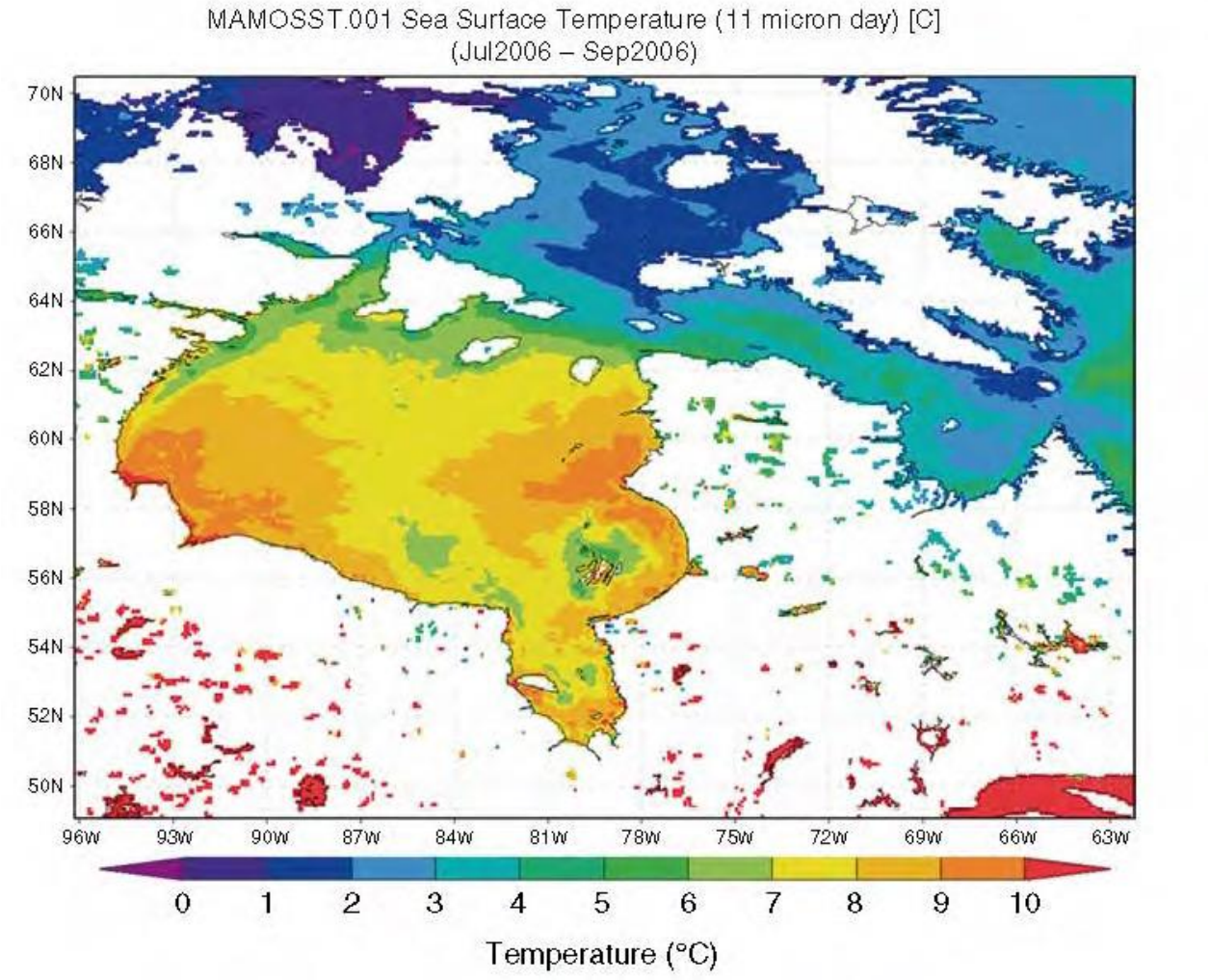


Figure B-6: Summer (July to September) sea surface temperature in 2006 (Stewart and Barber 2010)

1.3.2 Biological Environment

The marine ecosystem of Hudson Bay encompasses a large geographical area that includes James Bay, Hudson Bay, Fox Basin, and Hudson Strait. Four important features characterize this unique ecosystem:

1) an extreme southerly penetration of Arctic marine water from the north;

2) a very large volume of freshwater runoff that enters the Hudson Bay watershed each year from land;

3) seasonal coverage of sea-ice; and

4) the dynamic coastal geomorphology of the coastal zone where exposure of new shoreline (made up of coastal salt marshes and wide tidal flats) presently occurs at a rate of up to 15 m/year (horizontal) as part of an isostatic rebound of the land from the weight of the Laurentide Ice Sheet, which once covered this entire region (Stewart and Lockhart 2004).

These key features combine to form critical habitat areas for many species of marine fauna including anadromous fish and large concentrations of migratory species including shorebirds, waterfowl, seabirds, and marine mammals. The following section provides an overview of the biological characteristics of each taxa (by key species) potentially impacted by shipping activities in the RSA.

1.3.2.1 Fishes

Approximately 60 species of fish are known to inhabit estuarine waters of Hudson Bay and James Bay (CARC 1991). Fewer species are present in the northern limits of the RSA, where arctic species predominate. Arctic char, Arctic cod, and other species contribute directly to the domestic fishery, and indirectly to the food chain of marine and terrestrial mammals and birds. Fish species considered important to the local commercial, recreational, and subsistence fisheries are identified in Table B-1. An overview on the biology of these species is provided below.

Table B-1: Overview of Marine Fish Species Found within the Local and Regional Study Areas

Common Name	Species	Inuktitut Name	Habitat	*SARA* Status[a]	COSEWIC Status[b]	Of Cultural, Economic or Subsistence Importance	LSA	RSA
Arctic char	*Salvelinus alpinus*	ᐃᖃᓗᖅ ᐱᖅ / ᑕᕆᐅᕐᓕ ᒥᐅᑕᖃᖅ	Anadromous (Riede 2004). In the marine environment, they are found in coastal areas in waters 30 to 70 m deep (Billard 1997).	No status	Not assessed	Yes	✔	✔
Greenland cod	*Gadus ogac*	ᐅᓪ ᖃᖅ	Demersal[c]. Coastal waters up to 400 m deep (Coad and Reist 2004; Cohen et al. 1990).	No status	Not assessed	Yes	✔	✔
Polar cod	*Arctogadus glacialis*	ᐅᓪ ᖃᖅ	Cryopelagic[d] or epontic[e] (Coad and Reist 2004). Marine waters down to 1,000 m; Mainly found in the shallower areas of the water column (Scott and Scott 1988).	No status	Not assessed	Yes	✔	✔
Arctic cod	*Boreogadus saida*	ᐅᓪ ᖃᖅ	Cryopelagic or epontic. Marine waters down to approximately 1400 m. Favour coastal areas during the summer and winter months (Coad and Reist 2004). Spawning occurs under the Arctic ice (DFO 2011b).	No status	Not assessed	Yes	✔	✔
Fourhorn sculpin (marine form)	*Myoxocephalus quadricornis*	ᑲᓇᕐᖃᖅ	Benthic. Shallow coastal estuarine environments (Morrow 1980). In spring, they move to deeper waters for the summer and are generally found in waters 45 m to 100 m deep (Muus 1999).	No status	Not at Risk	Yes	✔	✔
Arctic staghorn sculpin	*Gymnocanthus tricuspis*	ᑲᓇᕐᖃᖅ	Benthic. Prefers sandy bottoms (Fedorov 1986; Coad and Reist 2004). Coastal areas, close to shore (ArcOD 2011).	No status	Not assessed	Yes	✔	✔
Arctic sculpin	*Myoxocephalus scorpioides*	ᑲᓇᕐᖃᖅ	Benthic. Shallow marine environments up to 275 m (Coad and Reist 2004).	No status	Not assessed	Yes	✔	✔
Slender eel blenny	*Lumpenus fabricii*	ᒪᓕ ᖃᓄᐊᑉ ᑐᑦ	Sandy to rocky habitats. Seem to prefer seagrass and algae, where they spawn (Mecklenburg and Sheiko 2004).	No status	Not assessed	No	✔	✔
Greenland halibut	*Reinhardtius hippoglossoides*	ᖃᓕᕆᔨᓪ	Epibenthic. Surface to deep waters down to 2000 m (Coad and Reist 2004).	No status	Not assessed	Yes	✔	✔

[a] SARA.The *Act* is a key federal government commitment to prevent wildlife species from becoming extinct and secure the necessary actions for their recovery. It provides for the legal protection of wildlife species and the conservation of their biological diversity (extracted from *SARA* 2012).

[b] COSEWIC (Committee on the Status of Endangered Wildlife in Canada) is a committee of experts that assesses and designates which wildlife species are in some danger of disappearing from Canada. It is up to Government to legally protect wildlife species designated by COSEWIC. The potential impacts of legal listing are for Government to analyse, and the SARA applies only to wildlife species on the SARA legal list (extracted from COSEWIC 2012).

[c] live on or near the seafloor.

[d] cold, deep marine environments.

[e] associated with the lower interface of the sea ice.

Arctic char (*Salvelinus alpinus*)

Arctic char exhibit anadromous and land-locked life history types (DFO 2006c). The anadromous forms of this species spend a large portion of its life cycle in the coastal marine environment (Riede 2004; Billard 1997). Spawning occurs in freshwater rivers, with annual migrations to marine waters occurring in the spring after the first 2-6 years of life (DFO 2006c). During autumn, adults migrate back to freshwater habitats to overwinter (Richardson et al. 2001). Arctic char feed on crustacean and other fish including capelin (Mallotus villosus), sand lance (Ammodytes spp.), Arctic cod, and juvenile Greenland cod (Richardson et al. 2001; Coad and Reist 2004).

In the RSA, Arctic char can be found along the western and northern coast of Hudson Bay and coastal areas of Hudson Strait (Coad and Reist 2004), with high abundances identified near Arviat, Chesterfield Inlet, Cape Dorset, and Kimmirut (NPC 2008) (Figure B-7). Arctic char are harvested commercially, recreationally, and for subsistence use (Canadian Circumpolar Institute 1992; Heather and usher 2004). Kangiqliniq Hunter and Trappers Association consider Arctic char an important food fish species for the residents of Rankin Inlet (Nunami Stantec Ltd. 2012).

Greenland cod (*Gadus ogac*)

Greenland cod are a demersal[2] fish found most commonly in coastal waters up to 400 m deep (Coad and Reist 2004; Cohen et al. 1990). They feed on crustaceans, molluscs, sea stars, worms, and other fish including capelin, polar cod juvenile Greenland cod and Greenland halibut (Coad and Reist 2004). Greenland cod spawn at the mouths of freshwater rivers during spring (DFO 2006a). Their habitat range overlaps with the RSA, primarily occupying inlets and estuaries along both coasts of Hudson Bay extending south to Arviat along the west coast and to the Eastmain River estuary in James Bay along the east coast (Coad and Reist 2004; Ochman and Dodson 1982; Hunter et al. 1984).

Polar cod (*Arctogadus glacialis*)

The habitat range of polar cod includes offshore continental shelf waters of the RSA in Hudson Bay and Hudson Strait (Cohen et al. 1990; NPC 2008). They exhibit cryopelagic[3] or epontic[4] life history types (Coad and Reist 2004), although they frequent primarily the upper surface waters in Hudson Bay (Scott and Scott 1988). Polar cod are closely associated with sea-ice and spawn underneath the ice during winter (Bradstreet et al. 1986; Craig et al. 1982). Prey species include other fish and crustaceans; predators include seabirds, seals, whales, and other fish (Bradstreet 1982).

