some potential conflicts between bowhead whale distribution in feeding areas and commercial activities. Despite the findings of George *et al.* (2009) regarding a correlation between increased body condition and light sea ice in the eastern Beaufort Sea, this may be a temporary condition which requires further research. However, a loss of sea ice may make the area more susceptible to the encroachment of killer whales which could then negate any benefit to increased body condition.

There are no specific, recent traditional or local knowledge studies on bowhead whale by the Inuvialuit of the western Arctic, likely because harvesting of the species has been rare over the past century. Marquette and Bockstoce (1980) suggested that only six bowheads were harvested by Canadian western Arctic Inuit between 1869 and 1922, perhaps in large part due to the ease with which whale meat could be obtained from commercial whalers. Reeves and Mitchell (1985) found scant evidence for opportunities or interest in bowhead harvesting by Inuit hunters after the 1920s suggesting that the previous tradition of bowhead hunting had gradually been lost. It is believed the last bowhead whale landed by the ancestors of the Inuvialuit in Canada's western Arctic was taken in 1926 at the Baillie Islands (Harwood and Smith 2002). However, Freeman *et al.* (1992) noted the continuing role that the bowhead whale has played in defining the Inuvialuit and reported that even after whaling had ceased, bowhead muktuk was still sought from a variety of sources due to its high value.

Some limited knowledge of bowhead whale habitat is included in the Community Conservation Plans for the Inuvialuit Settlement Region (*e.g.*, Community of Aklavik *et al.* 2008). However, the Inuvialuit bowhead whale hunts of 1991 and 1996, participation by individuals in recent bowhead tagging studies and a more widespread interest in reviving the bowhead hunt may mean that some individuals have recent observations or knowledge that has not been previously recorded (L. Harwood, pers. comm.).

Between 1987 and 2005, thirty bowhead whale carcasses, beached or floating, were reported from various areas of the Canadian Beaufort Sea and Amundsen Gulf. As most carcasses were in an advanced state of decay or in inaccessible locations when discovered, cause of death was never determined. As 11 of these carcasses were found between 2000 and 2005 and the lengths indicated these animals were both adult and juveniles, concern was raised as to the cause. While the number of dead bowhead whales reported has greatly decreased since 2005, it would be prudent for Fisheries and Oceans Canada (DFO) to respond to reports or sightings of carcasses, especially fresher ones, to gather data to assist in determining the cause of death of these whales. The Marine Mammal Response Program of DFO should provide the funds required to ensure this takes place.

The impact of killer whales as predators of bowhead whales in the Beaufort Sea remains unknown, although presumably low, and could increase if the trend for multi-season ice to diminish continues. Increasing knowledge of the distribution of killer whales in the Beaufort as well as collecting any data on the demographics of bowheads attacked might prove useful in management planning. Several killer whale sightings have been made in the Canadian Beaufort Sea in the past few years (http://www.naturenorth.com/OCA/OCAsightings.html).

1.8. Relevant Federal and Territorial Legal Protection

The Bering-Chukchi-Beaufort population of bowhead whale was listed under the *Species at Risk Act* in December 2007 as a species of Special Concern. Bowhead whale are also protected in Canada under the *Marine Mammal Regulations* of 1993, enacted under the *Fisheries Act*, with hunting allowed only by licence.
Bowhead whales have been ranked “Sensitive” in the NWT under the *General Status Ranking Program* (Working Group on General Status of NWT Species 2011). The *Species at Risk (NWT) Act* does not apply to marine animals and will therefore not provide any legal protection.

2. MANAGEMENT

Bowhead whale from the Bering-Chukchi-Beaufort population are regularly harvested by subsistence hunters in Alaska and Russia. The International Whaling Commission (IWC) regulates these hunts. The IWC has approved a six year plan from 2013 through 2018 that could result in a total harvest of 336 bowhead whales with 30 of these assigned for Russian harvest and the rest for Alaskan harvest (IWC 2013). Canada is an observer at the IWC and as such does not receive a quota for bowhead harvest as others do. In Canada, bowhead hunting is co-managed by Fisheries and Oceans Canada and by wildlife management boards created under land claim agreements. The Fisheries Joint Management Committee (FJMC) is the co-management body in the Inuvialuit Settlement Region created by Inuvialuit land claim enacted by the Inuvialuit Final Agreement (Indian Affairs and Northern Development 1984).

