

MAPPING CRITICAL WHALE HABITAT IN THE NUNAVUT SETTLEMENT AREA

Prepared by: Jeff W. Higdon, Higdon Wildlife Consulting, Winnipeg, MB

Prepared for: Brandon Laforest, Senior Specialist, Arctic Species & Ecosystems, WWF-Canada, Iqaluit, NU

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Re: mapping critical whale habitat in the Nunavut Settlement Area

Introduction

The Nunavut Planning Commission (NPC) is planning the use of the land and marine environments in the Nunavut Settlement Area (NSA), through the on-going development of a Draft Nunavut Land Use Plan (DNLUP). WWF-Canada (WWF) is actively engaged in the planning process for the DNLUP and provided various inputs throughout the process including written submission and datasets. In the latest draft of the plan, released June 2016, two areas were identified by the Coral Harbour Hunters and Trappers Organization (HTO) to be critical calving grounds for beluga whales (*Delphinapterus leucas*) and shipping seasonal restrictions were applied. These types of sensitive habitats should receive special protection and/or management, and WWF therefore sought to complete the spatial information to make sure all the known calving areas are identified for submission to the NPC, along with other critical whale habitats.

This report summarizes the scientific and traditional knowledge sources of spatial information on whale sensitive/critical habitat for three Arctic cetaceans - beluga whales, narwhal (*Monodon monoceros*), and bowhead whales (*Balaena mysticetus*). The best available data are used to produce a GIS-based inventory of critical whale habitat spatial information within the NSA and report on the biological value of critical habitats and the support for special management of these areas. The DNLUP states that belugas are sensitive to disturbance during the summer calving season, and also identifies a need to "[d]evelop an improved understanding of whale calving, and when nursing cow whales and their young are most sensitive [s. 6.8.9]. These data can therefore improve the NPC's understanding of whale life cycles and sensitive periods.

The report includes maps of the information gathered within the NSA, and the digital spatial data used to create these maps complements the report. Spatial information is reported by species and stock (as defined by DFO (Richard 2010) and/or the Committee on the Status of Endangered Wildlife in Canada [COSEWIC]). A narrative on the definition of critical habitats and on calving activities is provided to support the rationale of special management designation under the DNLUP.

Methods

Defining critical habitat

As a first step, an objective definition of what constitutes "critical habitat" or "sensitive habitat" is needed. The Department of Fisheries and Oceans (DFO) defines critical habitat for aquatic species at risk (SAR) as the habitat vital to the survival or recovery of wildlife species. The habitat may be an identified breeding site, nursery area or feeding ground. None of the three Arctic cetaceans (or their stocks) are listed on Schedule 1 of the Species at Risk Act (SARA), but the definition does provide guidance as to the types of habitats that should be considered for additional protection under the DNLUP.

The SARA definition of critical habitat for aquatic SAR included spawning grounds and nursery, rearing, food supply, and migration routes. The Recovery Plan for St. Lawrence beluga whales (DFO 2012) defines critical habitat as providing the following essential functions: calving, suckling, feeding, rearing of the young, socialization, and seasonal migration.

Data collection efforts therefore focused on calving and/or nursery/rearing habitats as a priority, and report on important feeding, migratory and socializing habitats depending on data availability. A focus on calving activities will also assist the NPC with their identified need to develop an improved understanding of when and where nursing cow whales and their young are most sensitive.

Data sources

Spatial information on habitat use was compiled from a variety of sources including peer-reviewed literature, technical reports, local knowledge, and consulting company reports.

Database structure

Data on critical/sensitive habitats are reported by species and stock/population (Table 1) for those stocks that are found in the NSA. Several additional stocks, namely the Eastern Beaufort Sea, Ungava Bay and James Bay beluga whale stocks and the Bering-Chukchi- Beaufort Seas stock of bowhead whales, may occasionally enter water covered under the NSA, but they are not included in the database. For each stock/population, the database lists the status under COSEWIC and SARA (if applicable).

Important habitats are defined by type (i.e., calving/calf rearing) and sources are provided for each area identified. In addition, for each mapped area I have identified whether the information is from scientific or traditional knowledge sources, or both. For each identified habitat area, the database reports on overlap with existing NPC/DNLUP designations, as this provides information on the overall/cumulative importance of these areas.

Results and discussion

The GIS database and associated Excel file includes a total of 36 important habitat areas (66 polygons because some areas are multi-shape) for the three cetacean species (see Appendix 1). Most effort went into defining calving and calf rearing areas, for reasons noted above, but some important (or critical) habitats are also defined for foraging, migration, and overwintering, depending on data availability. These important habitats are largely limited to eastern and central Nunavut, as there is little information to support critical habitat designations for cetaceans in western Nunavut (although there is evidence to support important areas for pinnipeds (primarily ringed seals) and polar bears, see for example the various EBSAs defined by DFO 2011). The different habitats are described below on a type (calving, foraging, etc.) basis.

All GIS analyses were done using a land shapefile provided by ESRI, and this file is coarser in resolution than that used by the NPC in their GIS database. As such, there are slight differences in the coastline and island boundaries between the two files, causing slight discrepancies. These discrepancies can be easily rectified by NPC staff should these polygons be added to their database and included in the NLUP.

For multi-part habitat areas (i.e., multiple polygons), overlap with existing NLUP Designations and Valued Components are defined on a habitat area, and not polygon, basis. In other words, overlap for each habitat area is defined consistently for all polygons comprising that area, even though each individual polygon may not overlap with each specified designation.

Calving/rearing habitats

The GIS database and associated Excel file includes calving and calf rearing areas for the three Arctic cetacean species, with a total of 41 different polygons in 19 different species/stock combinations. The ID code in the shapefile links to the appropriate column in the Excel file. For each species/stock entry, data fields include the months in which calving and nursing occur, suggested designations for protection (see below), sources for more information (in the Excel file), and overlap between the identified habitats and existing areas included in the DNLUP (for both Designations and Valued Components). Regarding recommended status, all are suggested as Special Management Areas with the exception of two - areas used by the Cumberland Sound beluga stock and the Eastern Hudson Bay beluga stock, which are considered to be "at risk" by COSEWIC. These are recommended as Protected Areas, with additional limitations on activities. The other areas are recommended as Special Management Areas, where the critical uses by cetaceans can be maintained through management actions such as seasonal closures or restrictions, vessel restrictions such as vessel speed maximums or having observers on watch, limitations on tourism activities, etc. A map of critical calving and calf rearing areas, by species, is shown in Figure 1. The same areas are mapped in Figure 2, only showing areas of overlap among the three species.

Beluga whales

Breeding behaviour in beluga whales is not well understood, but mating is thought to occur in offshore areas in late winter and early spring (Brodie 1971; Burns and Seaman 1985). Breeding habitat is therefore undefined. Calving in estuaries has been postulated (Sergeant 1973), but detailed studies in two Canadian estuaries never recorded a calving event (Caron and Smith 1990; Smith et al. 1994). Most calving appears to occur on offshore areas, on spring migration, as belugas whales often arrive at estuaries with calves already at their side. Calves are born between June and September, with a peak in mid-June to early July (Brodie 1971; Sergeant 1973; Stewart et al. 1995). In addition, many of these estuaries are outside the NSA (see below). As such, some of the important summer habitats identified for beluga whales (COSEWIC 2004a) are defined as calf rearing and nursing habitats, not calving habitats *per se*. The Western-Northern-Southern Hudson Bay (WNSHB) beluga whale stock (referred to as the Western Hudson Bay population by COSEWIC 2004a) does occur in Nunavut waters, but the primary calf rearing areas in the Seal, Churchill and Nelson river estuaries in Manitoba are outside the NSA and are therefore not mapped (calving areas identified in the DNLUP by the Coral Harbour HTO are included in the database).

Narwhal

While the distribution and migration patterns of narwhal are well known, their habitat requirements (i.e., reasons for selecting certain habitat types) have received little study (COSEWIC 2004b). As such, much of the information on narwhal calving and/or calf rearing habitats comes from Inuit knowledge (e.g., Remnant and Thomas 1992; Stewart et al. 1995; Gonzalez 2001; Stewart 2001; Westdal 2008), coupled with aerial survey and shore-based scientific observations (e.g., Silverman 1979; Hay 1984; Koski and Davis 1994; Marcoux et al. 2009; Richard et al. 2010). In summer, narwhals are found in coastal areas that offer deep water and shelter from the wind, and during winter they are found in heavy pack ice over deep winter (COSEWIC 2004b). Females lose blubber over the course of a summer, suggesting that their summer habitat selection may be related more to calving requirements than feeding opportunities (Finley and Gibb 1982). Conception is thought to occur between late March and mid May, peaking in mid-April, and most calves are born in July and August (Mansfield et al. 1975; Hay 1984; Hay and Mansfield 1989). Calving commonly occurs in inlets, bays, and fjords (Hay 1984). Calving and calf rearing areas for the Smith Sound stock have not been studied, and no data are available, although it likely occurs somewhere within the stock's summer range.

Bowhead whales

Bowhead whales are widely distributed throughout the waters of the NSA and surrounding areas, and this population exhibits significant age- and sex-based segregation, with juveniles and mothers with calves tending to remain apart from the rest of the adults during summer (Reeves et al. 1983; Cosens and Blouw 2003; COSEWIC 2009). Bowhead whales become sexually mature at around 25 years of age, and adult females give birth to a single calf about every 3-4 years (Koski et al. 1993). Sexual activity occurs during the year, although most conceptions occur in late winter or early spring based on studies of fetuses (Koski et al. 1993). Research in Alaska shows that calves are usually born between April and early June during the spring migration, with a peak in May (Koski et al. 1993). The Inuit Bowhead Knowledge Study (NWMB 2000) provides extensive information on bowhead whale distribution and ecology in Nunavut and highlights the importance of nearshore waters for many activities including feeding, mating, and calving. These Inuit observations are complementary to the

available scientific knowledge (e.g., Cosens and Blouw 2003). Calf rearing (i.e., nursery) habitats are well understood, but actual calving locations less so. There does appear to be a calving area in western Hudson Strait, which is included in the database, but this is uncertain (NWMB 2000).

Feeding habitats

The GIS database and associated Excel file includes some important feeding areas for the three species, with a total of 19 different polygons in 11 different species/stock combinations. Database structure and status recommendations follow that identified above for calving and nursing habitats. A map of critical feeding areas, by species, is shown in Figure 3. The same areas are mapped in Figure 4, only showing areas of overlap among the three species.