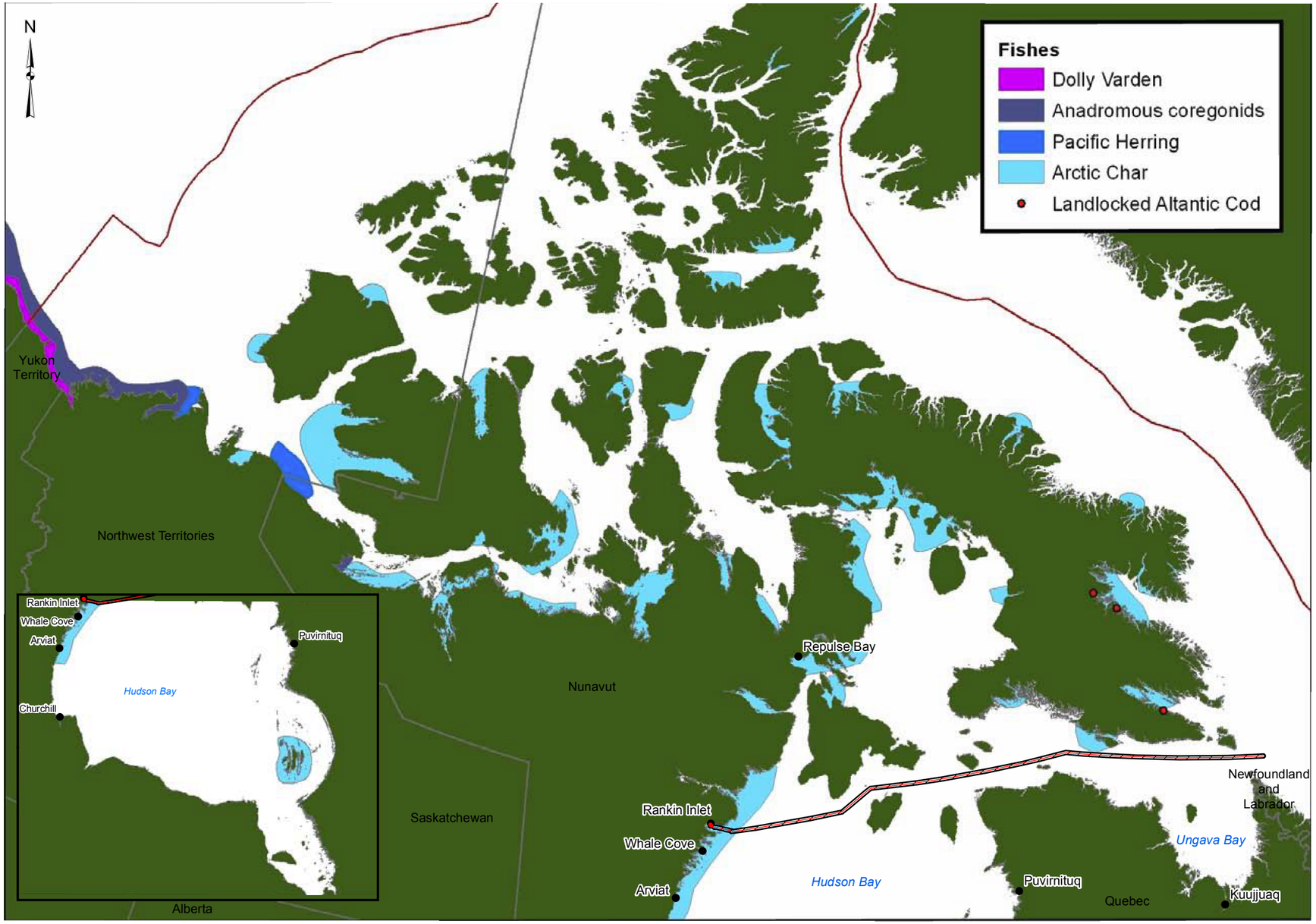
Arctic cod (*Boreogadus saida*)

Arctic cod are a key species in the arctic marine ecosystem (DFO 2011b). Like polar cod, Arctic cod exhibit cryopelagic or epontic life history types and have a short life span (Coad and Reist 2004). They live in marine waters down to 1,400 m (Coad and Reist 2004) and inhabit coastal areas during the summer and winter months (Cohen et al. 1990). Arctic cod feed on epibenthic mysids, amphipods, copepods, and other fish (Coad and Reist 2004). Spawning is thought to occur in late autumn and winter under the sea-ice. Arctic cod are a main food source for marine mammal and seabirds, particularly narwhals and murres (DFO 2011b).

[2] live on or near the seafloor

[3] associated with cold, deep marine environments

[4] associated with the lower interface of the sea ice



LEGEND

- LOCAL STUDY AREA (LSA)
- MARINE REGIONAL STUDY AREA (MARINE RSA)

REFERENCE

POVINCIAL DATA OBTAINED FROM E.S.R.I.
BASE IMAGE OBTAINED FROM STEPHENSON AND HARTWIG, 2010
DATUM: NAD 83 PROJECTION: CANADA ALBERS EQUAL AREA CONIC

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PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
DISTRIBUTION OF ARCTIC CHAR (*Salvelinus alpines*) AND OTHER SELECTED FISH SPECIES IN THE MARINE RSA AND ADJACENT ARCTIC WATERS

Golder Associates

PROJECT NO.	1535029	FILE No.		
DESIGN	AK	19 Jul. 2012	SCALE AS SHOWN	REV. 0
GIS	DSC	20 Jul. 2012		
CHECK	PR	18 Jan. 2013		
REVIEW	DW	18 Jan. 2013		

FIGURE B-7

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There is no commercial harvest of Arctic cod in the Canadian Arctic (DFO 2011b). Subsistence fishery records indicate that Arctic cod have been traditionally harvested in Arviat, Whale Cove, Coral Harbour, Cape Dorset, Kimmirut (Canadian Circumpolar Institute 1992; Heather and Usher 2004). Their habitat range overlaps with that of the RSA and extends into the Hudson Bay and Hudson Strait (Coad and Reist 2004).

Fourhorn sculpin (*Myoxocephalus quadricornis*)

Fourhorn sculpins are a benthic species (Coad and Reist 2004) and are generally found in shallow coastal estuarine waters (Morrow 1980). In the spring, this species migrates to deeper waters for the summer months where they are typically found in waters 45 to 100 m in depth (Muus 1999). They feed on crustaceans, molluscs, and fish (Coad and Reist 2004). Spawning occurs in shallow waters where pairing and egg laying occur in gravel substrate (Muus 1999). This species is distributed throughout Hudson Bay and Hudson Strait (Coad and Reist 2004). Fourhorn sculpins have been traditionally harvested in Arviat, Whale Cove, Coal Harbour, Cape Dorset, and Kimmirut (Canadian Circumpolar Institute 1992; Heather and Usher 2004).

Arctic staghorn sculpin (*Gymnocanthus tricuspis*)

The Arctic staghorn sculpin are a benthic species preferring sandy bottom types but also frequenting mud, gravel, and rocky habitats (Fedorov 1986; Coad and Reist 2004). This species tends to inhabit near-shore areas (ArcOD 2011). Spawning occurs in late autumn and winter (ArcOD 2011). Artic staghorn sculpin feed primarily on benthic amphipods and worms (Fedorov 1986). They are not a commercially harvested species and do not represent a major target species of the subsistence fishery.

Arctic sculpin (*Myoxocephalus scorpioides*)

Arctic sculpin are known to occur in the RSA, with a regional distribution extending from James Bay and the Straits of Belle Isle to Greenland (Fishbase 2012). They are a benthic species found primarily in shallow marine environments up to 275 m in depth (Coad and Reist 2004). Spawning occurs during autumn (Coad and Reist 2004). Prey items include mainly crustaceans (Coad and Reist 2004). They are not a commercially harvested species and do not represent a major target species of the subsistence fishery.

Slender eelblenny (*Lumpenus fabricii*)

The slender eel blenny can be found in a variety of marine environments from sandy bottoms to rocky habitats but are rarely found in intertidal areas (Coad and Reist 2004; Mecklenburg and Sheiko 2004). They are closely associated with seagrass and macroalgae in the nearshore where they spawn during autumn (Mecklenburg and Sheiko 2004). This species feeds on crustaceans, worms, clams, and other fish eggs (Coad and Reist 2004). Its habitat range includes both Hudson Strait and Hudson Bay (Coad and Reist 2004). They are not a commercially harvested species and do not represent a major target species of the subsistence fishery.

Greenland halibut (*Reinhardtius hippoglossoides*)

The Greenland halibut is an epibenthic species and can be found at the surface to waters down to 2,000 m (Coad and Reist 2004). This species feeds on other fishes, crustaceans and squids (Coad and Reist 2004). Its habitat range includes the Hudson Strait (Coad and Reist 2004). The Greenland halibut has become increasingly important in developing commercial fisheries in the eastern Arctic (Coad and Reist 2004); however, they do not represent a major target species of the subsistence fishery.

Hearing Abilities of Marine Fish

It is well known that fish use sound for communication, detection of predators and prey, and learning about their environment (Popper and Fay 1999; Zelick et al. 1999; Fay and Popper 2000; Popper et al. 2003). All fish species can hear with varying degrees of sensitivity within the frequency range of sound produced by seismic sources and other industrial sound sources (Popper and Fay 1973; Fay 1988; Popper and Fay 1993; Fay 2000). The hearing range for most fish is believed to be in the frequency range of 100 to 1000 hertz (Hz) (Fay 1988). A smaller number of species can detect sounds to over 3,000 Hz, while a very few can detect sounds to well over 100 kHz. Because of wide differences in hearing capability and morphologies among fish species, behavioural responses and the susceptibility of fish to auditory trauma varies greatly. There is considerable anatomical and physiological variation amongst fish with respect to hearing structures, suggesting that various species may detect and process sound in different ways (Popper and Fay 1993). Fish can be divided into 2 broad categories: hearing generalists and hearing specialists (Popper et al. 2003; Ladich and Popper 2004). Hearing generalists are fish species without any auditory system specializations. They have poor auditory sensitivity characterized by a narrow bandwidth of hearing, typically detecting sounds from below 50 Hz up to 1 or 1.5 kHz (Popper et al. 2003). This includes most bottom-dwelling species such as Greenland halibut (Popper et al. 2003). The majority of fish species that fall into this category generally do not hear frequencies much above 1 kHz, with peak sensitivities around 300 to 500 Hz (Ladich and Popper 2004). The sound pressure detection threshold can be as high as 120 dB re 1 µPa at 1 m at the most sensitive frequency (Nedwell et al. 2004). Hearing specialists have specialized auditory structures connected to well-developed pressure sensitive organs (Popper and Fay 1993). These morphological adaptations allow hearing specialists to detect sound pressure with greater sensitivity (i.e., lowering their hearing threshold) and in a wider bandwidth than “generalists”, and makes hearing specialists more sensitive to high-amplitude sound introduced into the marine environment.

Hearing thresholds for many Arctic species of fish are largely unknown. Underwater noise generated by vessel engines and cavitation can affect fish behaviour. Behavioural changes may cause disruption to migration patterns or spawning events and movement away from valuable food sources and have the potential to cause population-level effects. Fish are particularly sensitive if these changes occur over a critical period when they have a short window of opportunity to complete an activity.

Over 60 species of marine fish may be found in the LSA and RSA including: Greenland cod (*Gadus ogac*), slender eelblenny (*Lumpenus fabricii*), fourhorn sculpin (*Triglopsis quadricornis*), Arctic staghorn sculpin (*Gymnocanthus tricuspis*) and Arctic sculpin (*Myoxocephalus scorpioides*), Arctic char (*Salvelinus alpinus*), Arctic cod (*Boreogadus saida*), and polar cod (*Arctogadus glacialis).* Polar cod and Arctic cod are both hearing specialist species and are likely to be present in the RSA. Cod fish can detect both sound acceleration and sound pressure over a substantial frequency range; 20 to 150 KHz. Sound pressure thresholds in cod fish in the frequency range 60 to 300 Hz lie in the range 80 to 90 dB re 1 µPa at 1 m. Although hearing thresholds for most of these fish species are largely unknown, hearing thresholds for closely related species such as the walleye pollock

(*Theragra chalcogramma*) and the Atlantic cod (*Gadus morhua L.)* are known and may be used as surrogates for Greenland cod. The hearing ability of walleye pollock, from three different age groups (corresponding to size-classes), was determined from auditory evoked potentials by Mann et al. 2009. Walleye pollock hearing was most sensitive between 100 and 200 Hz, with thresholds around 75 dB re: 1 µPa (Mann et.al 2009). Hearing sensitivity decreased as frequency increased up to 450 Hz. The three age groups of walleye pollock did not show a difference in hearing sensitivity, although there was a noticeable interaction between frequency and age

as well as a trend with older fish having a slightly lower mean threshold level. Water temperature appears to have an effect on the hearing thresholds at 350 Hz for walleye pollock. Each degree of temperature increase (from 8 to 12°C) resulted in an 8.3-dB decrease in hearing threshold, with hearing being largely changed by local temperature over their natural range of occurrence. However, walleye pollock are generally found in the marine environment at temperatures less than those used during the Mann et al. 2009 laboratory experiments. In the Bering Sea, walleye pollock are generally found in 3–6°C waters and avoid temperatures less than 0°C (Kotwicki et al. 2005). They may be found in temperatures as warm as 10–12°C (Bailey et al. 1999). Based on the above results, Mann et al. 2009 suggests that the hearing thresholds of walleye pollock are generally similar to those of other gadid fishes.

Hearing studies on Atlantic cod demonstrated that this species is sensitive to pure tones in the frequency range of 30 to 470 Hz. Greatest sensitivity was observed between 60 to 310 Hz and the hearing threshold ranged from 78 to 117 dB re: 1 µPa (Chapman and Hawkins 1973). Changes in levels of ambient sea noise caused variation in thresholds in most frequency bands. In calm sea conditions, unmasked thresholds can be obtained. Thresholds were largely independent of the sound source distance within 1.7 to 50 m, suggesting that cod are sensitive to acoustic pressure (Chapman and Hawkins 1973).