Despite a long period during which no bowhead were harvested, the Inuvialuit have maintained the historical and cultural importance of bowhead (Freeman *et al.* 1992). Freeman *et al.* (1992) documented Inuvialuit interest in bowhead harvesting beginning in the early 1960s including attempts to secure licences to harvest bowheads in the 1970s and 1980s. Since the signing of the Inuvialuit Final Agreement, the Inuvialuit have exercised their rights to a subsistence harvest of bowhead whale twice, first in 1991 and then again in 1996. Both hunts were conducted by hunters from the community of Aklavik, under a harvest plan signed by the Aklavik Hunters and Trappers Committee (HTC), the FJMC and DFO and a licence to the HTC from the Minister of DFO.

At the current estimated size of the Bering-Chukchi-Beaufort population and considering the rather large annual Alaskan harvest permitted by the IWC, there is no reason to believe that the Inuvialuit should not be allowed to harvest bowhead whales should they decide to do so again. The Inuvialuit have recently expressed interest in exercising their right to a subsistence harvest and there seems no reason to deny it should a request be made. However, should there be a request for a bowhead hunt by the Inuvialuit, the *Western Arctic Bowhead*

Management Document (DFO, FJMC, IGC 1996) should be updated by all parties prior to the hunt being undertaken.

Current mitigative practices for activities such as seismic surveys require the use of observers for marine mammals, ramp up times for airguns to allow marine mammals time to move away and shut downs when marine mammals are sighted close to the work. These practices are expected to continue to be a requirement for similar activities taking place during times and in areas where bowhead whales are known to frequent and could be present. If shipping increases due to possible longer ice free seasons, speed limits in known congregation areas or creating specific shipping routes that avoid these areas may need to be established to protect bowhead whales. The management of shipping activities will need to be adaptive to respond to various types of shipping when and where they develop (*e.g.*, most likely north of Banks Island for Northwest Passage transits and closer to the mainland for anticipated mining activity). Currently, much of the future ship traffic in the Canadian Arctic is believed to be destinational in nature (Arctic Council 2009; Lasserre and Pelletier 2011) serving proposed mining or hydrocarbon developments which may make it easier to plan routes and timing which will avoid bowhead whale concentrations.

2.1. Goal

The two goals of this management plan are:

- To maintain a healthy population of bowhead whale in the Canadian Beaufort Sea by protecting bowhead whale and bowhead whale habitat; and,

- To provide information and strategies to assist Government, the Inuvialuit Environmental Impact Screening and Review Process and the Inuvialuit Lands Administration in their evaluation of development proposals which may affect bowhead whale, bowhead whale habitat or bowhead whale harvesting.

2.2. Objectives

The following short-term objectives (over the next five years) have been established to assist in achieving the goals of the management plan;

i. To identify and protect important habitats of the Bering-Chukchi-Beaufort population of bowhead whales from disruptive uses;

ii. To evaluate threats to the Bering-Chukchi-Beaufort population of bowhead whales and its habitat and mitigate them whenever possible;

iii. To understand trends in population and habitat; and,

iv. To increase public awareness of the presence, threats and conservation of the Bering-Chukchi-Beaufort population of bowhead whale and its habitat, and its status as a Canadian species at risk.

2.3. Actions

The following non-prioritized actions support the objectives outlined in Section 2.2. Some of these actions have been initiated and are ongoing.

Where responsibility for actions is determined to fall under DFO jurisdiction, actions will be implemented directly as availability of funding and other resources permit. Collaboration with other agencies and organizations may be necessary to complete some actions.

2.3.1. Habitat Protection

Known important feeding areas for bowhead whales include Mackenzie Bay, the Tuktoyaktuk Peninsula and Amundsen Gulf. Important migratory routes are present along the Yukon North Slope and the Tuktoyaktuk Peninsula and connect feeding areas. Actions to protect these habitats include:

- Ensuring that proponents of industrial activities in the Canadian Beaufort Sea are aware of seasonal habitat needs of bowhead whales, Aboriginal Affairs and Northern Development Canada (AANDC) have produced an internet based tool called the *Petroleum and Environmental Management Tool* which highlights sensitive areas of the Beaufort Sea (http://www.aadnc-aandc.gc.ca/eng/1315503786378#sens). This information has been identified by Inuvialuit and wildlife specialists and is intended to alert potential nominators that this area may be subject to additional regulatory terms and conditions during exploratory or developmental work. However, this tool only alerts proponents that there may be special environmental considerations put in place if work takes place within these areas.