Beluga whales

There is little information available to indicate critical feeding habitats for beluga whales, and they likely feed throughout their range in the NSA. Inuit report that beluga whales throughout the Baffin region consume Arctic cod (*Boreogadus saida*) from March through December, both at floe edges and inshore (Remnant and Thomas 1992; Stewart et al. 1995; Stewart 2001). Scientific research (e.g., Matley et al. 2015) also supports the critical importance of this species to the EHA-BB stock of beluga whales. Inuit in Arctic Bay report that belugas feed extensively on Greenland halibut (*Reinhardtius hyppoglossoides*) at the Admiralty Inlet floe edge (Stewart et al. 1995). Belugas are generally fatter when they arrive in the spring than when they leave in the fall (Remnant and Thomas 1992; Stewart et al. 1995; Stewart 2001), suggesting that summer habitats are primarily chosen for reasons other than foraging (e.g., calving, nursing, killer whale (*Orcinus orca*) avoidance). Inuit knowledge sources note that foraging is widespread in the region however, and there is little to distinguish critical feeding areas. The maps in Stewart (2001), for example, which summarizes data from multiple TEK studies, does not show the locations of any feeding areas outside southeast Baffin Island (although this is likely partly related to the methodologies used by the researchers in the original TEK studies, and not indicative of a lack of local knowledge). Similarly, studies using hunter-harvested samples such as stable isotopes and stomach contents (Matley et al. 2015) can provide information on food species and seasonal patterns, but not on the spatial pattern of critical foraging habitats.

Satellite-tracking studies (e.g., Smith and Martin 1994; Heide-Jørgensen et al. 1998; Richard et al. 1998, 2001) show areas where beluga whales are presumably foraging in various areas of the eastern Canadian Arctic, including Jones Sound, Barrow Strait, Lancaster Sound, Peel Sound, and northern Baffin Bay. Sample sizes are small when one considers that the whale population numbers in the thousands, which makes it challenging to identify areas that can be deemed "critical" for foraging. When combined, the studies by Smith and Martin (1994) and Richard et al. (2001) probably describe the behaviour of a substantial portion of the EHA-BB beluga stock however, and they suggest that southern Peel Sound, particularly the area of the Franklin Trench, may be an important foraging area for belugas in August. This region is therefore included in the database.

Belugas in Hudson Bay may feed opportunistically during the summer, but there is little evidence for intensive foraging while they are in their summer estuary habitats. Whales tagged

in eastern Hudson Bay departed their summering area between mid-September and late November, and diving activity increased significantly while they were located north of the Belcher Islands for the several-month period prior to migration, suggesting possible foraging activity (Bailleul et al. 2012). When beluga whales in western Hudson Bay begin their spring migration it is marked by diving in deep water and assumed foraging (Martin et al. 2001). These studies do not indicate any critical foraging habitats, however. The area around Whale Cove, north of Churchill, may be more important than the estuaries for late summer feeding, but this is uncertain and there is again no information with which to spatially define foraging areas (Sergeant 1973).

Interviews with Nunavik hunters indicated seasonal changes in body condition (blubber thickness) associated with observations about the seasonality of feeding (Breton-Honeyman et al. 2016). Beluga whales accumulate fat in the late fall and winter, suggesting that most foraging occurs outside Hudson Bay. Stewart (2001) maps (Figures 3, 4) areas in eastern Hudson Strait, near Kimmirut, and in Frobisher Bay, that are used as feeding areas in spring and early summer (using data from Kilabuk 1998). These whales may represent a mix of several summer stocks, including WNSHB and EHB. The Frobisher Bay area is defined in the database as WNSHB (based on Richard 2010), and the areas in eastern Hudson Strait are assigned to both stocks. The eastern Hudson Strait foraging area is recommended as a Protected Area because it may be used by the Endangered (COSEWIC 2004a) EHB stock. If beluga whales forage most intensively during the winter, the wintering habitats identified for Hudson Bay beluga whale stocks (see below) would presumably offer similar levels of protection for important feeding habitats.

In Clearwater Fiord, Cumberland Sound, belugas stomachs are often empty in summer, and those that did have stomach contents contained a variety of benthic organisms (Brodie 1967, 1970; Richard and Stewart 2009). Belugas that leave Clearwater Fiord in the fall are also noticeably thinner than those entering in the spring (Kilabuk 1998). This suggests a summer diet shift to opportunistic feeding on invertebrates while their fall and winter foraging targets pelagic and benthic fishes. Because these whales are relatively sedentary compared to other stocks, the entire Cumberland Sound area likely represents important (but not necessarily critical) foraging habitat. Local Inuit report that belugas eat Arctic cod and Greenland halibut at the floe edge in spring (Kilabuk 1998). Recent work in Cumberland Sound belugas has studied foraging behaviour using fatty acids in blubber samples collected from subsistence-hunted belugas and satellite tag information (Watt et al. 2016). The authors expected that recent food web changes, specifically increased abundance of capelin (*Mallotus villosus*) in the region, would have impacted beluga diet and diving behaviour. Fatty acid analyses indicated changes from the 1980s compared to the 1990s and 2000s and suggested an increased consumption of capelin with a reduction in Arctic cod in summer in more recent years (Watt et al. 2016, also see Marcoux et al. 2012 for similar findings from stable isotope studies). Dive behaviour suggested that foraging tactics differed across seasons: short, shallow short dives occurred in summer, and deeper longer dives were made in autumn and winter, possibly indicating foraging on deeper prey such as Arctic cod and Greenland halibut. The authors suggested that fall and winter are potentially important foraging seasons for Cumberland Sound belugas (Watt et al. 2016). The only critical foraging habitat identified for this stock is therefore the same area defined as wintering habitat (Richard and Stewart 2009), which is described below.

Narwhal

Different populations of narwhal employ specialized foraging strategies, with variation in diving behaviour and prey consumed (Watt et al. 2015). Narwhal feed year-round, but winter appears

to be the most important season for this activity (Laidre and Heide-Jørgensen 2005). Female narwhals lose blubber during the summer, and stomachs of landed animals are often empty, which suggests that summer habitat selection may be related more to calving requirements than feeding opportunities (Mansfield et al. 1975; Finley and Gibb 1982; Hay and Mansfield 1989). Inuit observations in eastern Baffin Island and Eclipse Sound suggest that they may increase their food intake prior to migration (Remnant and Thomas 1992; Stewart et al. 1995). Arctic Bay Inuit report that feeding takes place within Admiralty Inlet and along the floe edge (Remnant and Thomas 1992). Fjords and bays along the east Baffin Island coast (e.g. Home Bay, Eglinton Fiord) are also reported by Inuit to be summer feeding grounds, although the winter floe edge may be more important for foraging (Remnant and Thomas 1992). For the wide-ranging and abundant Somerset Island stock, feeding is reported to occur towards Austin Channel, west of the community of Resolute Bay, and along the southwest coast of Devon Island (Remnant and Thomas 1992). The Peel Sound EBSA is also recognized as an important feeding area for the SI narwhal stock, in addition to calving (DFO 2011, 2015).

Overall, Inuit knowledge studies (Remnant and Thomas 1992; Stewart et al. 1995; Stewart 2001) identified relatively few important feeding areas in the Baffin region. The ones that were identified were the floe edge and fjords of Home Bay and around Canso Channel; Milne Inlet, Eclipse Sound, and Koluktoo Bay; and an area in Barrow Strait west of Resolute and another along the southwest coast of Devon island. However none of these areas were explicitly mapped by Stewart (2001), and they are included in the database based on the seasonal distribution maps.

Narwhal in northern Hudson Bay (NHB stock) are "nice and fat when they come in the spring so you can tell that they come from a place of good eating" (Gonzalez 2001), suggesting that these animals also forage intensively during the winter season. Frozen Strait is known to be very deep with strong currents and a preferred place for narwhal to feed, and they are also reported to feed in Lyon Inlet (Westdal 2008; Westdal et al. 2010). Both areas are already included in the database as important calving/nursing areas.

New research by Watt et al. (2017) used satellite-tagging data from the ES and NHB narwhal stocks to identify important seasonal foraging areas. These analyses mapped important foraging areas on the summer grounds, the winter grounds, and along the migratory pathways between the two. This new study represents an important contribution to our knowledge on critical foraging habitats, and all the areas identified by Watt et al. (2017) are included in the database. Several of the areas identified in this study corroborate Inuit observations, for example Frozen Strait, Eclipse Sound, and Admiralty Inlet (Remnant and Thomas 1992; Westdal 2008; Westdal et al. 2010). Watt et al. (2017) also identified foraging locations on narwhal wintering grounds (see below).

Bowhead whale

Bowhead whales eat vast quantities of zooplankton including copepods and euphausiids (Pomerleau et al. 2014), and they forage year-round throughout their distribution (Matthews and Ferguson 2015). All areas of their range can be considered foraging habitats, but not necessarily "critical" foraging habitats. There is some feeding on ice-associated zooplankton in spring, but the most intensive foraging occurs during the open-water season (Finley 2001; Pomerleau et al. 2011a,b, 2012). As zooplankton specialists, bowhead whales enjoy optimal foraging conditions over several months in late summer and fall when zooplankton descend to

overwintering depths (Finley 1990, 2001; Finley et al. 1993; Pomerleau et al. 2011a,b). As such, the areas previously identified as critical calving/nursing areas also comprise the most important foraging areas in summer and early fall (e.g., Ferguson et al. 2010). Isotopic analysis of baleen plates indicates that bowheads alternate between periods of intense foraging during the open-water season and supplemental (reduced) food intake during winter/spring (Matthews and Ferguson 2015).

Inuit provided many observations of bowhead feeding (NWMB 2000), particularly interviewees from Clyde River. Bowhead whales feed in the Clyde River area in late summer and fall, including at Igaliktuuq/Isabella Bay, and local Inuit regularly observe them actively feeding (e.g., swimming with their mouth wide open). Bowhead whales also feed at Natsiqsujuk (at the mouth of Scott Inlet) and at Arviqtuuq/Eglinton Fiord (NWMB 2000). Inuit in numerous other communities have identified areas where bowhead whales feed, including Repulse Bay in summer; the Cumberland Sound floe edge during spring; at various locations in Cumberland Sound during summer; in the inlets, bays and fiords in the Pond Inlet area in summer; in Admiralty Inlet during summer; in northern Foxe Basin during summer; and in the Qikiqtarjuaq area in summer and fall (June to September) (NWMB 2000). Many of these areas are already included in the database under calving/calf rearing areas.

The only areas that are included in the database are the Isabella Bay/Scott Inlet/Eglinton Fiord region of eastern Baffin Island (Finley 1990, 2001; Finley et al. 1993; NWMB 2000) and the Gulf of Boothia and Prince Regent Inlet area (Higdon 2007; Ferguson et al. 2010; DFO 2011, 2015). These areas are also included as calving/nursing areas, as noted above. Additional research may support other areas being defined as "critical" foraging areas for EC-WG bowhead whales.