1.3.2.2 Marine Birds

The Hudson Bay marine ecosystem provides resources of critical importance to resident and migrant marine birds throughout the year. At least 43 species of seabirds, shorebirds, waterfowl, and marine-associated raptors frequent offshore, inshore, intertidal, or salt marsh habitats of the Hudson Bay marine ecosystem (Table B-2). Few of these species are year-round residents. Most pass through the area during summer for staging, moulting, nesting, and brooding purposes (Canadian Circumpolar Institute 1992) prior to transiting to their traditional wintering grounds in the south, many of which fall outside the NSA (e.g., Arctic terns, red-necked phalaropes). Thus, impacts to certain long-range migratory species have the potential for transboundary effects. Marine bird species present year-round in Hudson Bay / Hudson Strait are limited to common eider, king eiders, black guillemot, dovekie, and ivory gull. These species have adapted to accessing prey in polynyas, where current and tidal action keep waters ice-free throughout the winter. FigureB- 8 and Figure B-9 provide an overview of marine bird distribution in the RSA based on historical sightings, current scientific knowledge, and IQ.

Table B-2: Overview of Seabird Species Potentially Present within the Local and Regional Study Areas

Common Name	Species	Seasonal Occurrence	Distribution	Other Relevant Information	SARA Status[a]	COSEWIC Status[b]	Of Cultural, Economic or Subsistence Importance	LSA	RSA
Black guillemot	*Cepphus grylle*	year-round	coastal / offshore	Harvested for subsistence. Nests in small colonies on steep shores on Southampton and Coats islands.	No status	Not assessed	Yes	✔	✔
Thick-billed murre	*Uria lomvia*	summer	coastal / offshore	Large breeding colony (520 000 pairs) on Akpatok Island in Hudson Strait. Traditional knowledge suggests that murres winter in large numbers in area of open water west of the Belcher Islands in southeast Hudson Bay. Moulting adult birds with their young complete swimming migration in August from a number of known bird colonies in Hudson Bay through the Hudson Strait to offshore areas of Newfoundland and Labrador (Mallory and Fontaine 2004).	No status	Not assessed	Yes	✔	✔
King eider	*Somateria spectabilis*	year-round	coastal	Widely distributed in James Bay and Hudson Bay.	No status	Not assessed	Yes	✔	✔
Common eider	*Somateria mollissima*	year-round	coastal / offshore	Hudson Bay subspecies overwinter in areas where open water and shallow depth coincide. Breeds along rocky coasts or tundra throughout Hudson Bay. Present along ice edge and at polynyas. Feed exclusively on blue mussel.	No status	Not assessed	Yes	✔	✔
Northern fulmar	*Fulmarus glacialis*	summer / fall	coastal / offshore	Rare visitor to James Bay in late fall. Observed at Coats Island.	No status	Not assessed	No	✔	✔
Black-legged kittiwake	*Rissa tridactyla*	summer	coastal / offshore	Occurs on the open waters of northern Hudson Bay in July and August, and occasionally at Churchill in early summer.	No status	Not assessed	No	✔	✔
Dovekie	*Alle alle*	year-round	coastal / offshore	Winter offshore in Hudson Bay, Hudson Strait and Gulf of St. Lawrence.	No status	Not assessed	No	✔	✔

Table B-2: Overview of Seabird Species Potentially Present within the Local and Regional Study Areas

Common Name	Species	Seasonal Occurrence	Distribution	Other Relevant Information	SARA Status[a]	COSEWIC Status[b]	Of Cultural, Economic or Subsistence Importance	LSA	RSA
Long-tailed duck	*Clangula hyemalis*	May-Oct	coastal	Occur in large numbers close to shore in Hudson and James Bay. Some individuals also overwinter on open water of James Bay.	No status	Not assessed	No	✔	✔
Canada goose	*Branta canadensis*	summer and fall	coastal	Spring and fall transient. Breeds in large numbers along the coasts (McConnell River Migratory Bird Sanctuary) and on the islands of Hudson Bay and James Bay (e.g., Southampton Island).	No status	Not assessed	Yes	✔	✔
Lesser snow goose	*Anser caerulescens*	May – Sept	coastal	Migratory species. Breeding colonies occur along the coasts (McConnell River Migratory Bird Sanctuary) and on the islands of Hudson Bay (e.g., Southampton Island). Hudson Bay supports over 50% of the eastern Arctic breeding population.	No status	Not assessed	Yes	✔	✔
Atlantic Brant	*Branta bernicla*	April to October	coastal	Migratory species. Breed on Southampton Island. During the fall migration, > 50% of the population frequents eelgrass habitat in James Bay.	No status	Not assessed	No	✔	✔
Glaucous gull	*Larus hyperboreus*	summer	coastal / offshore	Breed along the northern coasts of Hudson Bay, the Belchers, and widely throughout the Canadian Arctic.	No status	Not assessed	No	✔	✔
Herring gull	*Larus argentatus*	April-Nov	coastal / offshore	Migratory species. Breed along the coasts of Hudson Bay and James Bay in summer and in the Belchers.	No status	Not assessed	No	✔	✔
Ross's gull	*Rhodostethia rosea*	spring and autumn	coastal / offshore	Established nesting areas near Churchill, McConnell River Migratory Bird Sanctuary, and in the Canadian High Arctic (Devon Island). May overwinter in polynyas.	TH (Schedule 1)	TH	No	✔	✔
Ivory gull	*Pagophila eburnean*	year-round	coastal / offshore	Occur in Hudson Bay during both summer and winter, but breed in the	EN (Schedule 1)	EN	No	✔	✔

Table B-2: Overview of Seabird Species Potentially Present within the Local and Regional Study Areas

Common Name	Species	Seasonal Occurrence	Distribution	Other Relevant Information	SARA Status[(a)]	COSEWIC Status[(b)]	Of Cultural, Economic or Subsistence Importance	LSA	RSA
				Canadian High Arctic.					
Sabine's gull	*Xema sabini*	summer	coastal / offshore	Migratory species. Breeds on colonies along the northern coasts of Hudson Bay. Pelagic outside breeding season.	No status	Not assessed	No	✔	✔
Thayer's gull	*Larus thayeri*	summer	coastal / offshore	Migratory species. Breeds along the coasts of northern Hudson Bay during summer including Coats and Southampton islands.	No status	Not assessed	No	✔	✔
Arctic tern	*Sterna paradisaea*	summer	coastal / offshore	Migratory species that breeds throughout the Hudson Bay and Hudson Strait.	No status	Not assessed	No	✔	✔
Pacific loon	*Gavia pacifica*	summer	coastal	Migratory species. Arctic breeding species common and numerous along the mainland and island coasts of the Hudson Bay coast.	No status	Not assessed	No	✔	✔
Red-throated loon	*Gavia stellata*	summer	coastal	Migratory species. Arctic breeding species common and numerous along the mainland and island coasts of the Hudson Bay coast.	No status	Not assessed	No	✔	✔
Common loon	*Gavia immer*	summer	coastal	Migratory species. Common in southeastern Hudson Bay and James Bay.	No status	Not at risk	No	✔	✔
Black scoter	*Melanitta americana*	summer	coastal	Migratory species. Common on the Belchers and along the coast from southeastern Hudson Bay west to Churchill. May overwinter in small numbers in James Bay.	No status	Not assessed	No	✔	✔
Red-breasted merganser	*Mergus serrator*	summer	coastal	Migratory species. Common along the coasts of James Bay and southwestern Hudson Bay. Males and non-breeding birds frequent coastal marine waters.	No status	Not assessed	No	✔	✔
Red-necked phalarope	*Phalaropus lobatus*	summer	coastal / offshore	Migratory species. Breeds widely across the Arctic and throughout Nunavut.	No status	Not assessed	No	✔	✔

Table B-2: Overview of Seabird Species Potentially Present within the Local and Regional Study Areas

Common Name	Species	Seasonal Occurrence	Distribution	Other Relevant Information	SARA Status[(a)]	COSEWIC Status[(b)]	Of Cultural, Economic or Subsistence Importance	LSA	RSA
Red phalarope	*Phalaropus fulcarius*	summer	coastal / offshore	Migratory species. Breeds along the west coast of the Hudson Bay, on the Ungava Penninsula and on the southern end of Baffin Island in Nunavut.	No status	Not assessed	No	✔	✔
Parasitic jaeger	*Stercorarius parasiticus*	summer	coastal / offshore	Migratory species. Breed along the coast and islands of Hudson Bay.	No status	Not assessed	No	✔	✔
Long-tailed jaeger	*Stercorarius longicaudus*	summer	coastal / offshore	Migratory species. Breeds along the Quebec coast of Hudson Bay, on Southampton Island, and along the Kivalliq coast.	No status	Not assessed	No	✔	✔
Pomarine jaeger	*Stercorarius pomarinus*	summer	coastal / offshore	Migratory species. Breeds along the Quebec coast of Hudson Bay and on Southampton Island.	No status	Not assessed	No	✔	✔
Sandhill crane	*Grus canadensis*	summer	coastal	Migratory species. Summer visitors to the southern and western coasts of James Bay and Hudson Bay, from Boatswain west and north. Also reported on the Belchers and Southampton islands.	No status	Not at risk	No	✔	
Dunlin	*Calidris alpina*	summer	coastal	Migratory species. Breeds along the west coast of the Hudson Bay, on Southampton and Coats Island and on the southern end of Baffin Island in Nunavut.	No status	Not assessed	No	✔	
Semi-palmated sandpiper	*Calidris pusilla*	summer	coastal	Migratory species. Breeds in in the Hudson Bay including Southampton Island, Coats Island and the southern end of Baffin Island.	No status	Not assessed	No	✔	

Table B-2: Overview of Seabird Species Potentially Present within the Local and Regional Study Areas

Common Name	Species	Seasonal Occurrence	Distribution	Other Relevant Information	SARA Status[a]	COSEWIC Status[b]	Of Cultural, Economic or Subsistence Importance	LSA	RSA
Least sandpiper	*Calidris minutilla*	summer	coastal	Migratory species. Common breeder on the mainland shores of Hudson Bay south of Chesterfield Inlet in the west and Inukjuak in the east	No status	Not assessed	No	✔	
White-rumped sandpiper	*Calidris fuscicollis*	summer	coastal	Migratory species that breeds on the southern tip of Baffin Island and on the northwestern side of the Hudson Bay.	No status	Not assessed	No	✔	
Baird's sandpiper	*Calidris bairdii*	summer	coastal	Migratory species that breeds on the northern end of Baffin Island and in the coastal areas of the northern Foxe Basin.	No status	Not assessed	No	✔	
Pectoral sandpiper	*Calidris melanotos*	summer	Coastal	Migratory species that breeds along the northwest coast of the Hudson Bay, on Southampton and Coats islands in Nunavut.	No status	Not assessed	No	✔	
American golden plover	*Pluvialis dominica*	summer	Coastal	Migratory species that breed along the shores of Hudson Bay and James Bay and Southampton Island.	No status	Not assessed	No	✔	
Semi-palmated plover	*Charadrius semipalmatus*	summer	Coastal	Migratory species that breed along the shores of Hudson Bay and James Bay.	No status	Not assessed	No	✔	
Black-bellied plover	*Pluvialis squatarola*	summer	Coastal	Migratory species that breeds on the shores of northern Hudson Bay and Southampton Island.	No status	Not assessed	No	✔	
Ruddy turnstone	*Arenaria interpres*	summer	Coastal	Migratory species that breeds on the southern end of Baffin Island, along the coastal areas of the northern Foxe Basin and on Southampton Island and Coats Island.	No status	Not assessed	No	✔	