- DFO provides specific requirements to proponents such as requiring them to use marine mammal monitors in some areas so that shut downs of seismic work will take place if bowhead whales are seen within a prescribed distance of the operations. Based on the reported number of shutdowns during seismic programs (*e.g.*, Harwood *et al.* 2009), mitigation advice given by DFO to proponents working in these sensitive areas is assisting in protecting bowhead whales.

- Consideration of additional mechanisms for protecting important bowhead whale habitat (*e.g.*, establishment of Marine Protected Areas (MPA), Marine Wildlife Areas or National Marine Conservation Areas). However, no new protected areas are currently being considered in the Canadian Beaufort Sea which would protect known important bowhead whale habitat. Bowhead whales

may occasionally enter the westernmost portion of the *Tarium Niryutait* MPA (Stewart 2013) at the mouth of the Mackenzie Delta, although most of the MPA is too shallow for their use and therefore offers limited protection.

- Continued aerial surveys of the eastern Beaufort Sea and tagging at various locations (*e.g.*, Quakenbush *et al*. 2013) to document the distribution of bowheads and identify temporal and spatial use of areas used repeatedly, primarily for feeding. These areas might be considered for additional management measures in the future. This information can be provided to industry and be used to identify seasonal or permanent "off limit" areas or areas in which the use of marine mammal observers and shut down protocols must be utilized (see "Threat evaluation and mitigation" below).

2.3.2. Research

All research programs concerning bowhead whales in the Beaufort Sea should make an attempt to include any local or traditional knowledge and observations. Any research taking place on other species in the Beaufort should record opportunistic observations on bowhead whales noting, minimally, approximate location and numbers as well as any other information that may be possible to collect (*e.g.*, direction of travel, possible activity of whales) as this information may help identify areas where feeding or segregation by age or sex occurs.

Although currently rare, killer whales in the western Arctic should be reported when observed as this species may have an effect on bowhead whales directly through mortality or indirectly by changing habitat choices and movement patterns. Killer whale sightings can be reported to *WildlifeOBS@gov.nt.ca* or the Orcas of the Canadian Arctic (oca@dfo-mpo.gc.ca).

Threat evaluation and mitigation

It is important to investigate and evaluate the significance of threats facing the Bering-Chukchi-Beaufort population of bowhead whale while in Canadian waters. To be effective, research should focus on the perceived high priority threats, such as noise. Studies on the effects of noise on bowhead activities, the possibility of increased ship strikes on this slow moving species and evaluation of the current mitigation measures in place (*e.g.*, the continued use of monitors and shut down protocols when whales approach closer than a prescribed distance from seismic programs) should be continued or increased. The possibility that use of the Northwest Passage may be increased as ice thins suggests now would be the time to have important bowhead feeding areas identified so that ship traffic could avoid these areas. Known threats currently impacting related species (*e.g.*, beluga whale) could also be investigated to assist in evaluating and perhaps mitigating threats to the bowhead whale.

2.3.3. Monitoring and Assessment

Population estimates should be continued on a regular basis (*e.g.*, every 4 – 8 years) to monitor the population trend to identify if there is any evidence of a decline. Population estimates for this population are currently made approximately every four years in Alaskan waters using an ice based survey (*e.g.*, Zeh and George 2012) as it is impossible to determine population trends once the whales have distributed themselves throughout the eastern Beaufort Sea. When possible, demographics of the population should be noted and reported (*e.g.*, Harwood *et al.* 2010) as this provides information important to note in recovery planning. Similar to the past, any Inuvialuit hunt of bowhead whales will be attended to by DFO and the whale will be sampled to collect biological information. DFO will continue to participate in the satellite tagging study led by the Alaska Department of Fish and Game which documents movements of bowhead whales and helps identify migratory routes and feeding areas (*i.e.*, Quakenbush *et al*. 2013).

2.3.4. Outreach and Communication

Species at Risk information booklets (www.nwtspeciesatrisk.ca) have been released to help identify bowhead whales and other species considered to be at risk, their typical habitat, potential threats and their ranges in the Northwest Territories. However, a plan to raise awareness and facilitate communication should be developed and implemented to inform the public about the Bering-Chukchi-Beaufort population of bowhead whale, where it occurs, the various risks it faces while in Canadian waters and its status as a Canadian Species at Risk. This may increase overall public interest and involvement in conservation activities involving this or other species. The plan should outline objectives, identify target audiences, and select the most efficient means of communication.