Migration routes

The GIS database and associated Excel file includes three areas that are important for migration for multiple species. Database structure and status recommendations follow that identified above. A map of these important migration routes is shown in Figure 5.

All species

Both Lancaster Sound and Hudson Strait are primary migration routes for all three cetacean species (e.g., Read and Stephansson 1976; Richard 1991; 2010; Richard et al. 1994, 2010; Gonzalez 2001; Lewis et al. 2009; Ferguson et al. 2010). The three species also migrate along the east Baffin Island coast. These are large areas, however, and the exact routes used by individuals are not known with certainty, and they may also vary with environmental conditions (ice cover, etc.). As such, identifying particular corridors within these large areas is difficult, and other methods, such as defined shipping corridors, vessel speed limits, noise restrictions, etc., may be the most effective ways to minimize impacts to migrating cetaceans in these areas.

Several smaller channels and straits are also important to cetacean migrations, however, and these can be mapped and identified for protection via the land use planning process. Three areas are identified: 1) Fury and Hecla Strait, an important migratory corridor used by all three

cetacean species (NCRI 2008; DFO 2014; Paulic et al. 2014); 2) Bellot Strait, which is used by both beluga and narwhal as a migratory corridor in July and August (Richard et al. 2001; Heide-Jørgensen et al. 2003a; DFO 2015); 3) Frozen Strait, which is the main migratory corridor that NHB narwhal use to move into and out of the Repulse Bay area in spring and fall (Gonzalez 2001; Westdal 2008; Westdal et al. 2010) (and is also used by WNSHB beluga whales and EC-WG bowhead whales).

Wintering areas

Most information on over-wintering areas for the three Arctic cetaceans comes from scientific research, primarily satellite-tagging studies and aerial surveys. There is some TEK available (e.g., Lewis 2009), but there is less than for other seasons because whales are more difficult to observe during the winter season due to environmental conditions like sea ice cover and darkness, and because they tend to be further offshore than in the summer when they are found in coastal areas. Wintering areas for all three species are included in the database, and one area (the North Water Polynya) is included as a wintering area for all three species.

A total of three different wintering areas (single polygon per area) are included for wintering areas, including one area used by all three species. A map of these overwintering areas is shown in Figure 6.

All three species

The North Water Polynya, in northern Baffin Bay between Canada and Greenland, is the largest polynya in the Canadian Arctic. It is used by the three cetacean species (and the two monodontids in particular) as important wintering habitat, from March to July (Finley and Renaud 1980; Richard et al. 1998; Heide-Jørgensen et al. 2003b, 2013, 2016; DFO 2011, 2015).

Beluga whales

Most beluga whale stocks migrate long distances between their summering and wintering grounds (COSEWIC 2004a), although there are exceptions, such as the Cumberland Sound population, which is relatively sedentary (Richard and Stewart 2009). That beluga whale stock migrates a short distance from their calving area in Clearwater Fiord to their wintering area in eastern Cumberland Sound (Richard and Stewart 2009; DFO 2015). This area is recommended for Protected Area status given the Threatened nature of the beluga stock (COSEWIC 2004a). Some beluga whales from the EHA-BB stock winter in the North Water Polynya, as noted above. Others winter along the coast of West Greenland (Heide-Jørgensen and Aquarone 2002; Heide-Jørgensen et al. 2003b), and these areas are not included in the database since they occur well outside the NSA.

Winter habitats of the two Hudson Bay beluga whale stocks have been studied using satellite telemetry, aerial surveys, and Inuit knowledge. Satellite-tags affixed to whales during the summer often stop working before the fall migration is complete, adding uncertainty to our

understanding of critical wintering areas. Both the WNSHB and EHB stock overwinter in areas of Hudson Strait, but EHB whales that have been tagged for a sufficient time period to study wintering habitat have stayed in southern Hudson Strait and Ungava Bay (and the Labrador Sea), outside the NSA (Lewis et al. 2009; Bailleul et al. 2012). Some tagged whales occasionally moved into NSA waters near Resolution Island, but their winter core areas (i.e., critical habitats) were further south (Lewis et al. 2009). As such, no winter habitat for the EHB beluga whale stock has been defined within the NSA. Four WNSHB beluga whales instrumented at the Nelson River estuary (MB) had their tags last long enough to provide winter (December - February) locations (Smith 2007; Smith et al. 2007). Two of these whales spent time near Resolution Island, within the NSA, and the other two were in southern Hudson Strait and Ungava Bay, outside the NSA and overlapping with the areas used by EHB beluga whales (Lewis et al. 2009; Bailleul et al. 2012). These data indicate that some beluga whales overwinter in this area, but are not sufficient to define critical habitat. There have been limited aerial surveys in this area during winter and spring. Surveys flown in March 1981 and March-April 2012 (Finley et al. 1982; Elliott et al. 2013) both found belugas to be widely distributed in the Hudson Strait pack ice, preferring deeper areas with moderate sea ice cover. Sightings are generally concentrated in central and southern Hudson Strait, outside the NSA. The entirety of Hudson Strait appears important for beluga whales in winter, but critical habitat cannot be defined with available data.

Narwhal

Narwhals from the various Baffin Island stocks use several different wintering areas in the deep offshore waters of Baffin Bay, with some overlap between different stocks (Dietz et al. 2001, 2008; Heide-Jørgensen et al. 2002, 2003a; Watt et al. 2012). A few tagged whales (from Admiralty Inlet and Eclipse Sound) have made sporadic movements into coastal areas south of Qikiqtarjuaq, but there is little overlap between wintering areas and the NSA. None of the area sporadically used can be considered critical habitat. One narwhal tagged in Admiralty Inlet overwintered in northern Foxe Basin (Watt et al. 2012), and Inuit in Igloodik also report that narwhals remain in the Fury and Hecla Strait during the winter (White 2012). The importance of this area for narwhal overwintering is not known, however, and it is therefore not included in the database. Aerial surveys indicate that at least some members of the NHB narwhal stock winter in eastern Hudson Strait (McLaren and Davis 1982; Richard 1991; Koski and Davis 1994; Elliott et al. 2013), but like belugas, most sightings occur offshore of coastal areas, outside the NSA, in deep waters with heavy pack ice cover. Satellite-tagged animals from this stock wintered outside Hudson Strait, in an area east of Resolution Island (Westdal 2008; Westdal et al. 2010). This area again barely overlaps with the NSA boundary, and no critical habitat is included in the database. Some animals also overwinter in northwest Hudson Bay (Richard 1991), but this importance of this area for narwhal overwintering is unknown. No narwhal critical overwintering habitat is therefore included.

Bowhead whales

Bowhead whales are widely distributed during the winter, and there are little data available to define critical wintering habitats within these large areas. They are found throughout Hudson Strait during the winter season, ca. November to March (Heide-Jørgensen et al. 2006; COSEWIC 2009; Ferguson et al. 2010), but, similar to results for narwhal and beluga, most sightings during aerial surveys occur in the central portion of Hudson Strait in offshore areas of heavier ice, outside of the NSA boundaries (Koski et al. 2006; Elliott et al. 2013). Some bowhead whales also winter near the mouth of Frobisher Bay (Ferguson et al. 2010; Matthews and Ferguson 2015), but the importance of this area is not well understood, and the data are

not sufficient to determine whether it is critical habitat. Bowhead whales also overwinter in and near the polynya in eastern Cumberland Sound, an area that is already defined as important overwintering habitat for the Cumberland Sound beluga whale stock (see above). This area is included in the database as critical overwintering habitat, with the mapped extent defined based on Matthews and Ferguson (2015). There is also an important bowhead whale wintering area in West Greenland (Reeves and Heide-Jørgensen 1996; Laidre et al. 2007), but this is obviously well outside the NSA boundary.

Summary

To summarize, a total of 36 habitat areas in eastern and central Nunavut are included in the database, with a focus on areas used by beluga whales, narwhal and bowhead whales for calving and/or calf rearing. Other important areas are used for foraging, migration and overwintering, to the extent that such data are available. These areas are mapped in the associated Figures and are all included in the Appendix 1 table. All habitat areas included in the GIS database are shown in Figure 7. Key habitat areas used by all species, and for a variety of life-history process, include Peel Sound, Prince Regent Inlet, Admiralty Inlet, Eclipse Sound, and the Repulse Bay area. The database is also provided as a digital (Excel) file and in shapefile format (separate shapefiles for calving/rearing habitats and another for foraging, migration, and overwintering areas). The shapefiles can be used by NPC staff to add these data to the NLUP and determine key areas for cetaceans within the NSA based on overlap between the habitat functions, the species, and existing land use designations.

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Table 1. Stocks of beluga whales, narwhal and bowhead whales that occur in the Nunavut Settlement Area (NSA).

Beluga whale*	Narwhal	Bowhead whale
Western-Northern-Southern Hudson Bay (WNSHB)**	Northern Hudson Bay (NHB)	Eastern Canada-West Greenland (EC-WG)
James Bay (JB)	E Baffin fiords (EB)	
Eastern Hudson Bay (EHB)	Eclipse Sound (ES)	
Cumberland Sound (CS)	Admiralty Inlet (AI)	
Eastern High Arctic-Baffin Bay (EHA-BB)	Somerset Island (SI)	
	Jones Sound (JS)	
	Smith Sound (SS)***	

* Note: three additional beluga whale stocks, in the Eastern Beaufort Sea, Ungava Bay and James Bay, may occasionally enter NSA waters, but are not included in the database.

** Calving areas along the northern coast of Southampton island have been identified in the DNLUP, but the majority of the calving areas for this stock are in MB, outside the NSA.

*** Calving and nursery areas for this narwhal stock are not known

Figure 1. Map of critical calving and calf rearing areas in the Nunavut Settlement Area (NSA), by species.