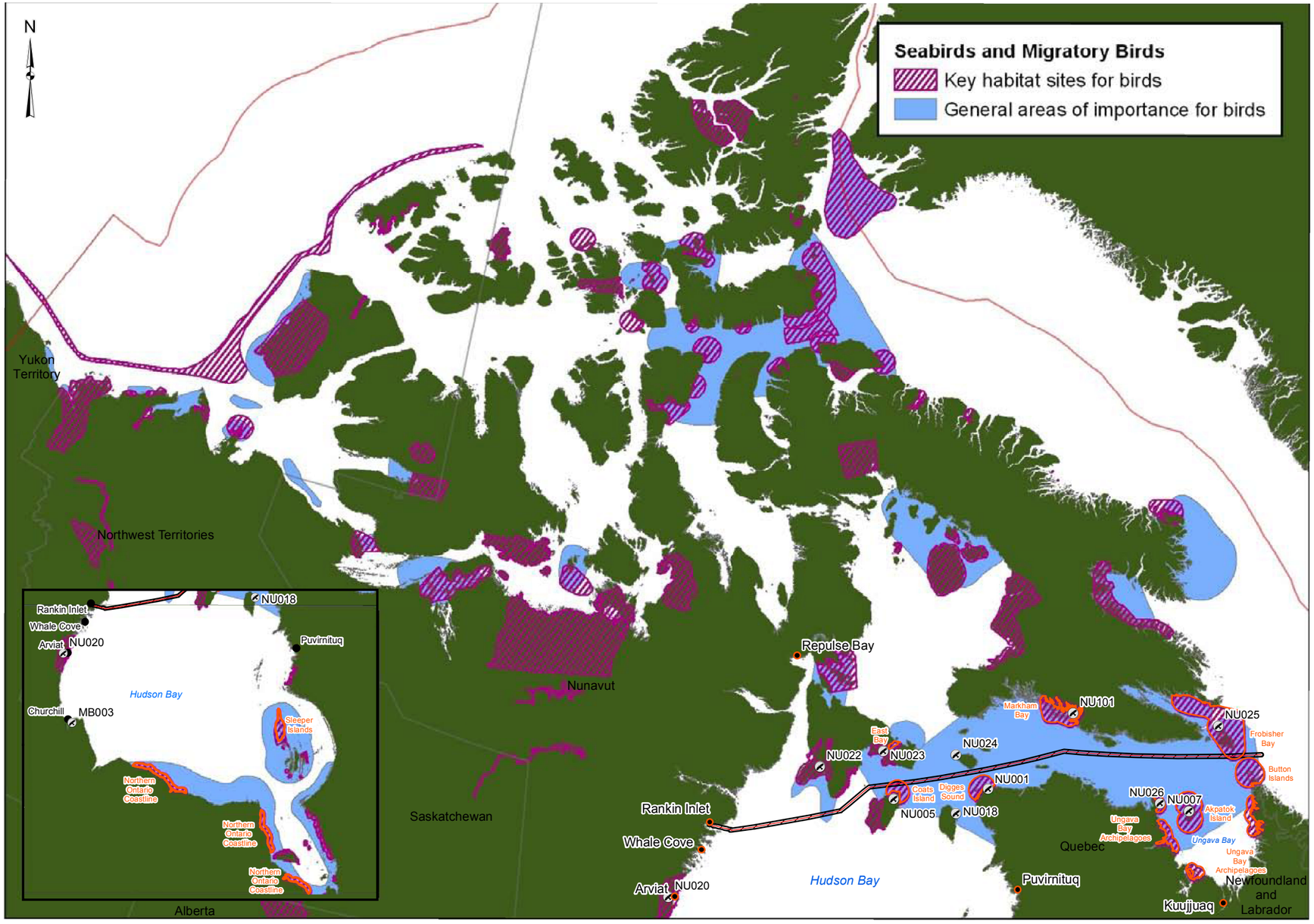
Table B-2: Overview of Seabird Species Potentially Present within the Local and Regional Study Areas

Common Name	Species	Seasonal Occurrence	Distribution	Other Relevant Information	SARA Status[a]	COSEWIC Status[b]	Of Cultural, Economic or Subsistence Importance	LSA	RSA
Sanderling	*Calidris alba*	spring / summer	Coastal	Migratory species. Common spring migrant along the coast near Churchill en-route to its breeding grounds in the Arctic.	No status	Not assessed	No	✔	
Red knot	*Calidris canutus*	summer	Coastal	Migratory species. Hudson Bay ecosystem provides critical resources for this species.	EN-*rufa ssp*. (schedule 1) SC-*islandica ssp*. (schedule 1)	EN-*rufa ssp*. SC-*islandica ssp*.	No	✔	
Peregrine falcon	*Falco peregrinus tundrius*	summer	coastal	Breed and hunt along the coasts of Hudson Bay and James Bay in summer. Breed in areas with high to moderate relief along the Hudson Bay coast of Manitoba, Nunavut, and northern Quebec and on Southampton, Coats and the Belcher and Nastapoka islands	SC (Schedule 1)	SC	No	✔	
Snowy owl	*Bubo scandiacus*	summer	coastal	Breed and forage along the coasts of Hudson Bay and James Bay	No status	Not at risk	No	✔	

[a] SARA (Species at Risk Act). The Act is a key federal government commitment to prevent wildlife species from becoming extinct and secure the necessary actions for their recovery. It provides for the legal protection of wildlife species and the conservation of their biological diversity (extracted from SARA 2012).

[b] COSEWIC (Committee on the Status of Endangered Wildlife in Canada) is a committee of experts that assesses and designates which wildlife species are in some danger of disappearing from Canada. It is up to Government to legally protect wildlife species designated by COSEWIC. The potential impacts of legal listing are for Government to analyse, and the *Species at Risk Act* (SARA) applies only to wildlife species on the SARA legal list (extracted from COSEWIC 2012).

EN=Endangered, TH=Threatened, SC = Special Concern



LEGEND

- IMPORTANT BIRD AREAS
- COMMUNITY
- KEY MARINE HABITAT AREAS FOR MIGRATORY BIRD
- MARINE REGIONAL STUDY AREA (MARINE RSA)

ID#	Important Bird Areas
NU022	Harry Gibbons Migratory Bird Sanctuary (federal)
MB003	Wapusk National Park (federal)
NU005	Cape Pembroke
MB013	Seal River Estuary Heritage River (federal)
NU020	McConnell River Migratory Bird Sanctuary (federal) & Ramsar Site
NU023	East Bay Migratory Bird Sanctuary (federal)
NU024	Fraser Island
NU001	Digges Sound
NU101	Markham Bay Eider Colony
NU026	Eider Islands
NU007	Akpatok Island
NU018	Mansel Island
NU025	Hantzsch Island

REFERENCE

PROVINCIAL DATA OBTAINED FROM E.S.R.I.
BASE IMAGE OBTAINED FROM STEPHENSON AND HARTWIG, 2010, IBA 2012
DATUM: NAD 83 PROJECTION: CANADA ALBERS EQUAL AREA CONIC

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PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
KEY HABITAT AREAS FOR MARINE BIRDS

Golder Associates

PROJECT NO.	1535029		FILE No.	
DESIGN	KZ	06 Feb. 2014	SCALE AS SHOWN	REV. 0
GIS	MH	06 Feb. 2014	**FIGURE B-8**	
CHECK	KZ	16 Feb. 2014		
REVIEW	DRW	16 Feb. 2014		

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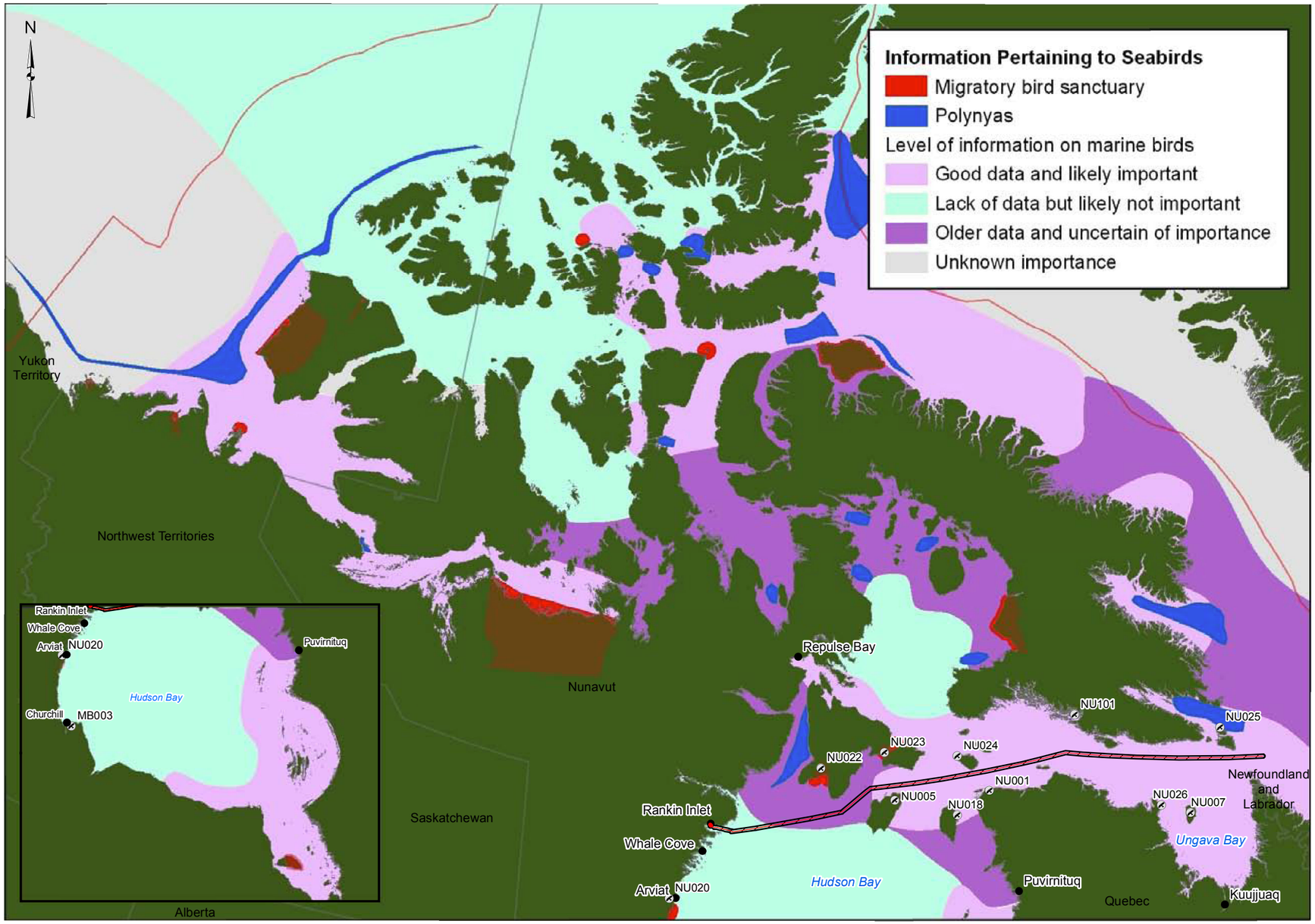

LEGEND

- LOCAL STUDY AREA (LSA)
- MARINE REGIONAL STUDY AREA (MARINE RSA)

ID#	Important Bird Areas
NU022	Harry Gibbons Migratory Bird Sanctuary (federal)
MB003	Wapusk National Park (federal)
NU005	Cape Pembroke
MB013	Seal River Estuary Heritage River (federal)
NU020	McConnell River Migratory Bird Sanctuary (federal) & Ramsar Site
NU023	East Bay Migratory Bird Sanctuary (federal)
NU024	Fraser Island
NU001	Digges Sound
NU101	Markham Bay Eider Colony
NU026	Eider Islands
NU007	Akpatok Island
NU018	Mansel Island
NU025	Hantzsch Island

REFERENCE

PROVINCIAL DATA OBTAINED FROM E.S.R.I.
BASE IMAGE OBTAINED FROM STEPHENSON AND HARTWIG, 2010, IBA 2012
DATUM: NAD 83 PROJECTION: CANADA ALBERS EQUAL AREA CONIC

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KILOMETRES

PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
DISTRIBUTION OF MARINE BIRDS AND BIRD HABITAT IN THE MARINE RSA AND ADJACENT ARCTIC WATERS

Golder Associates

PROJECT NO.	1535029	FILE No.		
DESIGN	AK	19 Jul. 2012	SCALE AS SHOWN	REV. 0
GIS	DSC	24 Jul. 2012		
CHECK	PR	18 Jan. 2013	FIGURE B-9	
REVIEW	DW	18 Jan. 2013		

Y:\burnaby\CAD-GIS\Client\Agnico_Eagle_Mines_Ltd\Meliadine_Gold_Project\99_PROJECTS\1535029_WL_Tech_Sup\02_PRODUCTION\5000\MXD\Report\1535029_Figure_B-9_Distribution_of_Birds.mxd

Hudson Bay / Hudson Strait provides key breeding habitat for numerous species, including many birds that are primarily Arctic breeders and others that are rarely seen in breeding condition outside the Arctic Islands. The only species listed under the SARA with the potential to occur in the RSA are the Ross's gull and the ivory gull (listed as Threatened and Endangered under Schedule 1 of SARA, respectively) (Table B-2). Those bird species identified as having special ecological or cultural importance, or holding special conservation status, with home ranges overlapping with the RSA are identified in Table B-2.

Three designated migratory bird sanctuaries occur along the shorelines of Hudson Bay / Hudson Strait: one south of Arviat in western Hudson Bay (McConnell River), and 2 on Southampton Island in northern Hudson Bay (Harry Gibbons and East Bay). Although these sites are generally a fair distance from the proposed shipping route, birds do forage offshore to considerable distances and may be vulnerable to impacts associated with shipping activities. For instance, hundreds of thousands of thick-billed murre fledglings migrate with molting adults from colonies in Hudson Strait (Hantzsch Island and Digges Sound) to Newfoundland by swimming, while those that nest on Akpatok Island overwinter west of the Belcher Islands.

