Submission of Scientific Information
to Describe Areas Meeting Scientific Criteria for
Ecologically or Biologically Significant Marine Areas

Title/Name of the areas:

- Canadian Archipelago including Baffin Bay

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Abstract
The region within the Canadian Archipelago, extending from Baffin Bay and Davis Strait to the North Water (encompassing the North Water Polynya), and then West around Devon Island and Somerset Island, including Jones Sound, Lancaster Sound and bordering Ellesmere Island and Prince of Whales Island, should be set aside as a protected area for both ice-dependent and ice-associated species inhabiting the area such as the Narwhals (*Monodon monoceros*), Polar bears (*Ursus maritumus*), and Belugas (*Delphinapterus leucus*). The Canadian Archipelago overall has showed slower rates of sea ice loss relative to other regions within the Arctic with areas such as Baffin Bay and Davis Strait even experiencing increasing sea ice trends (Laidre et al. 2005b). Because of the low adaptive qualities of the above mentioned mammals as well as the importance as wintering and summering grounds, this region is invaluable for the future survival of the Narwhal, Beluga, and Polar Bear.

Introduction
The area includes the Canadian Archipelago, extending from Baffin Bay and Davis Strait to the North Water (encompassing the North Water Polynya), and then West around Devon Island and Somerset Island, including Jones Sound, Lancaster Sound and bordering Ellesmere Island and Prince of Whales Island. Significant scientific literature exists to support the conclusion that preservation of this region would support the continued survival of several ice-dependent and ice-associated species. Specifically, the region provides habitat for Narwhals, Belugas, and Polar Bears. Both Narwhals and Belugas are considered near-threatened with unknown population trends under the IUCN Red List, whereas Polar bears are considered vulnerable with a decreasing population trend (IUCN 2008), and all three are listed under the Canadian Species at Risk Act with a status of special concern (COSEWIC 2004).

Not only does the region represent the main habitat for Narwhals and Belugas, but it is also predicted to experience the least environmental change in terms of receding ice. Baffin Bay and other areas within the Canadian Archipelago demonstrate higher degrees of ice retention and stability amidst the impacts of climate change and are therefore key to the persistence of long-lived, slowly adapting ice-dependent and ice-associated species such as the Narwhal, Beluga, and Polar bear.

Sea ice has been disappearing rapidly and it is estimated that by 2100 the Arctic will have lost between 50% and 80% of its sea ice coverage (Overland et al. 2007). While these approximations are extreme the estimated change in ice coverage is not evenly distributed throughout the Arctic. Scientists predict that regions within the Canadian Archipelago as well as Baffin Bay will have much slower melting rates relative to the rest of the Arctic. While one study predicted that by 2050, the Canadian Archipelago region will have approximately an additional 75 days of open water per year (which was a low estimate compared to other regions), the article also noted that the Canadian Archipelago contains sea ice refugia, which are expected to retain ice much longer than nearby regions, and implies that the range of ice-obligate species might be reduced to these areas in the future (Moore et al. 2008). Baffin Bay remains one of the only places in the Arctic to have experienced significant increasing trends in sea ice concentration and extent in the last 25 years (Laidre et al. 2005b) and is the only area in the Arctic predicted to retain approximately the same ice cover through 2100 (Overland et al. 2007).

The implication for this predicted stability of sea ice in Baffin Bay is enormous for the survival of Narwhals, Belugas and Polar bears.

Narwhals and Belugas are considered to be ice-associated species, in other words, they do not depend on sea ice for survival but rather are dependent on the processes and productivity related to sea ice (Tynan et al. 1997). Not only do the whales migrate according to the melting and forming of sea ice, but their livelihoods also depend on the timing of phytoplankton blooms associated with the melting of ice and the cascading of nutrients from lower trophic levels to higher ones (Laidre et al. 2008). Premature phytoplankton blooms due to early melting can disrupt the connection between trophic levels and can lead to reduced food availability for top predators and each level of the food chain in between (Moline et al. 2008). This problem is documented and modeled in the article "Impact of changing ice cover on pelagic productivity and food web structure in Disko Bay, West Greenland: a dynamic model approach (Hansen et al. 2003).