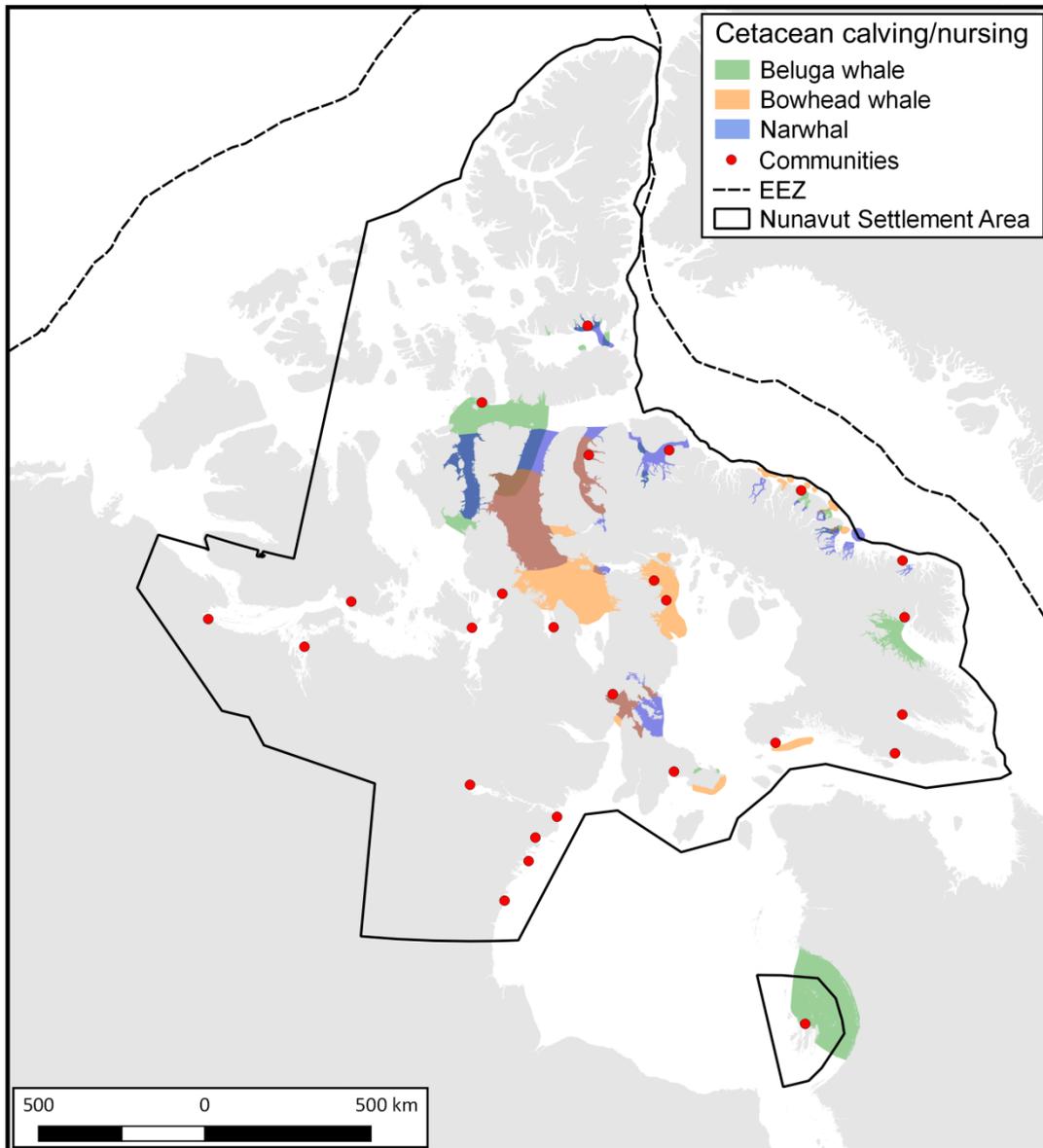


Figure 2. Map of critical calving and calf rearing areas in the Nunavut Settlement Area (NSA) showing overlap among the three species.

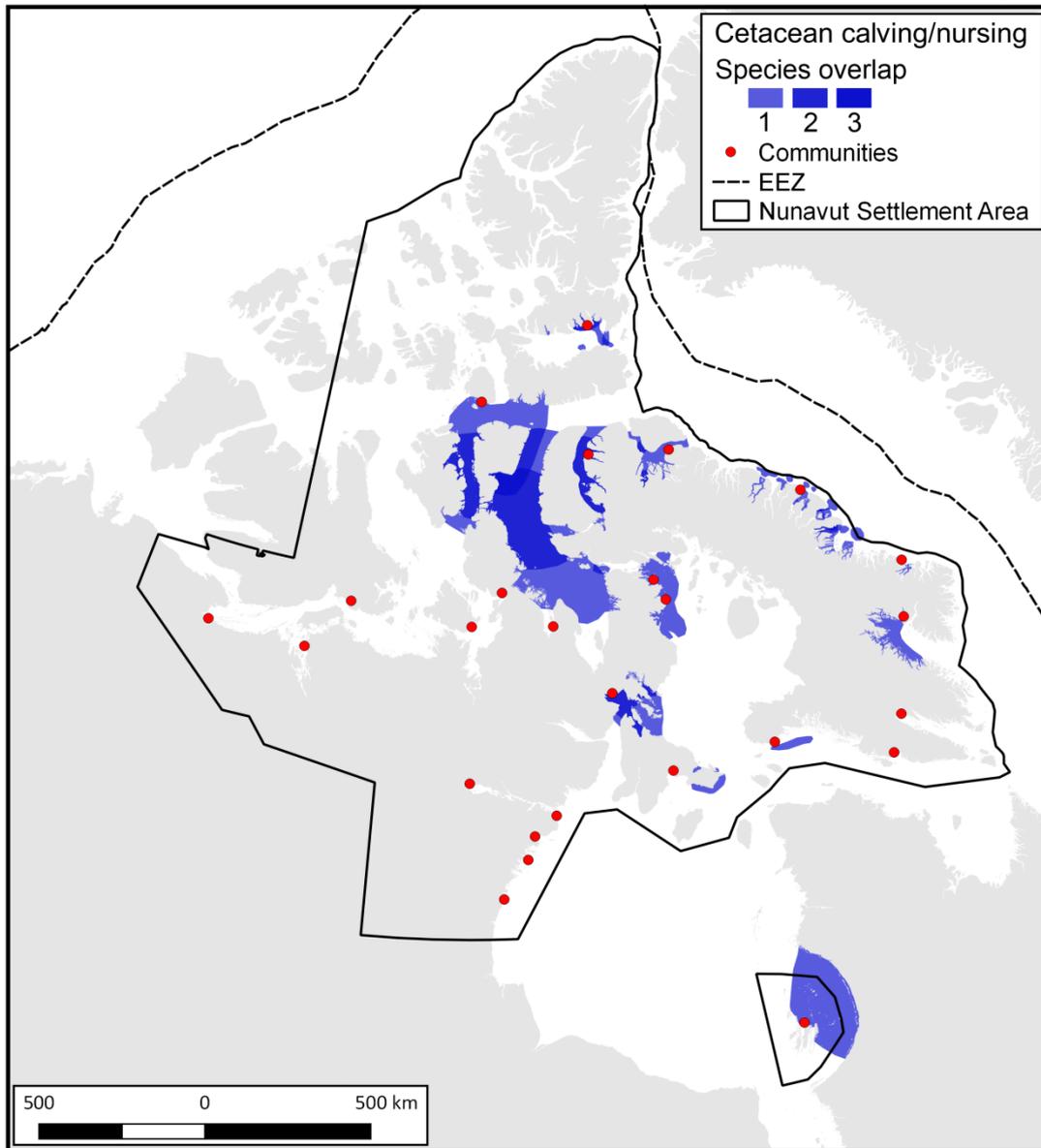


Figure 3. Map of critical foraging areas in the Nunavut Settlement Area (NSA), by species.

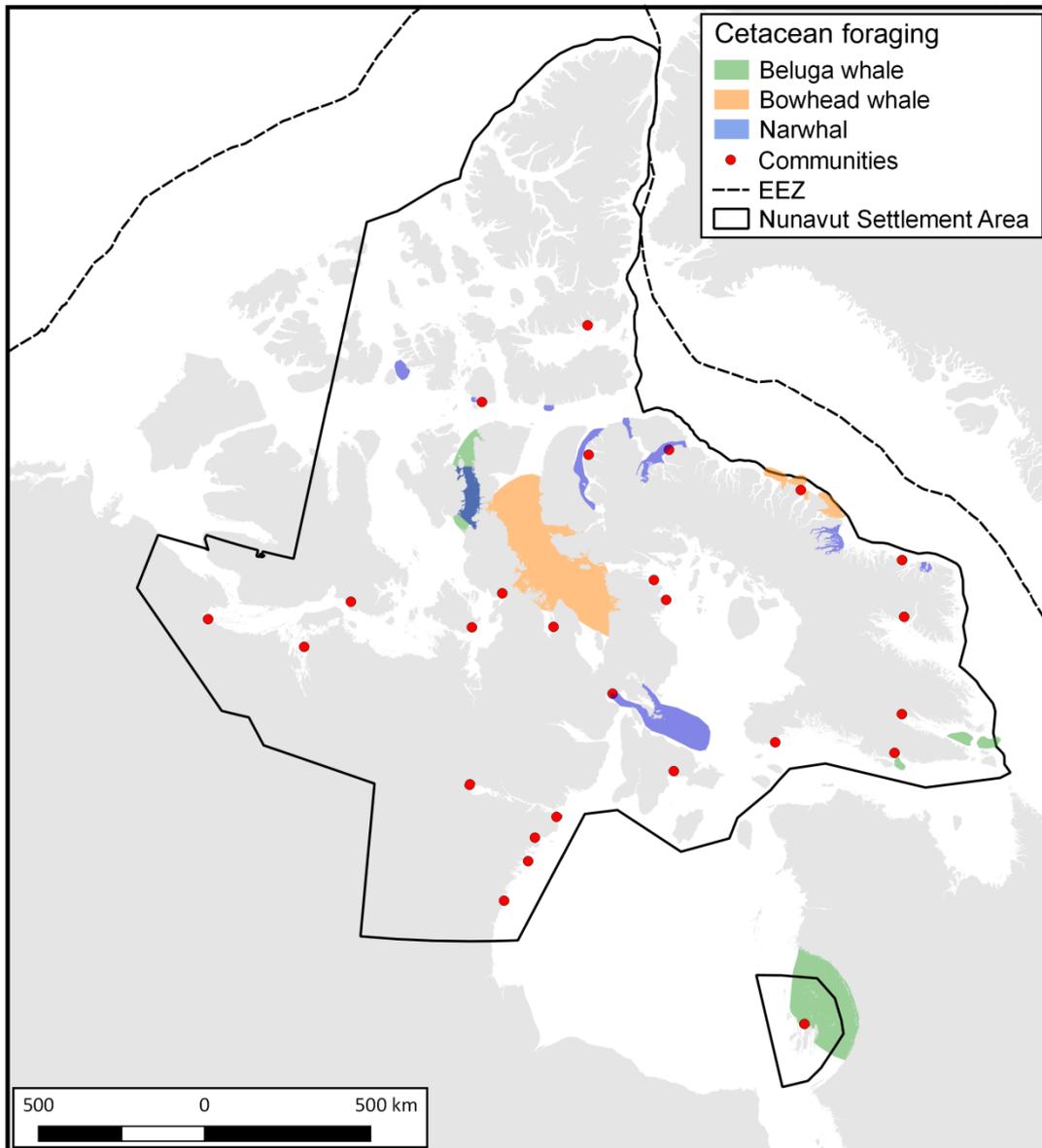


Figure 4. Map of critical foraging areas in the Nunavut Settlement Area (NSA) showing overlap among the three species.