Approximate densities of seabirds in the RSA during late summer / early fall have been identified by means of vessel-based seabird surveys undertaken in Hudson Bay and Hudson Strait in 2005 as part of the 2005 ArcticNet expedition (McKinnon et al. 2009). Mean seabird density indices were highest in Hudson strait (8.3 ± 1.9 birds/km^2) and lowest in southern Hudson Bay (0.36 ± 0.2 birds/km^2). Where mean density indices were high, sightings were dominated by northern fulmars or dovekies (or both). The results suggest that several seabird populations that migrate eastward through Hudson Strait converge at the eastern mouth of the Hudson Strait, thus representing a major staging area for migrant seabirds during September and October, particularly for northern fulmar, dovekie, and thick-billed murre.

In Hudson Strait, the mean density index of seabirds sighted within transects (both sitting on the sea and in flight) was 8.3 ± 1.9 birds/km^2. The species most commonly documented sitting on the sea were northern fulmar (65.8% of sightings) and dovekie (14.2%). The species most commonly documented in flight were Dovekie (48.3% of sightings) and northern fulmar (38.7%). Other species sighted (sitting on the sea and in flight) included, in order of abundance, thick-billed murre, black-legged kittiwake, glaucous gull, common eider and black guillemot (McKinnon et al. 2009).

In Hudson Bay, the mean density index of seabirds within transects (both sitting on the sea and flying) was 0.36 ± 0.2 birds/km^2. Species sighted sitting on the sea included thick-billed murre, herring gull, and glaucous gull. The species most commonly documented in flight were Canada goose (36.4% of sightings) and herring gull (23.6%). Other species sighted in flight included, in order of abundance, thick-billed murre, northern fulmar, black guillemot, black-legged kittiwake, glaucous gull, common eider, and long-tailed duck (McKinnon et al. 2009).

1.3.2.3 Marine Mammals

There are 11 species of marine mammals potentially present within the RSA for variable periods of time and at different times throughout the year (Table B-3). This includes 4 species of cetaceans (3 toothed whales and one baleen whale), 6 species of pinnipeds (seals and walrus), and the polar bear. Narwhal (*Monodon monoceros*), beluga (*Delphinapterus leucas*), and bowhead whales (*Balaena mysticetus*) are known to overwinter in Hudson Strait and in polynyas within Hudson Bay. Atlantic walrus (*Odobenus rosmarus rosmarus*), bearded seal (*Erignathus barbatus*), ringed seal (*Phoca hispida*), and harbour seal (*Phoca vitulina concolor*) are year-round residents to at least portions of Hudson Bay. Polar bears are also common in the RSA, entering the pack-ice in early November following their denning season but retreat to coastal areas during the summer ice-free season. The remainder of marine mammals identified in Hudson Bay / Hudson Strait are migratory and seasonal visitors, limited largely by the presence of solid land-fast ice throughout the winter and spring. There is a pronounced geographic bias on the distribution of several species within Hudson Bay; for example, belugas are strongly associated with the western part of Hudson Bay with substantial attraction to estuaries such as the Churchill River. Table B-4 provides a summary of marine mammal species harvested throughout the year by Coastal Inuit communities in Nunavut. An overview on the biology of each marine mammal species potentially present in, or in the vicinity of, the RSA is provided below.

Table B-3: Overview of Marine Mammal Species Found within the LSA and RSA

Common Name	Species	Seasonal Occurrence	Habitat	SARA Status[a]	COSEWIC Status[b]	Of Cultural, Economic or Subsistence Importance	LSA	RSA
Ringed seal	*Pusa hispida*	Year-round	Shore-fast ice and pack-ice	No Status	Not at Risk	Yes	✔	✔
Harp seal	*Pagophilus groenlandica*	Open-water season (July-Sept)	Pack-ice	No Status	Not assessed	Yes	✔	✔
Bearded seal	*Erignathus barbatus*	Year-round	Pack-ice	No Status	DD	Yes	✔	✔
Harbour seal	*Phoca vitulina concolor*	Year-round	Coastal terrestrial areas and edge of shore-fast ice	No Status	Not assessed	Yes	✔	✔
Hooded seal	*Cystophora cristata*	Open-water season (July-Sept)	Pack-ice	No Status	Not assessed	Yes	✔	
Atlantic walrus	*Odobenus rosmarus*	Year-round	Pack-ice or coastal waters during summer; floe-edge / polynyas during winter	No Status	SC	Yes	✔	✔
Polar bear	*Ursus maritimus*	Year-round	Spring: shore-fast ice; Summer: coastal areas and inland; and Winter: shore fast-ice and coastal areas for denning	SC (Schedule 1)	SC	Yes	✔	✔
Beluga whale	*Delphinapterus leucas*	Winter (Nov-May) and Summer	Spring: ice-edges/leads; Summer: shallow coastal areas (around Southampton Island and western Hudson Bay); Fall: deep water (foraging); Winter: offshore pack-ice (Hudson Strait)	No Status	EN	Yes	✔	✔
Narwhal	*Monodon monoceros*	Year-round	Winter: deep water / edge of banks; Summer: fjords / coastal waters	No Status	SC	Yes	✔	✔
Bowhead whale	*Balaena mysticetus*	Winter (Feb-Jun)	Spring : along the ice-edge; Summer: open-water /pack-ice; Winter: heavy pack-ice	No Status	SC	Yes	✔	✔
Killer whale	*Orcinus orca*	Jun-Aug	Coastal / offshore	No Status	SC	No	✔	✔

(a) SARA (*Species at Risk Act*). The Act is a key federal government commitment to prevent wildlife species from becoming extinct and secure the necessary actions for their recovery. It provides for the legal protection of wildlife species and the conservation of their biological diversity (extracted from SARA 2012).

(b) COSEWIC (Committee on the Status of Endangered Wildlife in Canada) is a committee of experts that assesses and designates which wildlife species are in some danger of disappearing from Canada. It is up to Government to legally protect wildlife species designated by COSEWIC. The potential impacts of legal listing are for Government to analyse, and the Species at Risk Act (SARA) applies only to wildlife species on the SARA legal list (extracted from COSEWIC 2012).

EN=Endangered, SC=Special Concern, DD=Data Deficient

Table B-4: Marine Mammal Species Harvested Throughout the Year by Coastal Inuit Communities in Nunavut

Target Species	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Ringed seal	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Bearded seal	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Harp seal	✔			✔		✔	✔	✔	✔	✔	✔	
Hooded seal							✔	✔	✔	✔	✔	✔
Harbour seal							✔	✔	✔	✔	✔	
Walrus	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Beluga	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Narwhal	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Bowhead								✔				
Polar bear	✔	✔	✔	✔	✔					✔	✔	✔

Source: Priest and Usher (2004)

Ringed seal (*Phoca hispida*)

The ringed seal has a circumpolar distribution that is closely associated with the distribution of land-fast ice. This species occurs at the southern limit of their range in Hudson Bay where it is present year-round (Mansfield 1967; Stewart and Lockhart 2005). Ringed seals are the most abundant and widespread seal in the Arctic; however, their numbers in western Hudson Bay declined between 1995 and 2010 based on annual aerial surveys conducted during spring/summer (Lunn et al. 2000; Vincent-Chambellant 2010; Ferguson and Young 2011). The results of two DFO aerial surveys in 2007 and 2008 indicate the relative density of ringed seals in western Hudson Bay falls in the range estimated in previous years and is consistent with estimates derived from surveys conducted in other Arctic areas (DFO 2009). In western Hudson Bay, density estimates for ringed seals varied greatly from year to year and there is inter-annual variation widely reported in the literature for the density of ringed seals hauled-out on the ice (DFO 2009). In 2007 and 2008, ringed seal relative densities in western Hudson Bay were estimated at 0.92 ±0.07 seal/km^2 and 0.44±0.05 seal/km^2 respectively with an abundance of 73170±5440 and 33701±3704 individuals respectively (DFO 2009)... Several factors, in addition to an actual change of seal abundance, could contribute to inter-annual variation including: ice type and conditions, water depth, temperature, wind speed and cloud cover, and time of the day and year could potentially affect ringed seal presence, haul-out activity and detectability (DFO 2009). DFO (2009) notes that many ringed seals may not have been available for detection in 2008 relative to 2007, and a declining population might not be an accurate interpretation of results.

The ability of ringed seals to maintain breathing holes in the land-fast ice enables them to occupy large areas that are inaccessible to other marine mammals except during the summer. During winter, their preferred habitat consists of ice leads and polynyas where breathing holes are easiest to maintain. In spring, breeding adults occur in highest densities in areas of stable land-fast ice with good snow cover where they maintain birth lairs for pup rearing (Hamill and Smith 1991), whereas non-breeders occur at the floe edge or in the moving pack-ice (Stewart and Lockhart 2005). Pups are born in early spring (March/April) and weaned prior to break-up of the sea-ice in late June (Evans and Raga 2001). Pups will remain in subnivean[5] dens during a 5 to 8 week lactation

[5] situated or occurring under the snow

period to avoid detection from predators such as polar bears (Evans and Raga 2001). During the open-water season (July-Sept), ringed seals are commonly observed hauled-out on the sea-ice in large numbers. Juveniles may move offshore at this time, but adults remain around islands and within the bays and fiords (McLaren 1958a; Dunbar and Moore 1980). As such, seals are unlikely to occur in large numbers in the proposed offshore shipping corridor during summer.

Figure B-10 provides an overview of ringed seal distribution in the RSA based on historical sightings, current scientific knowledge, and IQ.

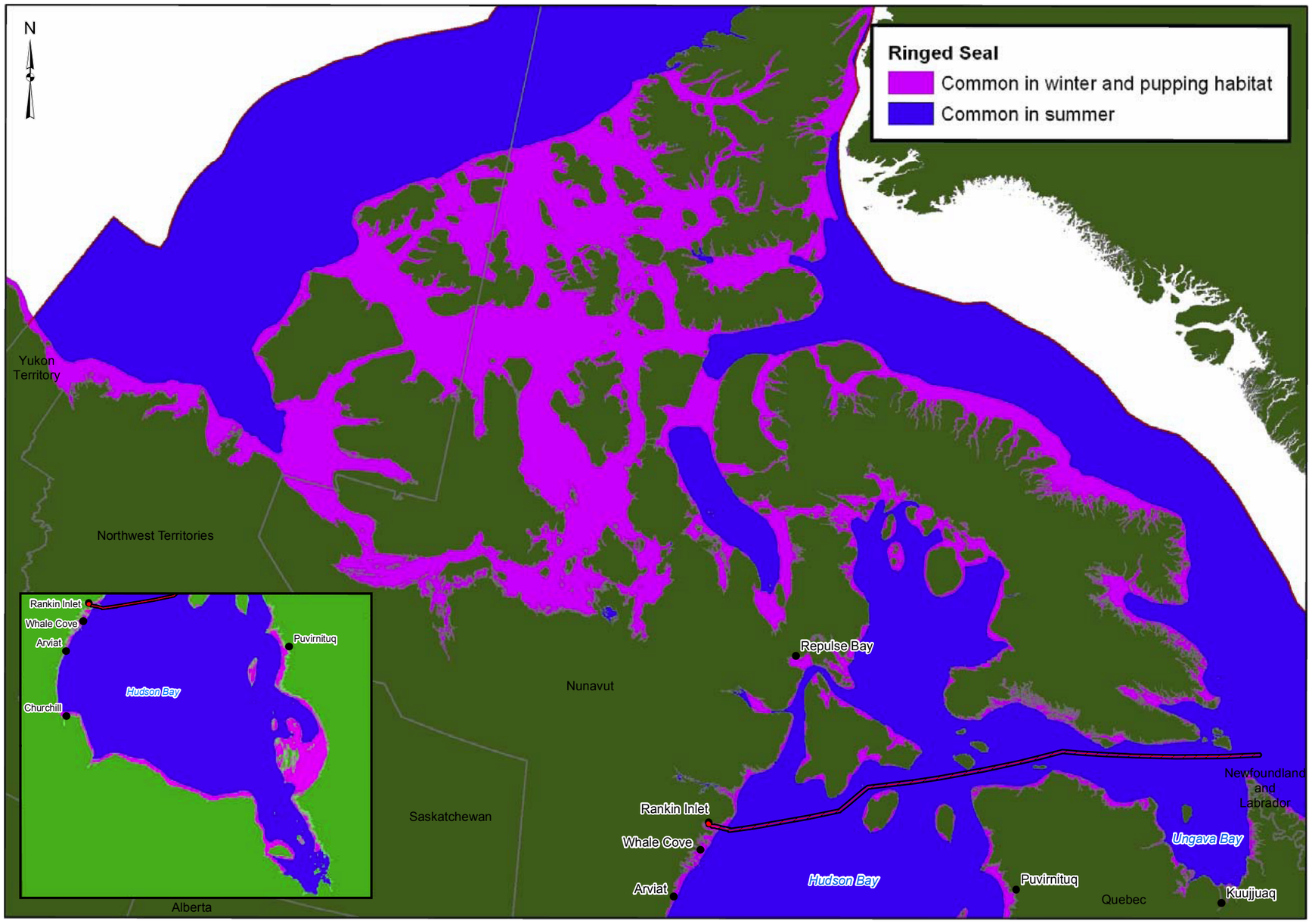
Ringed seals are considered a keystone species[6] (Ferguson et al. 2005), as both adults and pups are an important food source for polar bears (Smith et al. 1991). Other predators include Arctic fox, walrus, wolves, humans, and dogs (Hammill and Smith 1991). Juvenile ringed seals prey mainly on crustaceans under the ice, whereas adults prey on crustaceans and small fish (e.g., Arctic cod) (Richard 2001). This species serves as the main target of the Coastal Inuit subsistence hunt, with all communities in Nunavut (28 out of 28) actively harvesting this species (Priest and Usher 2004). The number of ringed seals harvested in Rankin Inlet is variable, ranging from 55 to 356 animals over a 5 year period (Priest and Usher 2004). The meat is considered a staple of the local diet, and seal hides are used for clothing and sold commercially. Concerns have been raised over possible declines in ringed seal abundance in western Hudson Bay, as indicated by Inuit traditional knowledge, due to reduced pregnancy rate (Stirling 2005), reduced pup survival and recruitment (Holst et al. 1999; Ferguson et al. 2005), later age of maturation and older age structure (Vincent-Chambellant 2010), and increased number of polar bears (Regehr et al. 2007).