Location

The area is defined as the Canadian Archipelago, extending from Baffin Bay and Davis Strait to the North Water (encompassing the North Water Polynya), and then West around Devon Island and Somerset Island, including Jones Sound, Lancaster Sound and bordering Ellesmere Island and Prince of Whales Island. The region straddles jurisdictions and includes Canadian and Greenland waters.

Maps from: http://encarta.msn.com/map_701584426/Arctic_Archipelago.html

Laidre et al. 2005a:

Feature description of the proposed area

Central Baffin Bay and Northern Davis Strait is the wintering ground to the largest population of Narwhals in the world, providing home to some 50,000 individuals (Laidre et al. 2005a), a very high proportion of the 80,000 total population estimate (IUCN 2008). Satellite studies have shown that three distinct sub-populations exist in Baffin Bay, using two separate wintering grounds where no overlap occurs (Laidre et al. 2005b). Narwhals are highly adapted to life in dense pack ice. Not only are they one of the only cetaceans to occupy such dense ice (Laidre et al. 2005b) but they are also

among the deepest diving cetaceans and regularly descend more than 1,800 m under sea ice to feed on Greenland Halibut (Laidre et al. 2007).

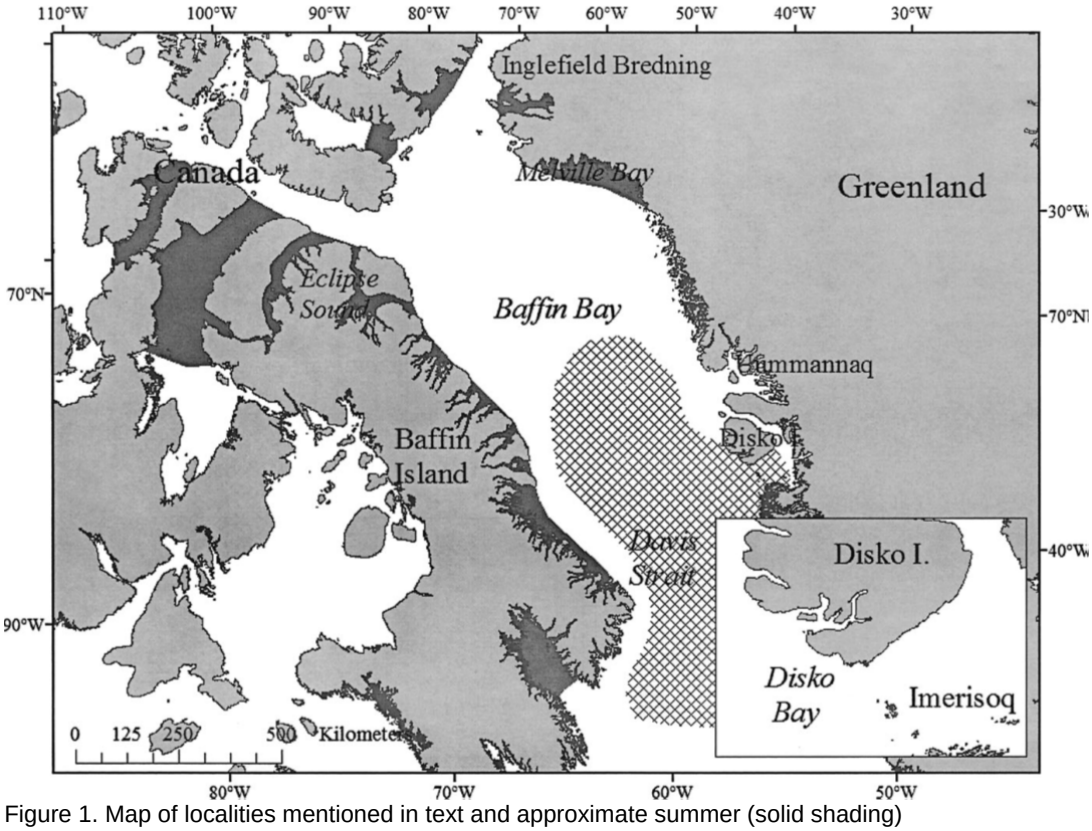

Figure 1. Map of localities mentioned in text and approximate summer (solid shading) and winter (hatched shading) distribution of narwhal subpopulations summering in the Canadian High Arctic or West Greenland and wintering in Baffin Bay, Davis Strait, or Disko Bay. Inset shows close-up of Disko Bay winter region where narwhals were harvested.