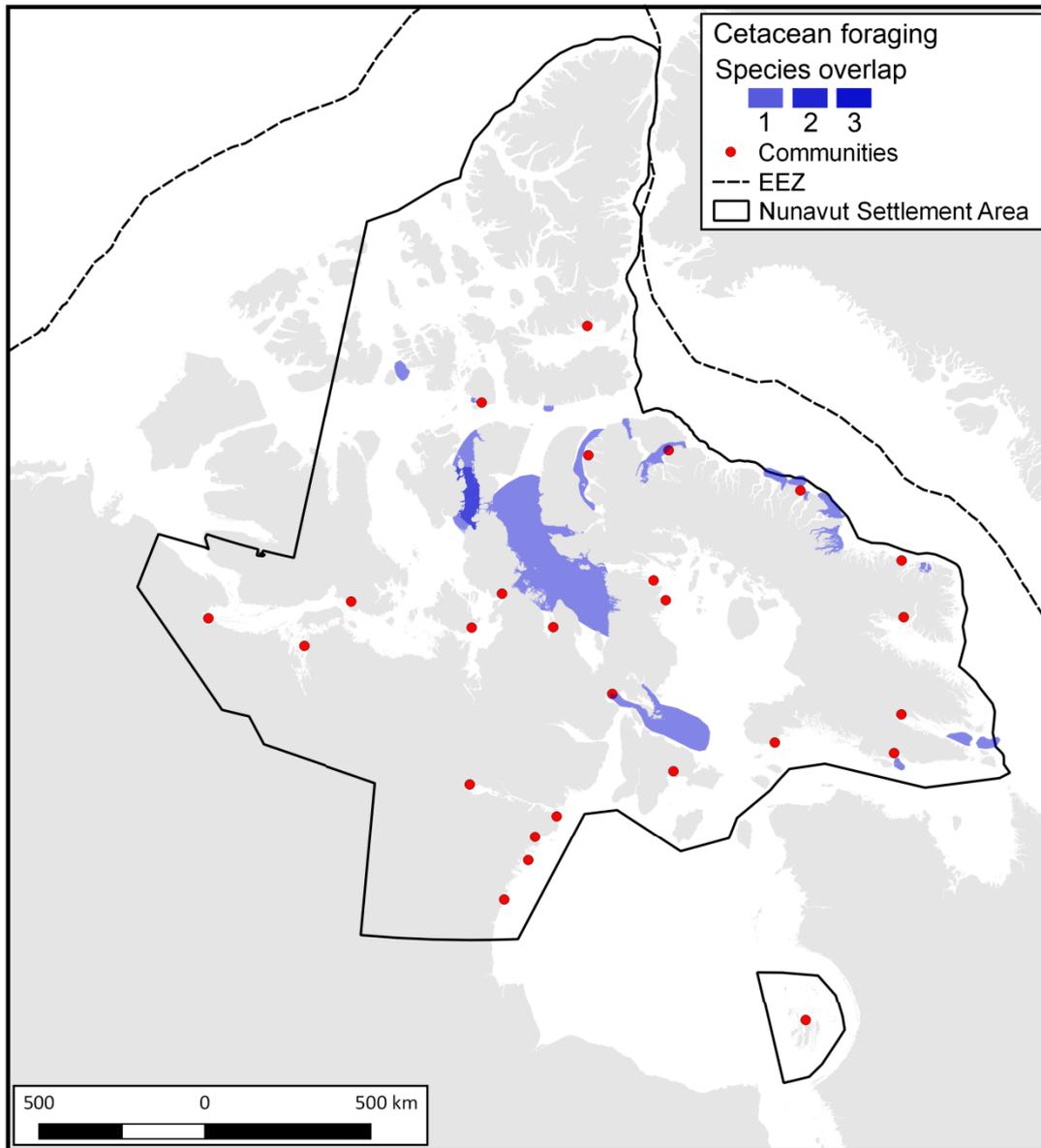


Figure 5. Map of important cetacean migration routes in the Nunavut Settlement Area (NSA). Three areas are shown (Bellot Strait, Fury and Hecla Strait, and Frozen Strait), and all are used by the three species.

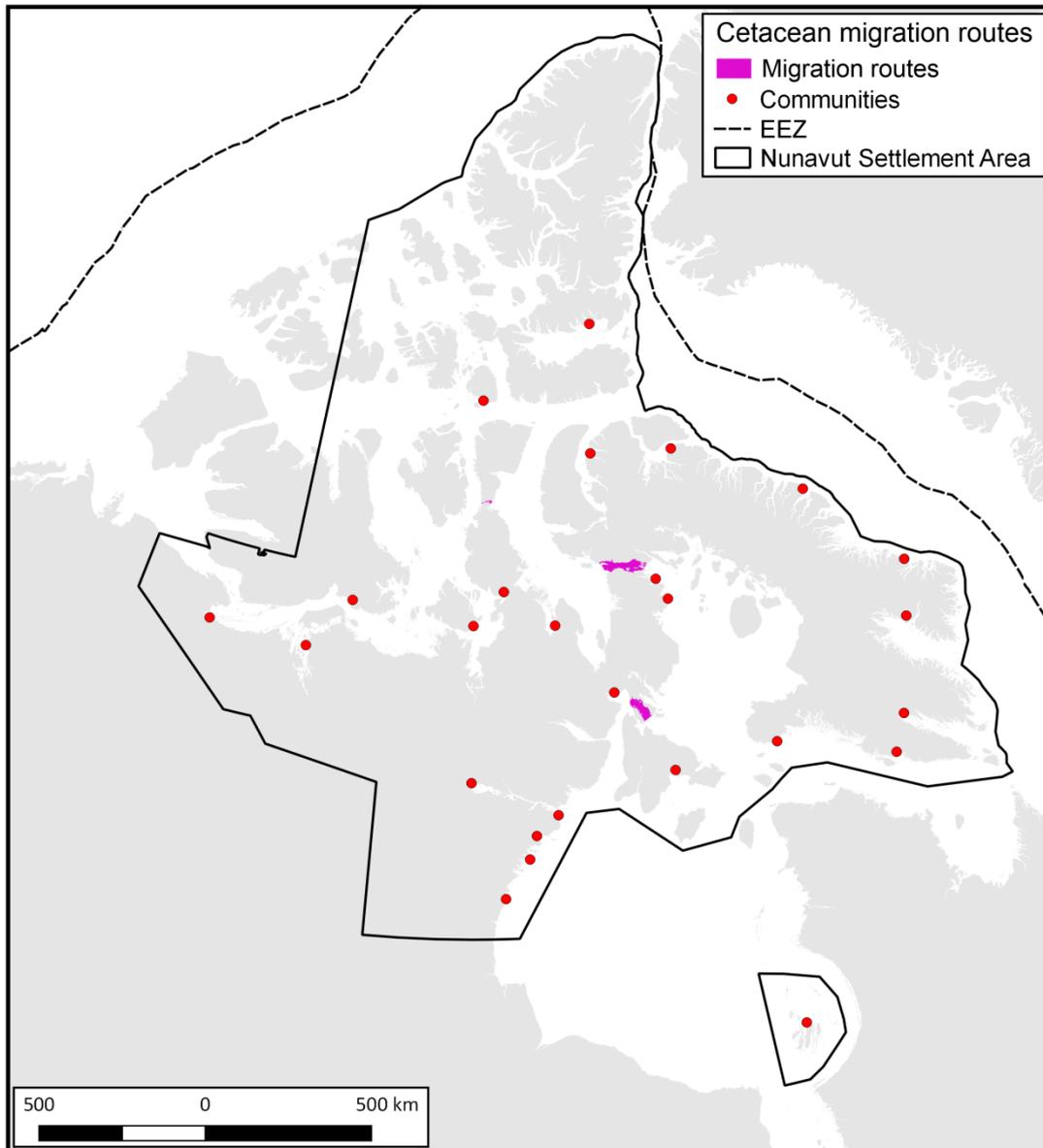


Figure 6. Map of important cetacean overwintering areas in the Nunavut Settlement Area (NSA).