Bearded seal (*Erignathus barbatus*)

Bearded seals are large, solitary seals, which have a circumpolar distribution in Arctic and sub-Arctic waters (Mansfield 1967). This species is sparsely distributed throughout their range, and are most abundant in areas where they have access to sea-ice upon which to haul-out, and in shallow water depths where they can access the seafloor (typically <200 m; Kingsley et al. 1985) to feed on crustaceans, molluscs, and fish (e.g., Arctic cod, polar cod, sculpin) (Burns and Frost 1979; Finley and Evans 1983). They are commonly found along continental shelf areas associated with high benthic productivity.

Since this species has only a limited capability to maintain breathing holes in solid ice, they are generally excluded from areas of land-fast ice during much of the year (e.g., High Arctic Archipelago) and are mostly found amongst the pack-ice where the surface is always accessible (Burns et al. 1981). As such, bearded seals move with the receding and forming ice, often travelling considerable distances to the north (seawards) in the summer and back south in the winter (Gilchrist and Robertson 2000). Studies of their general distribution have led to adopt the 250 m benthic contour interval as a measure to delineate the area in which bearded seals are commonly seen (Stephenson and Hartwig 2010). Figure B-11 provides an overview of bearded seal distribution in the RSA based on historical sightings, current scientific knowledge, and IQ.

[6] a keystone species is a species that plays a critical role in maintaining the structure of an ecological community and whose impact on the community is greater than would be expected based on its relative abundance or total biomass



LEGEND

- LOCAL STUDY AREA (LSA)
- MARINE REGIONAL STUDY AREA (MARINE RSA)

REFERENCE

PROVINCIAL DATA OBTAINED FROM E.S.R.I.
BASE IMAGE OBTAINED FROM STEPHENSON AND HARTWIG, 2010
DATUM: NAD 83 PROJECTION: CANADA ALBERS EQUAL AREA CONIC

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PROJECT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

DISTRIBUTION OF RINGED SEAL (*Phoca hispida*) IN THE MARINE RSA AND ADJACENT ARCTIC WATERS

Golder Associates

PROJECT NO.	1535029		FILE No.	
DESIGN	AK	19 Jul. 2012	SCALE AS SHOWN	REV. 0
GIS	DSC	19 Jul. 2012		
CHECK	PR	18 Jan. 2013		
REVIEW	DW	18 Jan. 2013		

FIGURE B-10

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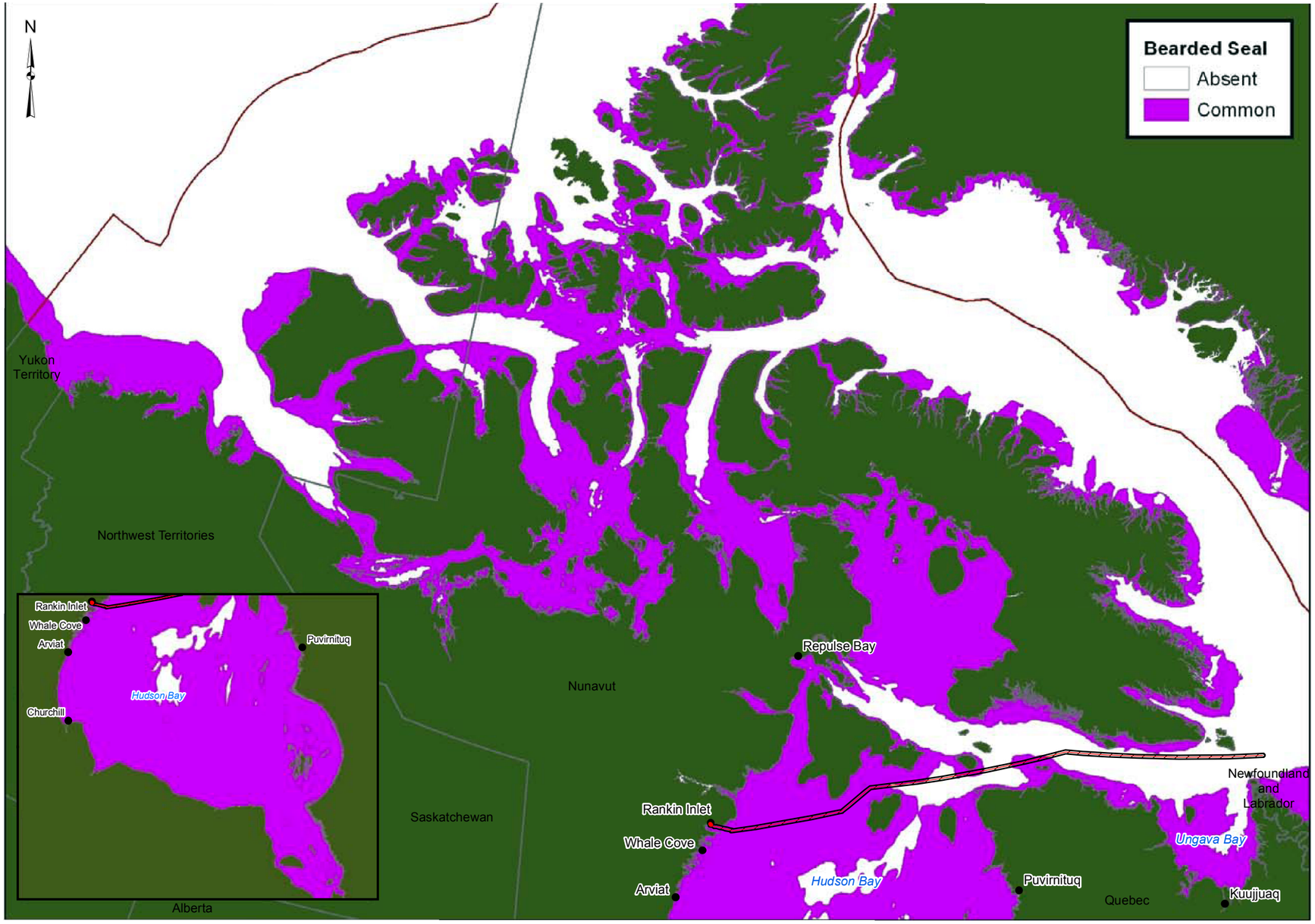

LEGEND

- LOCAL STUDY AREA (LSA)
- MARINE REGIONAL STUDY AREA (MARINE RSA)

REFERENCE

PROVINCIAL DATA OBTAINED FROM E.S.R.I.
BASE IMAGE OBTAINED FROM STEPHENSON AND HARTWIG, 2010
DATUM: NAD 83 PROJECTION: CANADA ALBERS EQUAL AREA CONIC

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PROJECT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

DISTRIBUTION OF BEARDED SEAL (*Erignathus barbatus*) IN THE MARINE RSA AND ADJACENT ARCTIC WATERS

Golder Associates

PROJECT NO.		1535029	FILE No.	
DESIGN	AK	19 Jul. 2012	SCALE AS SHOWN	REV. 0
GIS	DSC	23 Jul. 2012		
CHECK	PR	18 Jan. 2013		
REVIEW	DW	18 Jan. 2013		

FIGURE B-11

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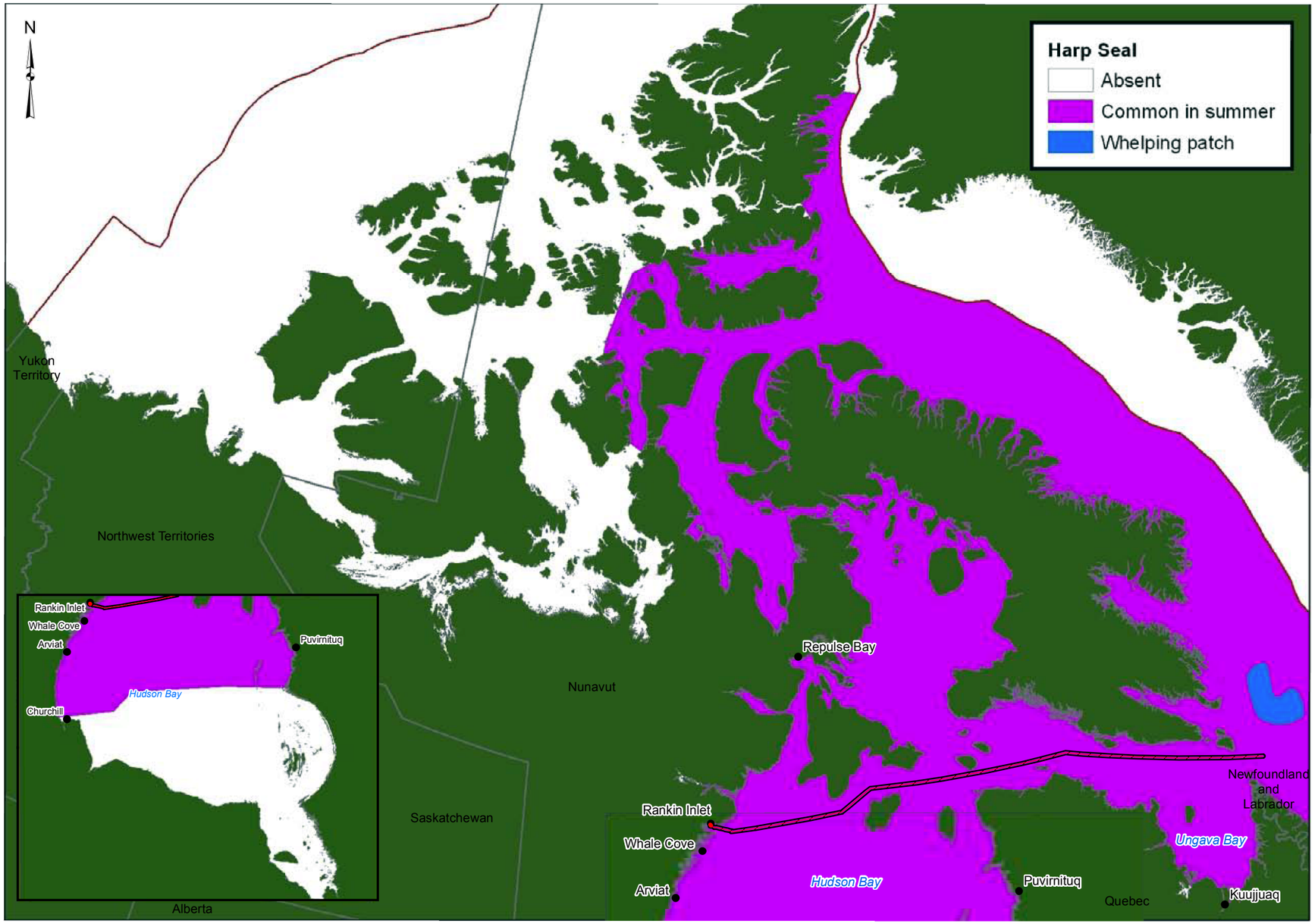
Bearded seal pups are born in late April on the ice, weaned approximately 12 to 18 days later, and then abandoned (Evans and Raga 2001). Mating occurs in the water shortly after weaning, and involves a 2-month delayed uterine implantation period. Both males and females mature around 6 years of age and reproduce biannually until 20 to 30 years of age (Evans and Raga 2001). Males actively vocalize underwater during the breeding season, with calling behaviour associated with territorial or mating displays (Richardson et al. 1995a). Bearded seals are estimated to number approximately 100 000 in the Canadian Arctic, and are especially abundant in Hudson Strait, Foxe Basin, and along the west coast of Hudson Bay (Mansfield 1967; Davis et al. 1980). The main predators of the bearded seal are polar bears and humans. This species is harvested throughout the year by virtually all coastal Inuit communities in Nunavut (27 of 28) (Furgal et al. 2002; Hovelsrud et al. 2008; Priest and Usher 2004), with hunting taking place from July to October. The meat is consumed and the tough flexible hide is used for harpoon lines, dog harnesses, whips, boot soles, and to cover boats called Umiak (Richard 2001). No Total Allowable Catch (TAC) limits exist for bearded seal in Nunavut. Population trends are listed as unknown by DFO (DFO 2015) and COSEWIC defines the status of bearded seals as 'Data Deficient' (DFO 2015)