The total estimated population of Belugas in the Eastern High Arctic/Baffin Bay area is approximately 21,213 Belugas, a number which rivals that in Hudson Bay and dwarfs populations found in Cumberland Sound, Ungava Bay, and the St. Lawrence River (IUCN 2008). Like Narwhals, Belugas feed little during the summer (Laidre et al. 2005b). They increase their foraging intensity during the migration to their wintering grounds and feed mainly on Cod, Redfish, Wolfish, and Greenland halibut (Laidre et al. 2005b).

Polar bears are found throughout the Arctic. Their total population consists of approximately 20,000 to 25,000 bears, comprised of an estimated nineteen subpopulations (IUCN 2008). Lancaster Sound is home to about 2,541 bears, Davis Strait contains approximately 1,650 bears, and Baffin Bay has an estimated population size of 1,650 bears (Schlieve et al. 2006). Polar bears depend on sea ice as a hunting platform and while they mainly depend on the Ringed seal as their main food source, they have been known to occasionally catch Narwhals and Belugas (Amstrup et al. 2007).

There is a substantial body of research supporting the ecological importance of this region. (See references listed at end of document.)

Feature condition and future outlook of the proposed area

As noted above, scientists predict that regions within the Canadian Archipelago as well as Baffin Bay will have much slower melting rates relative to the rest of the Arctic. The Canadian Archipelago contains sea ice refugia, which are expected to retain ice much longer than nearby regions (Moore et al. 2008). Baffin Bay remains one of the only places in the Arctic to have experienced significant increasing trends in sea ice concentration and extent in the last 25 years (Laidre et al. 2005b) and is the

only area in the Arctic predicted to retain approximately the same ice cover through 2100 (Overland et al. 2007).

The area is, however, vulnerable to the potential pressures of oil and gas exploration and increased ship traffic. A future threat remains the potential of an Arctic sea route to open up due to the diminishing ice area extent. A viable Northwest Passage would greatly reduce distances traveled by ships, which in turn reduces shipping costs, time traveled and emissions, and is therefore very attractive to the shipping industry. For example, a shipping route between Europe and Asia would be approximately 9,000 km shorter through the Arctic than the current route through the Panama Canal (Wilson et al. 2004). Already certain areas have experiencing longer shipping seasons such as the Hudson Bay where ice coverage in the summer has already decreased by 40% from 1971 to 2001 (Tivy et al. 2007). While regions experiencing greater ice retention such as Baffin Bay might not open up for year-round shipping, there is very high variability of melting within the Canadian arctic and so while some areas may become ice-free others will continue to remain impassable by ships. While there remains much excitement about the possibility for a Northwest Passage opening up by mid-century, sea ice conditions remain highly variable which make projections uncertain (Wilson et al. 2004).

With or without the emergence of a Northwest Passage, shipping traffic in the Arctic will expand and negatively affect the Arctic species inhabiting these areas through various types of pollution and disturbances. For instance, oil spilled in the Arctic is almost impossible to clean up because of the presence of ice and the fact that oil disintegrates more slowly in low temperatures, and can have very negative impacts on marine ecosystems (Laulajainen 2009). Narwhals are also being hunted in greater numbers in Greenland and the Canadian Arctic due to limited harvesting restrictions and increasing human population along with the improved technology in the area (Lairde et al. 2005). Also, noise pollution caused by ships has shown to alter navigation, behavior and breathing patterns of marine mammal species (Marcoux 2008).