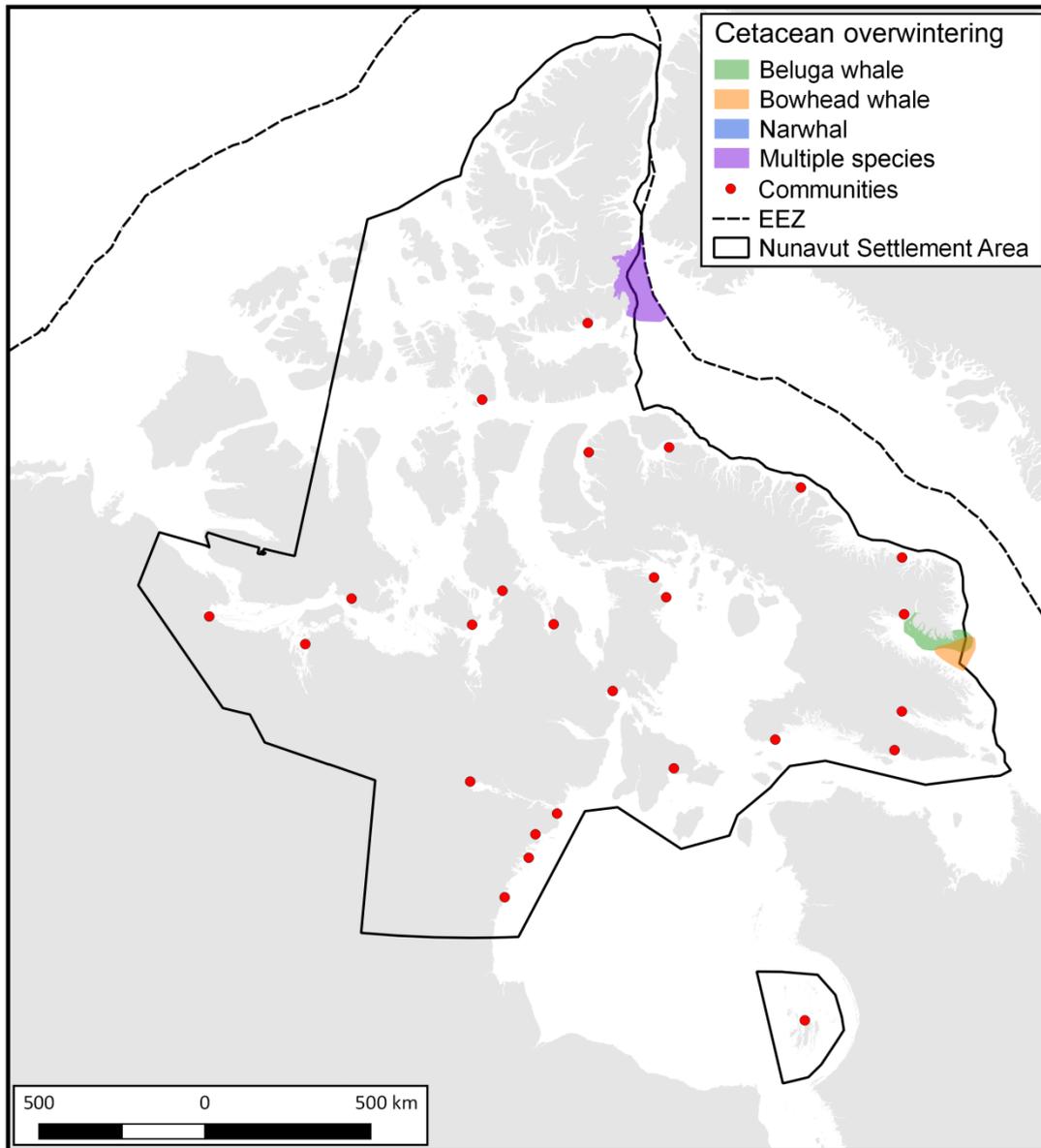
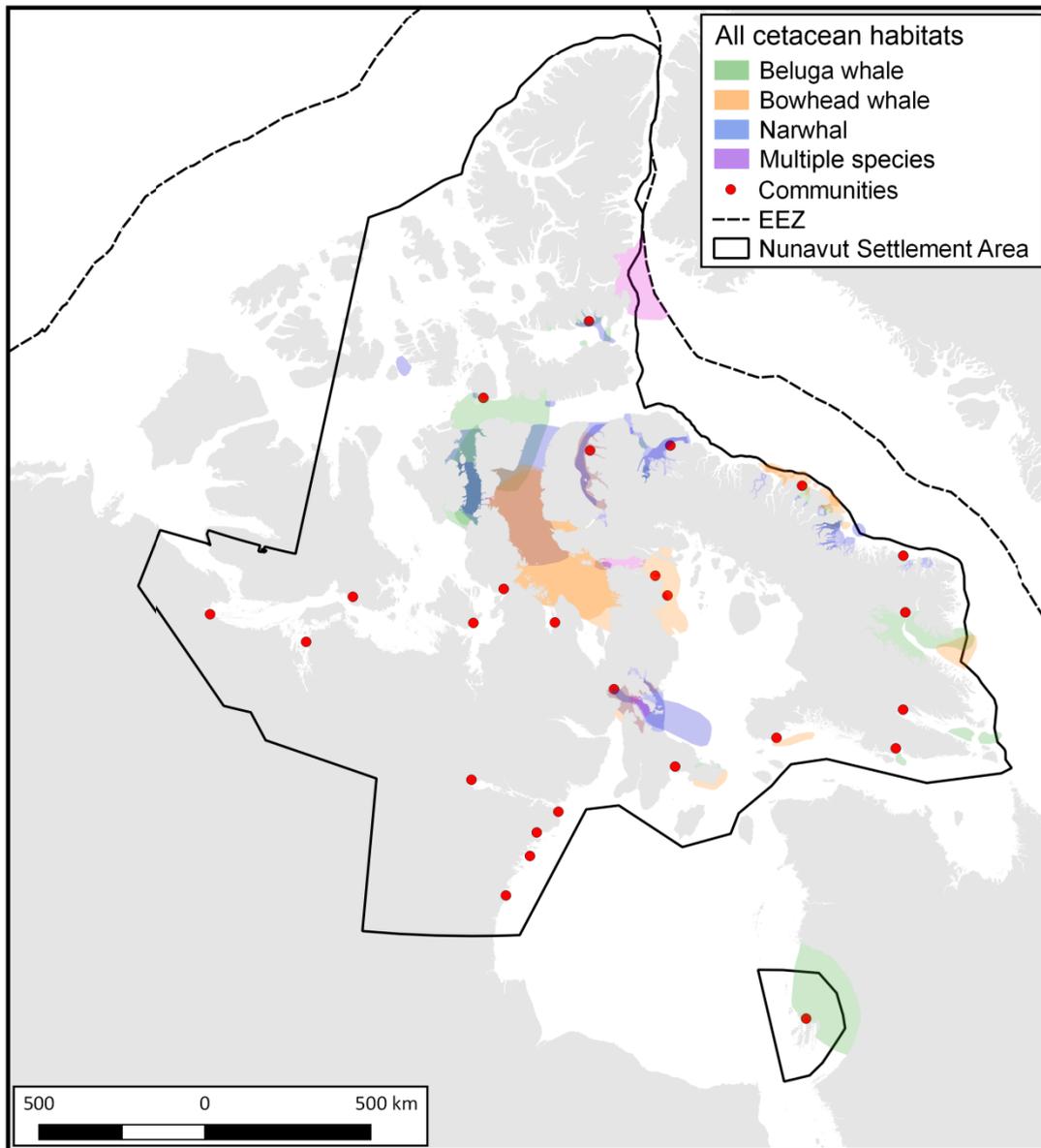


Figure 7. Map of all important cetacean habitat areas in the Nunavut Settlement Area (NSA), by species. The map includes important habitats used for calving and nursing, foraging, migration, and overwintering, depending on data availability. Key habitat areas used by all species, and for a variety of life-history process, include Peel Sound, Prince Regent Inlet, Admiralty Inlet, Eclipse Sound, and the Repulse Bay area.



APPENDIX

This Appendix provides background material on the cetacean calving (and calf rearing/nursing), feeding, migration, and overwintering habitats identified through a review of the scientific and TEK literature, conducted on behalf of WWF-Canada to inform their submission to the Nunavut Planning Commission. The table headers and field descriptions are as follows:

Table header	Description
Code (SHP)	ID code linked to the GIS shapefile (SHP)
Species	Beluga whale, Narwhal, Bowhead whale, or Multiple species
Population	Population/stock as defined by DFO
COSEWIC Status	Conservation status assigned by the Committee on the Status of Endangered Wildlife in Canada
SARA Status	Status under the Federal Species at Risk Act (note: none of these species/populations are listed)
Habitat type	Listed as "Calving/calf rearing" for all entries
Information type	TEK, Scientific, or both
Details	Text providing details on where areas are, why they are important, etc.
Months	Months that the areas provide important calving/calf rearing habitats
Source(s)	Information sources (see final worksheet for citations)
Map source	Source(s) used to define habitat areas in shapefile
Recommended status	Recommended status for NLUP - Special Management Area except for habitats used by 'At Risk' species (defined as COSEWIC status of Threatened or Endangered), for which a Protected Area designation is recommended
NLUP Designations #	ID numbers of Designated areas in the current draft of the NLUP

NLUP Designations Names	Names of Designated areas in the current draft of the NLUP
NLUP Valued Components #	ID numbers of Valued Components areas in the current draft of the NLUP
NLUP Valued Components Names	ID numbers of Valued Components areas in the current draft of the NLUP

Cetacean habitat database

Code (SHP)	Species	Population	COSEWIC Status	SARA Status	Habitat type	Information type	Details	Months	Source(s)	Map source	Recommended status	NLUP Designations #	NLUP Designations Names	NLUP Valued Components #	NLUP Valued Components Names
1	Beluga whale	EHA-BB	Special Concern (2004)	No Status	Calving/calf rearing	Scientific, TEK	Summer aggregations centered around the Lancaster Sound region, including Peel Sound and coastal waters of Somerset and Prince of Wales Islands and Jones Sound. They are not concentrated around river estuaries to the same extent as some other populations, but they do aggregate in Creswell Bay, Cunningham Inlet, and Elwin Bay. This summer core area includes DFO EBSAs Creswell Bay and Cunningham Inlet, where calving/calf rearing occurs in July and August, and the shallow waters in this area also provide refugia from killer whales.	July and August	Smith et al. 1985; Smith and Martin 1994; Richard et al. 2001; Innes et al. 2002; Koski et al. 2002; Richard 2010	Figure 8 (p. 25) in COSEWIC 2004 (summer core areas)	Special Management Area	9, 22, 52, 62, 63, 68, 157	CL and CB KBHS, LS NMCA, PLI MBS, Hist. sites, LS Polynya	1, 4, 32, 34, 42	Polynyas, Char areas, EBSAs-LS, PRI, Peel S
2	Beluga whale	EHA-BB	Special Concern (2004)	No Status	Calving/calf rearing	TEK	Grise Fiord hunters have seen belugas calving in Jones Sound, including in Grise Fiord and off the mouth of Grise Fiord	August and September	Remnant and Thomas 1992; Stewart et al. 1995; Stewart 2001	Figure 5 (p. 20) in Stewart 2001	Special Management Area	(None)	(None)	1, 4, 19, 22	Polynyas, Char, EBSAs - EJS and CS/HG
3	Beluga whale	EHA-BB	Special Concern (2004)	No Status	Calving/calf rearing	TEK	Inuit have observed beluga calving in southern Navy Board Inlet and in southern Milne Inlet and Koluktoo Bay.	July and August	Remnant and Thomas 1992; Stewart 2001	Figure 5 (p. 20) in Stewart 2001	Special Management Area	44, 50	LS NMCA, Bylot Island MBS	4, 6	Char, ES/NBI EBSA
4	Beluga whale	EHA-BB	Special Concern (2004)	No Status	Calving/calf rearing	TEK	Inuit report that beluga whales calves near Clyde River.	July and August	Remnant and Thomas 1992; Stewart 2001	Figure 5 (p. 20) in Stewart 2001	Special Management Area	16, 55	KBHS - Abbajalik/Ijutuk, Ninginganiq NWA	4, 31	Char, BI Coast EBSA
5	Beluga whale	CS	Threatened (2004)	No Status	Calving/calf rearing	Scientific, TEK	The summer aggregation area for these belugas is in the inner reaches of Cumberland Sound, at Clearwater Fiord, where the Ranger River forms an estuary. They aggregate in this area from mid-July to mid-September. Inuit have observed calves being born in the inner reaches of this area, Clearwater Fiord and Kangilo Fiord, from late July to late September. In the past belugas also calved in Shark Fiord immediately east of Clearwater Fiord	July, August, September	Brodie 1971; Sergeant and Brodie 1975; Kilabuk 1998; Stewart 2001; Richard and Stewart 2009	Figure 9 (p. 27) in COSEWIC 2004 (summer core area)	Protected Area	136	CS Turbot Area	1, 4, 5, 13, 29, 62	Polynyas, Char and turbot, EBSAs-CS and HB-LS-DS, WCS KBHS
18	Beluga whale	WNSHB	Special Concern (2004)	No status	Calving/calf rearing	TEK	Beluga calving areas identified by the Coral June, July Harbour HTO and included in the 2016 draft of the Nunavut Land Use Plan	June, July	DNLUP 2016	DNLUP 2016	Special Management Area	46	East Bay MBS	12	Southampton Island EBSA
19	Beluga whale	EHB	Endangered (2004)	No Status	Calving/calf rearing	Scientific, TEK	During summer, belugas are found in the inshore and offshore areas of the Nastapoka Arc, from Inukjuak to Kuujjuaraapik and offshore to the Belcher Islands (Sanikiluaq). The Nastapoka River and Little Whale River are the main areas of estuarine concentration, used from mid-July to the end of August.	July, August	Smith and Hammill 1986; Caron and Smith 1990; Kingsley 2000; Doidge and Lesage 2001; Gosselin et al. 2002, 2009, 2013	Figure 6 (p. 23) in COSEWIC (2004) (summer core area)	Protected Area	18, 37	KBHS - Belcher Islands, Sleeper Islands	4, 16	Char, Belcher Islands EBSA