Harp seal (*Pagophilus groenlandicus*)

The harp seal is a widespread species found in the northern Atlantic and Arctic oceans (Sergeant 1976). Their range includes northern Hudson Bay, Foxe Basin, Baffin Island, Davis Strait, Gulf of St Lawrence, Newfoundland, southern Greenland, Iceland, northern Norway, the White Sea, the Barents Sea, and the Kara Sea. Three distinct genetic populations are recognized: the Northwest Atlantic stock, the Greenland Sea stock, and the White Sea stock. Genetic evidence demonstrates that little gene flow occurs between the 3 stocks (Perry et al. 2000). Harp seals in Hudson Bay / Hudson Strait belong to the Northwest Atlantic stock and are only present in the RSA from ice break-up in early June until just before freeze-up (early October), at which point they migrate east outside the NSA and into the Gulf of St. Lawrence. Thus, impacts to harp seals due to the Project have the potential for transboundary effects. Harp seals are less common than ringed or bearded seals, but may have been more numerous and widespread in the past and may be re-occupying their former range (Stewart and Lockhart 2004). Figure B-12 provides an overview of harp seal distribution in the RSA based on historical sightings, current scientific knowledge, and IQ.

During spring (late February to April), female harp seals aggregate on the pack-ice along the southeast coast of Labrador ('Front') and in the Gulf of St. Lawrence where they form dense and highly-synchronized "whelping herds" and give birth to a single pup. Pups are nursed for 12 days, after which they remain fasting on the pack-ice for approximately 2 weeks before entering the water to feed (Lavigne and Kovacs 1988; Lydersen and Kovacs 1996). Adult females attain sexual maturity at 4 to 6 years of age (Frie et al. 2003). Reproductive maturity occurs in males at about 8 years of age. Towards the end of lactation, females come into estrus and mate (Lavigne and Kovacs 1988). Gestation lasts about one year, including a 3 to 4 month period of delayed implantation (Stewart et al. 1989). The life span of harp seals is approximately 20 to 30 years. Both males and females are sexually active until the ends of their lives, showing no evidence of reproductive senescence (Ronald and Healey 1981).



LEGEND

- LOCAL STUDY AREA (LSA)
- MARINE REGIONAL STUDY AREA (MARINE RSA)

REFERENCE

PROVINCIAL DATA OBTAINED FROM E.S.R.I.
BASE IMAGE OBTAINED FROM STEPHENSON AND HARTWIG, 2010
DATUM: NAD 83 PROJECTION: CANADA ALBERS EQUAL AREA CONIC

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KILOMETRES

PROJECT
AGNICO EAGLE
AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
DISTRIBUTION OF HARP SEAL (*Pagophilus groenlandica*) IN THE MARINE RSA AND ADJACENT ARCTIC WATERS

Golder Associates

PROJECT NO.		1535029	FILE No.	
DESIGN	AK	19 Jul. 2012	SCALE AS SHOWN	REV. 0
GIS	DSC	23 Jul. 2012		
CHECK	PR	18 Jan. 2013		
REVIEW	DW	18 Jan. 2013		

FIGURE B-12

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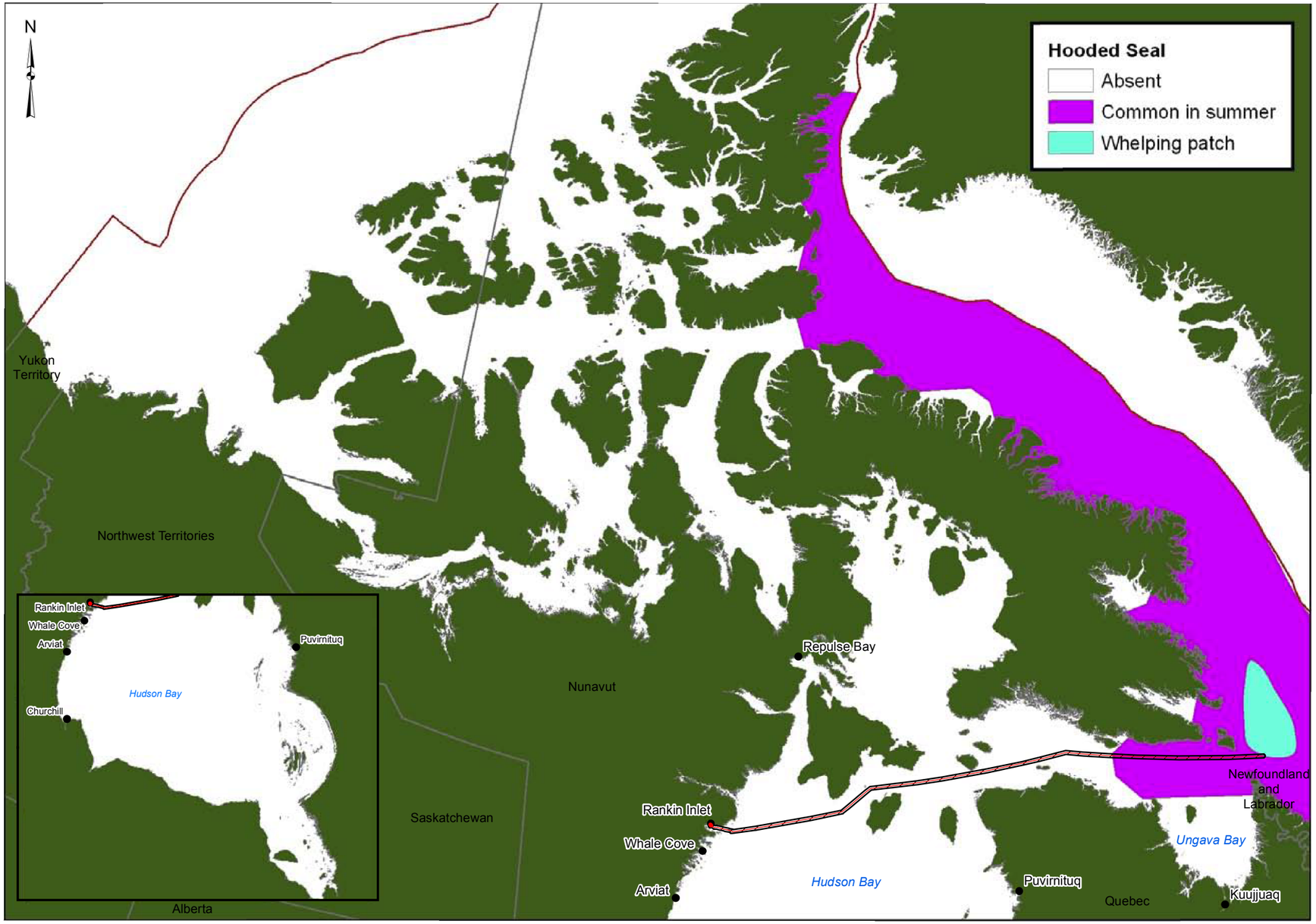
Harp seals undergo a moult in the post-breeding months, from early April to early May (Lavigne and Kovacs 1988). They are a highly social species that travel and forage in groups. The Northwest Atlantic population is highly migratory; after breeding, individuals follow the pack-ice up the coast of Labrador and spend the summer feeding in Baffin Bay, with small numbers entering Hudson Bay and Hudson Strait around Baffin Island before returning south to the Gulf of St. Lawrence during autumn, resulting in an annual migration of over 5000 km (Lavigne and Kovacs 1988). Natural predators of harp seals include polar bears, killer whales, Greenland shark, and humans (Lavigne and Kovacs 1988). Harp seals consume a wide range of fish and invertebrate prey that varies along their migration route (Lavigne 2002). Fish prey includes capelin, Arctic cod, Atlantic cod (Gadus morhua), Atlantic herring (Clupea herringus), and redfish (Sebastes sp.) (Lawson et al.1995). Pups and juveniles prey primarily on crustaceans, particularly euphausiids and amphipods (Haug et al. 2000; Nilssen et al. 2001).

The harp seal global population is presently estimated at 8 million individuals, with pup production at 1.4 million pups per year (Stenson et al. 2003; Potelov et al. 2003; Haug et al. 2006). The Northwest Atlantic stock is estimated to number 5.9 million individuals (DFO 2005a). This is a marked recovery from an estimated low of around 1.8 million recorded in the early 1970s (Sergeant 1976) linked to a population crash from overharvesting. This led to the near cessation of hunting and the gradual recovery of this stock. Catch levels have increased repeatedly during the last decade, with the Canadian and Greenland hunt now presently the largest marine mammal harvest in the world (DFO 2007). As of 2011, the Northwest Atlantic harp seal population was at the highest levels observed since monitoring began almost 60 years ago. Pup production in 2008 was on the order of 1.63 million animals with a total population size of around 8.0 to 8.7 million animals increasing to 8.6 to 9.6 million animals in 2010 (Hammill and Stenson 2011).According to Hammill and Stenson (2011) the likelihood that the population is no longer growing exponentially needs to be considered further, particularly within the context of levels of carrying capacity (K) to understand the dynamics of the population. It is important to note however, there is some uncertainty associated with reproductive rates and how density dependence is expressed in the models used to predict these population trends (DFO 2012). The 2010 assessment assumed that reproductive rates would remain high, predicting a population between 8.61 to 9.55 million animal (95% CI 7.80 to 10.80 million; DFO 2012). However, since 2008 reproductive rates have declined resulting in a 2012 population estimate of 7,700,000 (95% CI=6,900,000-8,400,000). The current population of Northwest Atlantic harp seals is estimated to have declined slightly since 2008; nevertheless it is near its highest level since the mid-19th Century (DFO 2012).

This species is hunted throughout Nunavut primarily during the months of June through September (Priest and Usher 2004), with pups representing the majority of the harvest. Both meat and blubber are consumed, and the pelts are sold commercially. Subsistence harvests are currently not regulated, but the commercial harvest is regulated by the 2011 to 2015 Integrated Fisheries Management Plan for Atlantic Seals. Seals are also caught incidentally in fishing gear (DFO 2012). DFO sets TACs within a 3-year period for the Northwest Atlantic population. In addition to Canada's commercial harvest, some harp seals are still taken in subsistence hunts in Labrador, Newfoundland, northern Quebec, and in Nunavut. Aboriginal peoples and non-Aboriginal coastal residents who reside north of latitude 53 degrees can hunt seals for subsistence purposes without a permit (DFO 2006b). Between 1983 and 1995, Canadian catches of Northwest Atlantic harp seals averaged approximately 52,000 seals per year, with catches increasing significantly to a range of 226,000 to 366,000 between 1996 and 2006 (DFO 2012). Since 2007 Canadian catches have declined significantly with DFO (2012) reporting a catch of 40,370 in 2011. Catches in the Canadian Arctic remains low at under 1,000 Northwest Atlantic harp seals per year (DFO 2012).

Hooded seal (*Cystophora cristata*)

The hooded seal occurs throughout much of the North Atlantic and Arctic Oceans (King 1983) preferring deeper water and occurring farther offshore than harp seals (Sergeant 1976; Campbell 1987; Lavigne and Kovacs 1988; Hammill and Stenson 2006). They are a highly migratory species, and are considered a rare visitor to Hudson Bay / Hudson Strait (Stewart and Lockhart 2004). Thus, impacts to hooded seals due to the Project have the potential for transboundary effects. As primarily deep-water feeders, the 200 m bathymetric contour interval has been adopted to estimate the offshore distribution boundary of this species (Stephenson and Hartwig 2010). Figure B-13 provides an overview of hooded seal distribution in the RSA based on historical sightings, current scientific knowledge, and IQ. They are generally associated with heavy pack ice, and their presence would extend until ice break-up (Sergeant 1974).