Fostering regular communication between researchers in DFO, the FJMC, Wildlife Management Advisory Council (NWT), Wildlife Management Advisory Council (North Slope) and the Government of the Northwest Territories, as well as other agencies involved in wildlife or resource management, will be important in ensuring that information on killer whale sightings or other findings of relevance to bowhead whale management and research are shared on a regular basis.

2.4. Effects on Other Species

Polar bear are currently listed as Special Concern and can be found throughout most of the Beaufort Sea in the same areas occupied by bowhead whale in the summer months. However, it is unlikely that this management plan will have any direct impact on polar bears. However, the proposed management activities may benefit the environment in general and it is possible that implementation of the suggested actions will benefit some native species not at risk. Benefits to other

species may accrue through a reduction or elimination of anthropogenic noise in some areas of the Beaufort, at least seasonally, and perhaps by a slowing or reversal of climate change which will threaten many species. No negative impacts on any species resulting from implementation of the Bering-Chukchi-Beaufort bowhead whale management actions are anticipated.

3. PROPOSED IMPLEMENTATION SCHEDULE

Fisheries and Oceans Canada encourages other agencies and organizations to participate in the conservation of the Bering-Chukchi-Beaufort population of bowhead whale through the implementation of this management plan. Table 2 summarizes those actions that are recommended to support the management goals and objectives. Some of the activities implemented by DFO will be subject to the availability of funding and other required resources, recognizing that aquatic species at higher risk may require more resources, while others will be implemented on a regular basis and do not require additional funding. Where appropriate, partnerships with specific organizations and sectors will provide the necessary expertise and capacity to carry out the listed action. However, this identification is intended to be advice to other agencies, and carrying out these actions will be subject to each agency’s priorities and budgetary constraints.

Table 2. Implementation schedule.

Action	Objective	Priority	Threats or concerns addressed[1]	Participating agencies[2]	Timeframe[3]
Habitat protection					
Ensuring proponents are aware of important habitats	i, iv	High	Known seasonal habitats protected from noise, ship collisions, entanglements	DFO, EC, AANDC, FJMC	Ongoing
Additional means to protect habitat	i	Medium	Key habitats protected from all industrial and commercial activities	DFO, EC, FJMC, AANDC, PCA	1 to 10 years
Research					
Determine effectiveness of current mitigation strategies	ii, iii	High	Ship collisions, hearing damage, pollution threats	DFO, AANDC	1 to 5 years
Document presence of killer whales	ii	Low	Predation threat	DFO, FJMC, GNT	Ongoing
Use Marine Mammal Response Program funding to investigate bowhead carcasses	ii, iv	Medium	Cause of death of beached or floating whales	DFO	Ongoing – as required
Monitoring and Assessments					
Population estimates and tagging in SE Beaufort Sea	iii	Medium	Provides information on important areas, numbers and stock demographics	DFO, Universities, FJMC, ADFG	Ongoing
Outreach and Communication					
Outreach and Communication	iv	Medium	All	DFO, FJMC	1 to 5 years

[1] See section: *1.5.2. Threat description*

[2] Acronyms: **DFO:** Fisheries and Oceans Canada
EC: Environment Canada
FJMC: Fisheries Joint Management Committee
AANDC: Aboriginal Affairs and Northern Development Canada
PCA: Parks Canada Agency
GNT: Government of the Northwest Territories
ADFG: Alaska Department of Fish and Game

[3] Timeframes are subject to change in response to demands on resources.

4. ASSOCIATED PLANS

There are no associated plans that deal specifically with the recovery or management of the Bering-Chukchi-Beaufort population of bowhead whale in Canadian waters. The Beaufort Sea Integrated Oceans Management Plan (Beaufort Sea Partnership 2009) details some strategies which could identify and help protect bowhead whale habitat. There is a plan in Alaska which deals with subsistence harvesting management. Implementation of actions listed in this and other plans will provide a multi-species and multi-jurisdictional approach to conservation of bowhead whales in the western Arctic.

- Beaufort Sea Partnership. 2009. *Integrated Ocean Management Plan for the Beaufort Sea: 2009 and beyond*. Beaufort Sea Planning Office, Inuvik, NT. 57 p. – details activities leading to identification of unique habitats, development of monitoring programs, identification of potential marine protected areas and reducing sources of contaminants.

- *Cooperative agreement between the National Oceanic and Atmospheric Administration and the Alaskan Eskimo Whaling Commission as amended 2013 (2013-2019)* – details responsibilities including reporting of information to be collected when bowhead whales are harvested.

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