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6	Narwhal	NHB	Special Concern (2004) (one single unit)	No Status	Calving/calf rearing	Scientific, TEK	Summer range includes Repulse Bay, Frozen Strait, western Foxe Channel, Gore Bay and Lyon Inlet. Narwhals arrive at the floe edge in June-July and calves are first seen in August. They are present in this area throughout August and they depart in September. The entire summer core area can be considered calving and nursery habitat, although some Inuit note that Lyon Inlet is known to have more females and young than Repulse Bay. This area includes the DFO EBSA Repulse Bay/Frozen Strait.	July, August, September	Richard 1991; Gonzalez 2001; Westdal 2008; Westdal et al. 2010; DFO 2011	Map 2 (p. 15) in Gonzalez 2001; Fig. 12 (p. 44) and 18 (p. 61) in Westdal 2008	Special Management Area	41, 72, 171	Haulouts, CAOI - DoY Bay, Essential Char river	1, 4, 11, 12, 63	Polynyas, Char, EBSAs-RB/FS and S. Island, FS KBHS
7	Narwhal	EB	Special Concern (2004) (one single unit)	No Status	Calving/calf rearing	Scientific, TEK	Narwhal occur throughout the fiords of eastern Baffin Island during the summer months. They give birth and nurse calves in the fiords near Clyde River where the water is warm and silty, including Buchan Gulf. Many calves are also observed near Qikiqtarjuaq, particularly in Home Bay and at several other nearby fiords. Mating has been observed at the outskirts of Home Bay, at the floe edge, and within Canso Channel. Scott Inlet (DFO EBSA #29) is used as a nursery for East Baffin Island narwhal.	July, August, September	Remnant and Thomas 1992; Koski and Davis 1994; Stewart 2001; Richard et al. 2010; Furgal and Laing 2011; White 2012; DFO 2015	Figure 15 (p. 30) in Stewart 2001; DFO 2015	Special Management Area	14, 16, 55	Scott Inlet KBHS, Abbajalik/Ijutuk KBHS, Ninginganiq NWA	1, 4, 5, 31	Polynyas, Char and Turbot, BI Coast EBSA
8	Narwhal	ES	Special Concern (2004) (one single unit)	No Status	Calving/calf rearing	Scientific, TEK	The Eclipse Sound region has long been known as an important narwhal calving and calf rearing area. Females and calves are observed in Milne Inlet and the adjacent fiords, Koluktoo Bay, and Tremblay Sound. This area includes the DFO EBSA Eclipse Sound.	August and September	Mansfield et al. 1975; Silverman 1979; Hay 1984; Hay and Mansfield 1989; Remnant and Thomas 1992; Koski and Davis 1994; Stewart 2001; Marcoux et al. 2009; Richard 2010; Marcoux 2011	Figure 15 (p. 30) in Stewart 2001; Richard 2010	Special Management Area	7, 44, 50	CGM KBHS, LS NMCA, BI MBS	5, 6, 32	Turbot, EBSAs - LS and ES/NBI
9	Narwhal	AI	Special Concern (2004) (one single unit)	No Status	Calving/calf rearing	Scientific, TEK	Inuit report that mating activities take place in Admiralty Inlet, and calving occurs throughout the inlet. This area is DFO EBSA "Admiralty Inlet", where narwhal calving and calf rearing occurs from July to mid-September.	July, August, September	Remnant and Thomas 1992; Stewart et al. 1995; Cosens and Dueck 1990; Stewart 2001; Dietz et al. 2008; Richard 2010; Asselin and Richard 2011; DFO 2015	Figure 15 (p. 30) in Stewart 2001; Richard 2010	Special Management Area	17, 44, 74	KBHS - Baillarge Bay, LS NMCA, CAOI - Moffett Inlet	4, 32, 33	Char, EBSAs - L. Sound and A. Inlet
10	Narwhal	SI	Special Concern (2004) (one single unit)	No Status	Calving/calf rearing	Scientific, TEK	This wide-ranging stock has been less studied than others such as AI and ES. Calving is known to occur along the east coast of Prince of Wales Island (Peel Sound), and there are mating and calving areas within Resolute Bay. Females and calves are also found within Prince Regent Inlet. The DFO EBSA "Peel Sound" is included in this area, where calving and calf rearing occurs in July and August. Calf rearing occurs throughout the Gulf of	July and August	Remnant and Thomas 1992; Koski and Davis 1994; Stewart et al. 1995; Stewart 2001; Richard et al. 2010; DFO 2011, 2015	Figure 15 (p. 30) in Stewart 2001; DFO 2011, 2015	Special Management Area	13, 22, 44, 157	KBHS - PLI and C. Bay, LS NMCA, LS Polynya	1, 4, 10, 32, 34, 40, 42	Polynyas, Char, EBSAs - GoB, LS, PRI, FHS, PS

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							Boothia (DFO EBSA # 19) in July and August. Inuit from Igloodik have also observed narwhal calving at the western end of Fury and Hecla Strait.								
11	Narwhal	JS	Special Concern (2004) (one single unit)	No Status	Calving/calf rearing	TEK	Grise Fiord hunters have observed narwhal calves in August and September in Grise and Stames fiords.	August and September	Remnant and Thomas 1992; Stewart et al. 1995; Stewart 2001	Figure 12 (p. 27) in Stewart 2001	Special Management Area	(None)	(None)	1, 4, 19	Polynyas, Char, Eastern Jones Sound EBSA
12	Bowhead whale	EC-WG	Special Concern (2009)	No Status	Calving/calf rearing	TEK	Inuit have observed young calves near the Taliiruat Islands and have observed bowhead whales giving birth at the floe edge near Cape Dorset. This is an area of perennially open water in the spring.	April, May	NWMB 2000; O. Akasuk, pers. comm.	CIS 2011 - 01 May map	Special Management Area	(None)	(None)	1, 14	Polynyas, Western Hudson Strait EBSA
13	Bowhead whale	EC-WG	Special Concern (2009)	No Status	Calving/calf rearing	Scientific, TEK	Northern Foxe Basin is a known nursery area for females with calves. Females usually arrive with calves, but newborns and birthing events have also been recorded here. Includes the following DFO EBSAs (Ecologically and Biologically Significant Areas): Rowley Island, Igloodik Island, Fury and Hecla Strait.	June, July, August	Cosens and Blouw 2003; NWMB 2000; DFO 2015	NWMB 2000 (summer distribution map); DFO 2015 (Foxe Basin EBSAs)	Special Management Area	41, 73	Walrus haulouts, CAO1 - Foxe Basin	1, 4, 38, 39, 40	Polynyas, Char, EBSAs - Rowley I, Igloodik I, FHS
14	Bowhead whale	EC-WG	Special Concern (2009)	No Status	Calving/calf rearing	Scientific, TEK	During the commercial whaling period, summer catches in Lancaster Sound and Prince Regent Inlet were comprised largely of young whales and females with calves, suggesting that this area was also a nursery ground. Inuit in Arctic Bay also report historic evidence for calves in Prince Regent Inlet (near Somerset Island) from Thule-era bowhead hunting. Many of the young whales and adult females with calves that use Prince Regent Inlet and the Gulf of Boothia in summer enter that area from Foxe Basin, via Fury and Hecla Strait. Prince Regent Inlet and the Gulf of Boothia tend to retain large expanses of sea ice throughout most of the summer, which may provide mothers and calves with important protection from killer whales. Bowhead whale calf rearing occurs in this area from late June to mid-November. Includes the area in DFO EBSA Gulf of Boothia.	July, August, September, October, November	Reeves et al. 1983; NWMB 2000; Higdon 2007; Ferguson et al. 2010; DFO 2015	Ferguson et al. 2010; DFO 2015	Special Management Area	22	KBHS - Creswell Bay	4, 10, 34, 40	Char, EBSAs - GoB, FHS, PRI