These problems will be amplified by one of the main issues with the melting of sea ice, which is increased shipping traffic through the Canadian Archipelago. Not only will cargo ships become more common through greater accessibility to ports, but also the thawing of land areas containing large natural gas reserves will become available for extractive production (Wilson et al. 2004). Vast natural gas and oil reserves have already been found on Melville Island in the Canadian Archipelago (Kubat et al. 2007). The total resources estimated in the Sabine Peninsula and western Sverdrup basin on Melville Island are 44 to 50 trillion cubic feet of natural gas and 3.5 to 5.5 billion barrels of oil (Harrison 2006). If companies were to pursue the extraction of these resources it would most likely lead to very high traffic through Arctic waters and profoundly impact the species living in them. While significant obstacles exist in exploiting these resources, such as sea ice and lack of infrastructure, the business has the potential of being very lucrative (Harrison et al. 2006). If it were to happen, two possibilities exist for the transportation of these shipments during the summer. The first would be to ship the gas to a terminal in the Beaufort Sea and then by pipeline and the second scenario would be to deliver the gas to Eastern Canada through Baffin Bay during the summer months (Kubat et al. 2007). If this were to happen, it would likely have a significant affect on the marine mammals residing in the area. For the Narwhal, Beluga, and Polar bear, this increased disruption of ships coupled with changes in Habitat due to climate change will make survival increasingly more difficult. For this reason, regions in the Canadian Archipelago and Baffin Bay should be blocked off in order to ensure the future survival of these species.

Assessment of the area against CBD EBSA Criteria

(Discuss the area in relation to each of the CBD criteria and relate the best available science. Note that a proposed area for EBSA description may qualify on the basis of one or more of the criteria, and that the polygons of the EBSA need not be defined with exact precision. And modeling may be used to estimate the presence of EBSA attributes. Please note where there are significant information gaps)

CBD EBSA Criteria (Annex I to decision	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No informat	**Low**	**Medi um**	**High**

IX/20)		**ion**			
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking: A high proportion of the total Narwhale population winter in Baffin Bay and Northern Davis Strait, and satellite studies have shown that three distinct sub-populations exist in Baffin Bay, using separate wintering grounds where no overlap occurs (Laidre et al. 2005b). The region is unique for its sea ice refugia. It is the only area in the Arctic predicted to retain approximately the same ice cover through 2100 (Overland et al. 2007).					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking: In addition to the Narwhale populations that winter in the region, the region is also of vital importance to belugas and Polar bears.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Explanation for ranking: The region provides the main habitats for Narwhals, Belugas, and Polar bears and is therefore invaluable for the preservation of these species. Both Narwhals and Belugas are considered near-threatened with unknown population trends under the IUCN Red List, whereas Polar bears are considered vulnerable with a decreasing population trend (IUCN 2008), and all three are listed under the Canadian Species at Risk Act with a status of special concern (COSEWIC 2004).					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.			X	
Explanation for ranking: The aforementioned species are vulnerable to degradation of the ecosystem. The threat of climate change coupled with a Northwest passage or increased oil and gas exploration in this region makes it highly vulnerable.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.			X	
Explanation for ranking: During the winter, demersal Greenland halibut constitute the main portion of the Narwhal diet, as the whales are forced to dive under the ice to hunt (Laidre et al. 2005b). One study demonstrated that whale wintering grounds were concentrated where bottom temperatures ranged between 0°C and 1.5°C, a range that correlated to the highest density of Greenland halibut (Laidre et al. 2004). The high concentration of Narwhales in the winter moths suggests high biological productivity.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.	X			
Explanation for ranking: Comparative diversity uncertain.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level				X

	of human-induced disturbance or degradation.				
Explanation for ranking: Area currently enjoys relatively low level of human induced disturbance.					

Sharing experiences and information applying other criteria (Optional)

Other Criteria	**Description**	**Ranking of criterion relevance** (please mark one column with an X)			
		Don't Know	**Low**	**Medium**	**High**
Add relevant criteria					
Explanation for ranking					

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Maps and Figures

Maps from: http://encarta.msn.com/map_701584426/Arctic_Archipelago.html

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