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15	Bowhead whale	EC-WG	Special Concern (2009)	No Status	Calving/calf rearing	TEK	Inuit from Arctic Bay frequently observe bowhead calves in Admiralty Inlet in midsummer. Bowhead whales first arrive at the floe edge in June and July; at that time calves are not present. The spring migration of mothers with calves is later than that of other whales; they enter Admiralty Inlet during the summer and can be seen at places like Qattiaq/Kakiak Point. They leave the inlet in October with freeze-up. No informants reported observations of bowhead whales giving birth in this area, suggesting that it is used as a nursery area but not necessarily for calving.	August, September, October	NWMB 2000	NWMB 2000 (summer distribution map)	Special Management Area	17, 44, 74	KBHS - Baillarge Bay, LS NMCA, CAOI - Moffett Inlet	4, 33	Char, Admiralty Inlet EBSA
16	Bowhead whale	EC-WG	Special Concern (2009)	No Status	Calving/calf rearing	TEK	Clyde River Inuit provided many observations and information about calves and calving in the local area. Bowhead whales in Igaliktuuq/Isabella Bay engage in calving and mating/breeding behaviour. Mothers with calves are seen in late summer/early fall in Igaliktuuq/Isabella Bay and elsewhere in the Clyde River hunting area, including Pinguarjuit/Cape Christian; Qakijaaq, near Kuugaajuk/Kogalu R.; and Patricia Bay. Some informants have observed births in this area, others have surmised that calving occurs here. This area may be used as both calving and calf-rearing habitat.	August, September, October	NWMB 2000	NWMB 2000 (summer distribution map)	Special Management Area	16	Ninginganiq NWA	4, 31	Char, Baffin Island Coast EBSA
17	Bowhead whale	EC-WG	Special Concern (2009)	No Status	Calving/calf rearing	TEK	Inuit informants reported a number of sightings of bowhead calves in Repulse Bay and the surrounding area, and this area has been suggested to be a bowhead nursery area. Calves were also observed around the southeastern Southampton Island area (Nuvualuk/Terror Point area). No Inuit informants reported evidence of calving (or nursing, etc.) further south in Hudson Bay. Includes areas included in DFO EBSA Repulse Bay/Frozen Strait.	August, September	NWMB 2000; DFO 2011	NWMB 2000 (summer distribution map); DFO 2011 (EBSA)	Special Management Area	41, 72, 171	Walrus haulouts, CAOI - DoY Bay, Essential Char river	1, 4, 5, 11, 12, 31, 63	Polynyas, Char/Turbot, EBSAs - RB/FS, SI and BIC, KBHS - FS
20	Beluga whale	EHA-BB	Special Concern (2004)	No status	Foraging	Scientific	Satellite-tagging studies suggest that southern Peel Sound, particularly the area of the Franklin Trench, may be an important foraging area for belugas in August.	August	Smith and Martin 1994; Richard et al. 2001	Fig. 2-5 in Richard et al 2001	Special Management Area	n/a	None	4, 42	Char abundance; Peel Sound EBSA
21	Beluga whale	Mixed? (EHB and WNSHB)	Special Concern (2004) (WNSHB); Endangered (2004) (EHB)	No status	Foraging	TEK	Inuit knowledge compiled in Kimmirut indicates that an area near the community, in eastern Hudson Strait, is a beluga whale feeding area used in spring and early summer.	March to July	Kilabuk 1998; Stewart 2001	Fig. 3, 4 in Stewart 2001	Protected Area	n/a	None	1, 14	Polynyas; W Hudson Strait EBSA

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22	Beluga whale	WNSHB	Special Concern (2004)	No status	Foraging	TEK	Inuit in Iqaluit describe an important beluga whale feeding area in Frobisher Bay, used in spring and early summer.	April to June	Kilabuk 1998; Stewart 2001	Fig. 3 in Stewart 2001	Special Management Area	10	KBHS - Frobisher Bay	1, 29	Polynyas; HB-LS-DS EBSA
23	Narwhal	AI	Special Concern (2004)	No status	Foraging	Scientific, TEK	Narwhal feed within Admiralty Inlet and along the floe edge. Diving data and tag movements identify important feeding areas. These data identified smaller "hotspots" within Admiralty Inlet, but the polygon here surrounds all those smaller areas since these hotspots are based on a small sample of whales.	August	Remnant and Thomas 1992; Watt et al. 2017	Fig. 5 in Watt et al. 2017	Special Management Area	17, 44, 74	KBHS - Baillarge Bay; LS NMCA; Community AOI - Moffett Inlet	4, 32, 33	Char abundance; AI and LS EBSAs
24	Narwhal	SI	Special Concern (2004)	No status	Foraging	TEK	Some narwhals from the Somerset Island stock feed towards Austin Channel, in Barrow Strait west of the community of Resolute Bay, and along the southwest coast of Devon Island	August	Remnant and Thomas 1992	Fig. 12 in Stewart 2001	Special Management Area	44, 157	LS NMCA; LS Polynya	25, 32	LS and Archipelago Multi-Year Pack ice EBSAs
25	Narwhal	SI	Special Concern (2004)	No status	Foraging	Scientific	The Peel Sound EBSA is also recognized as an important feeding area for the Somset Island narwhal stock, in addition to calving	August	DFO 2011, 2015	Fig. 2 in DFO 2015	Special Management Area	n/a	None	4, 42	Peel Sound EBSA; Char abundance
26	Narwhal	EBI	Special Concern (2004)	No status	Foraging	TEK	Narwhal from the East Baffin Island stock feed in the fiords of Home Bay and around Canso Channel.	August	Remnant and Thomas 1992; Stewart et al. 1995; Stewart 2001	Fig. 12 in Stewart 2001	Special Management Area	16, 20	KBHS - Abbajalik/Ijutuk, Cape 5, 31 Searle/Reid Bay		Turbot abundance; BI Coastline EBSA
27	Narwhal	ES	Special Concern (2004)	No status	Foraging	Scientific, TEK	Narwhal feed in Milne Inlet, Eclipse Sound, and Koluktoo Bay. Diving data and tag movements identify important feeding areas. These data identified smaller "hotspots" within the summering area, but the polygon here surrounds all those smaller areas since these hotspots are based on a small sample of whales.	August and September	Remnant and Thomas 1992; Stewart et al. 1995; Stewart 2001; Watt et al. 2017	Fig. 5 in Watt et al. 2017	Special Management Area	7, 8, 44, 50	KBHS - Cape GM, Cape Hay; LS NMCA; 4, 5, 6, 32 Bylot Island MBS		Char/Turbot abundance; ES/NBI and LS EBSAs
28	Narwhal	NHB	Special Concern (2004)	No status	Foraging	Scientific, TEK	Narwhal feed in Repulse Bay, Frozen Strait and Lyon Inlet. Diving data and tag movements identify important feeding areas. These data identified smaller "hotspots" within the summering area and on the migration route, but the polygon here surrounds all those smaller areas since these hotspots are based on a small sample of whales.	August to October	Gonzalez 2001; Westdal 2008; Westdal et al. 2010; 2017; Watt et al. 2017	Fig. 3 in Watt et al. 2017	Special Management Area	n/a	None	1, 4, 11, 12, 63	Polynyas; Char abundance; RB/FS and SI EBSAs; KBHS - F Strait
29	Bowhead whale	EC-WG	Special Concern (2009)	No status	Foraging	Scientific, TEK	The Isabella Bay/Scott Inlet/Eglinton Fiord region of eastern Baffin Island is well known as an important bowhead whale foraging area in in late summer and fall, and considerable research has been conducted in this region.	August to October	Finley 1990, 2001; Finley et al. 1993; NWMB 2000	Summer, fall maps - NWMB 2000	Special Management Area	55	Ninginganiq NWA	4, 5, 31	Char/Turbot abundance; BI Coastline EBSA

Code (SHP)	Species	Population	COSEWIC Status	SARA Status	Habitat type	Information type	Details	Months	Source(s)	Map source	Recommended status	NLUP Designations #	NLUP Designations Names	NLUP Valued Components #	NLUP Valued Components Names
30	Bowhead whale	EC-WG	Special Concern (2009)	No status	Foraging	Scientific	The Gulf of Boothia and Price Regent Inlet are important for bowhead whale foraging in summer and fall in addition to being important for raising calves. Both are included as EBSAs by DFO, with recognized Fitness Consequences for bowhead whales.	August to November	Higdon 2007; Ferguson et al. 2010; DFO 2011, 2015	Ferguson et al. 2010	Special Management Area	22	KBHS - Creswell Bay	4, 10, 34, 40, 42	Char abundance; G of B, PRI, FHS, and PS EBSAs
31	All three species	(Multiple)	Special Concern	No status	Migration route	Scientific, TEK	Fury and Hecla Strait is an important migratory corridor used by all three cetacean species. This area corresponds to DFO EBSA #34	June to November	NCRI 2008; DFO 2014; Paulic et al. 2014	Fig. 17 in DFO 2014	Special Management Area	n/a	None	40	Fury and Hecla Strait EBSA
32	Beluga, narwhal	EHA-BB, SI	Special Concern (both)	No status	Migration route	Scientific	Bellot Strait is used by both beluga and narwhal as a migratory corridor in July and August. This area corresponds to DFO EBSA #10.	July and August	Richard et al. 2001; Heide-Jorgensen et al. 2003; DFO 2015	Fig. 2 in DFO 2015	Special Management Area	n/a	None	34, 42	PR Inlet and P Sound EBSAs
33	All three species (primarily narwhal)	NHB (narwhal)	Special Concern	No status	Migration route	Scientific, TEK	Narwhals migrate into and out of Repulse Bay via Frozen Strait, which is their main migratory route. They migrate through Frozen Strait into Repulse Bay in June and July, and migrate back out through the strait in August or September (and sometimes into October). This area is part of the DFO "Repulse Bay/Frozen Strait" EBSA, and is also used by WNSHB beluga whales and EC-WG bowhead whales.	June to October	Gonzalez 2001; Westdal 2008; Westdal et al. 2010; DFO 2011	Westdal 2008	Special Management Area	72	Community AOI - Duke of York Bay	1, 4, 11, 63	Polynyas; Char abundance; RB/FS EBSA; KBHS - F Strait
34	All three species	Multiple	Special Concern (all)	No status	Overwintering	Scientific	The North Water Polynya, the largest polynya in the Canadian Arctic, is used by the three cetacean species (and the two monodontids in particular) as important wintering habitat. It is DFO EBSA #22. Most of this area falls outside the NSA, and also extends across the EEZ into Greenland waters.	March to July	Finley and Renaud 1980; Richard et al. 1998; Heide-Jørgensen et al. 2003b, 2013, 2016; DFO 2011, 2015	Fig. 2 in DFO 2015	Special Management Area	35, 158	North Water Polynya; KBHS - NW Polynya	1, 19, 27	Polynyas; NWP and EJS EBSAs
35	Beluga whale	CS	Threatened (2004)	No status	Overwintering	Scientific	The CS beluga population is relatively sedentary, migrating a short distance from their calving area in Clearwater Fiord to their wintering area in eastern Cumberland Sound. This area corresponds to DFO EBSA #16.	November to March	Richard and Stewart 2009; DFO 2015	Fig. 2 in DFO 2015	Protected Area	136	Cumberland Sound Turbot Area	1, 4, 5, 29	Polynyas; Char/Turbot abundance; HB-LS-DS EBSA
36	Bowhead whale	EC-WG	Special Concern (2009)	No status	Overwintering	Scientific	Some bowhead whales overwinter in and near the polynya in eastern Cumberland Sound, an area that is also important overwintering habitat for the CS beluga whale stock.	November to March	Ferguson et al. 2010; Matthews and Ferguson 2015	Fig. 1 in Matthews and Ferguson 2015	Special Management Area	136	Cumberland Sound Turbot Area	1, 29	Polynyas; HB-LS-DS EBSA

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