LEGEND

- LOCAL STUDY AREA (LSA)
- MARINE REGIONAL STUDY AREA (MARINE RSA)

REFERENCE

PROVINCIAL DATA OBTAINED FROM E.S.R.I.
BASE IMAGE OBTAINED FROM STEPHENSON AND HARTWIG, 2010
DATUM: NAD 83 PROJECTION: CANADA ALBERS EQUAL AREA CONIC

240 0 240
KILOMETRES

PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
DISTRIBUTION OF HOODED SEAL (*Cystophora cristata*) IN THE MARINE RSA AND ADJACENT ARCTIC WATERS

Golder Associates

PROJECT NO.	1535029	FILE No.		
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CHECK	PR	18 Jan. 2013	**FIGURE B-13**	
REVIEW	DW	18 Jan. 2013		

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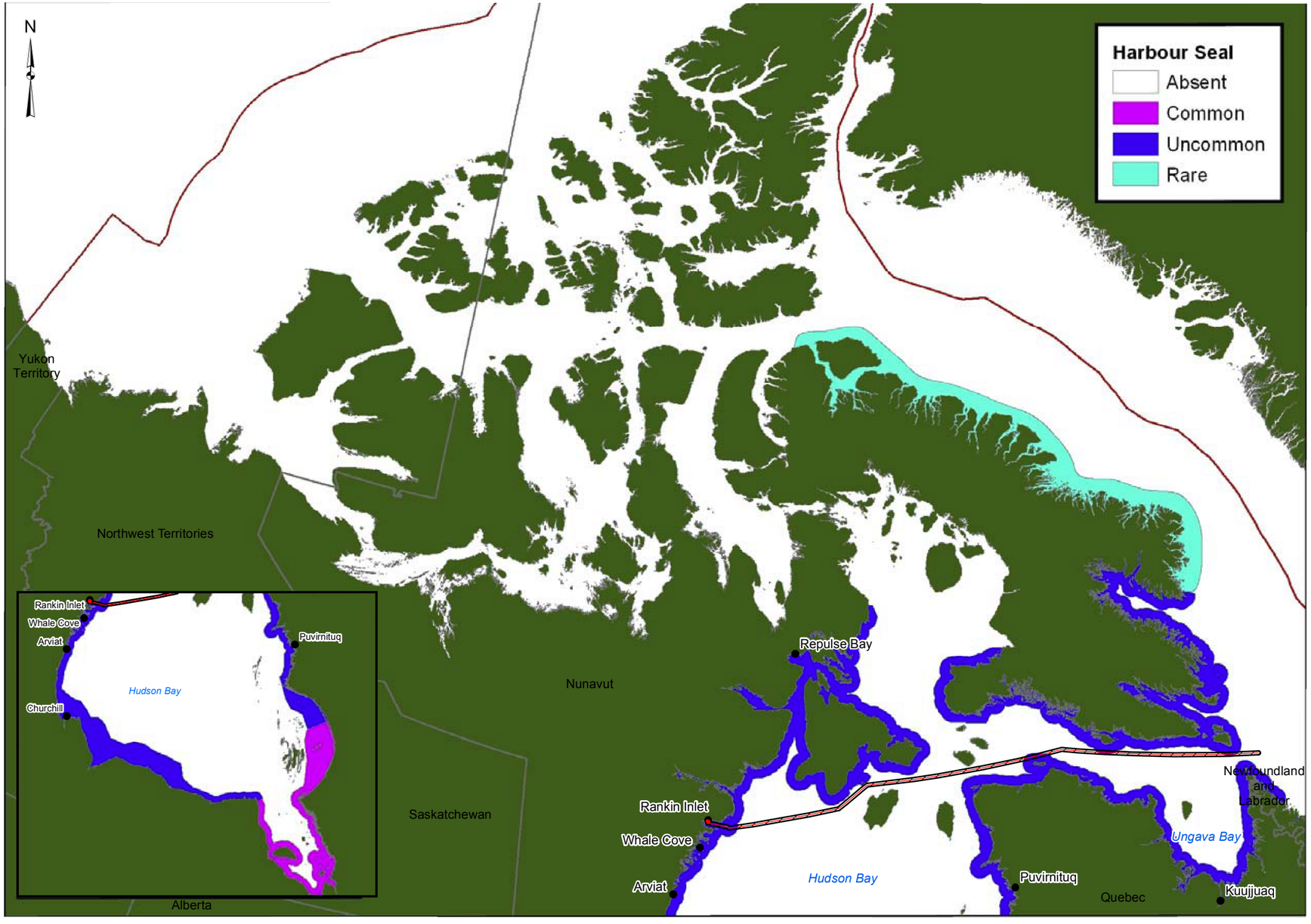
Hooded seals of the Western North Atlantic stock breed synchronously during mid to late March in heavy pack-ice areas off the coast of eastern Canada and around Greenland. Breeding of this population is divided into 4 whelping areas. The “Front” herd (largest of the 4) breeds off the coast of Newfoundland and Labrador, the “Gulf” herd breeds in the Gulf of St. Lawrence, the “Davis Strait” herd breeds between Baffin Island and western Greenland, and the “West Ice” herd breeds in the Greenland Sea near the island of Jan Mayen (Sergeant 1974, 1976; Folkow et al. 1996). These breeding herds are considered to belong to 2 recognized populations (Hammill and Stenson 2006). Seals whelping near Jan Mayen are thought to constitute the Northeast Atlantic population, while hooded seals whelping and breeding in Davis Strait, the Gulf and at the Front are all thought to belong to the Northwest Atlantic population (Hammill and Stenson 2006). The breeding season for this polygamous species is brief lasting only 2 to 3 weeks, with mating taking place in the water (Boness et al. 1988; Kovacs 1990). This species has the shortest lactation period for any mammal, with most pups being weaned in 4 days (Bowen et al. 1987). Hooded seals moult in July, with each breeding stock congregating at separate traditional sites away from the whelping areas. Many seals are reported to migrate to the pack-ice east of Greenland in Denmark Strait at this time (Sergeant 1974, 1976; Folkow et al. 1996). Hooded seals form loose aggregations in specific areas during the breeding and moulting season and generally remain solitary outside this period. Hooded seal life span is approximately 25 to 30 years (Kovacs 2002).

The Northwest Atlantic population has been estimated at approximately 600 000 animals (593 500, +67 200 SE, Hammill and Stenson 2006), of which 90% are estimated to whelp at the Front (Stenson et al. 2006). The DFO 2011 to 2015 Integrated Fisheries Management Plan for Atlantic Seals still estimates the hooded seal herd in the northwest Atlantic to have increased from 478,000 in 1965, to approximately 600,000 animals currently (DFO 2011c). The Northeast Atlantic population is estimated at between 70 000 and 90 000 animals, although there is considerable uncertainty around these estimates due to scarcity of data and limited understanding of the relationships between whelping areas (ICES 2006). Hooded Seals are annually harvested by coastal Inuit of Greenland and Canada for subsistence purposes (Kovacs 2002) and have been commercially hunted at the Front since the late 1800s (Kovacs 2008b). Harvesting occurs primarily during the months of July through December (Table B-5). For the Canadian harvest, the TAC has been set at 10 000 seals per year since 1998 (ICES 2006). For the period 2000-2004, the total estimated catch of hooded seals was 48 188 (Kovacs 2008b). By-catch of hooded seals in coastal net fisheries has been reported from the United States, from trawl fisheries off Norway and Newfoundland, and salmon drift nets used off Greenland (Woodley and Lavigne 1991; Reeves et al. 1992; Waring et al. 2005).

Harbour seal (*Phoca vitulina concolor*)

The harbour seal is the most widely-distributed of all pinnipeds, inhabiting temperate, sub-Arctic and Arctic coastal areas on both sides of the North Atlantic and North Pacific Oceans. As this species does not maintain breathing holes in the ice, their distribution in the RSA is limited to locations where currents maintain open water year-round, typically in freshwater or estuarine rapids, in small coastal polynyas, or at the ice floe edge (Mansfield 1967). Harbour seals are not typically found in offshore waters exceeding 50 m depth (COSEWIC 2007). This depth limitation is supported by radio telemetry studies that have indicated that the 50 m benthic contour line may be used to demarcate their offshore limit of distribution (Stephenson and Hartwig 2010). Figure B-14 provides an overview of their distribution in the RSA based on historical sightings, current scientific knowledge, and IQ. Adults tend to be solitary in the water but haul out in small sedentary groups on rocky shores, where pupping occurs. Harbour seals are harvested by coastal Inuit communities primarily during the period from July through October (Table B-4).



LEGEND

- LOCAL STUDY AREA (LSA)
- MARINE REGIONAL STUDY AREA (MARINE RSA)

REFERENCE

PROVINCIAL DATA OBTAINED FROM E.S.R.I.
BASE IMAGE OBTAINED FROM STEPHENSON AND HARTWIG, 2010
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240 0 240
KILOMETRES

PROJECT
AGNICO EAGLE
AGNICO EAGLE MINES LIMITED
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
DISTRIBUTION OF HARBOUR SEAL (*Phoca vitulina concolor*) IN THE MARINE RSA AND ADJACENT ARCTIC WATERS

Golder Associates

PROJECT NO.		1535029	FILE No.	
DESIGN	AK	19 Jul. 2012	SCALE AS SHOWN	REV. 0
GIS	DSC	23 Jul. 2012		
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REVIEW	DW	18 Jan. 2013		

FIGURE B-14

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Atlantic walrus (Odobenus rosmarus rosmarus)

The walrus (*Odobenus rosmarus*) has a circumpolar distribution and is the largest pinniped occurring in the Canadian Arctic. Individuals inhabiting coastal areas of the RSA belong to the Atlantic stock, 1 of 2 subspecies recognised. Walrus in the Canadian Arctic include two genetic populations, with seven different stocks (DFO 2013). The Baffin Bay (BB), west Jones Sound (WJS) and Penny Strait-Lancaster Sound (PS-LS) stocks comprise the high Arctic population. The central Arctic population is composed of the north and central Foxe Basin (N-FB and C-FB) and Hudson Bay-Davis Strait (HB-DS) stocks (DFO 2013). According to DFO (2013), the relationship between these six stocks and walrus distributed in south and east Hudson Bay (S&E-HB) is currently unknown. Recent aerial and satellite telemetry studies have been used to develop abundance estimates for six of the walrus stocks that make up the high Arctic and central Arctic populations in Canada. Based on those estimates, total allowable removals (TARs) were calculated for each stock using the Potential Biological Removal method (PBR) (DFO 2013). The aerial surveys of walrus haul outs conducted in 2007 to 2011 provided data to enable the calculation of abundance estimates for all stocks, with the exception of the S&E-HB stock (DFO 2013). However, it is likely that individual stock abundance estimates were underestimated due to incomplete survey coverage, inter-annual variability in distribution, and unfavourable weather and ice conditions (DFO 2013).

According to DFO (2013) stock estimates and associated TARs for walrus belonging to the high Arctic population are as follows:

- Baffin Bay stock was estimated at approximately 1,250 walrus in 2009 (based on a count of 571) resulting in an annual TAR of 10 to11 walruses;
- West Jones Sound stock was estimated at 503 (coefficient of variation (CV) = 0.07) walruses in 2008, (based on a count of 404) resulting in an annual TAR of seven or eight walrus; and
- Penny Strait-Lancaster Sound stock was estimated at between 661 (CV = 2.08) and 727 (CV = 0.07) walrus in 2009 (based on a count of 557) resulting in an annual TAR of 10to12 walrus.

However, dividing the harvest of the three stocks that make up the high Arctic population was not possible (DFO 2013). The average annual Canadian reported harvest (reported over 25 years) was approximately 14, less than the combined annual TAR of 27 to 31 walrus (DFO 2013).

The combined population estimates for the north and central Foxe Basin stocks in 2011 ranged from 8,153 (CV = 0.07) to 13,452 (CV = 0.43) animals and was based on counts of 6,043 and 4,484, respectively, using different survey dates and different adjustment factors (DFO 2013). The annual TARs is currently 106 to166 walruses and with a yearly harvest level of approximately 185 animals (DFO 2013). Further investigation into walrus movements within Foxe Basin and exchange with the larger Hudson Bay-Davis Strait stock is required to better understand how and if these stocks interact (DFO 2013).

Walruses from the Hudson Bay-Davis Strait stock summer in the Hoare Bay area on southeast Baffin Island. Population estimates were between 1,420 (CV = 0.07) and 2,533 individuals (CV = 0.17) in 2007 (based on a count of 1,056 animals; DFO 2013). The calculated annual TARs for the Hudson Bay-Davis Strait stock is currently 18 to 38 with local annual harvests of approximately 36 walruses (DFO 2013).

According to DFO (2013), the central Arctic population lacks sufficient data for a meaningful population estimate. Changes in the abundance of the Atlantic walrus population during the past 45 years remain unclear (COSEWIC 2006). Modelling indicates that populations in the Eastern Canadian Arctic have been in steady decline (Witting and Born 2005). The current total abundance of the Atlantic walrus is poorly known, the most recent information suggests a population size of 18,000 to 20,000 individuals (COSEWIC 2006). The population status of Atlantic walrus was recently upgraded to “Special Concern” (COSEWIC 2006). Walruses are harvested year-round by coastal Inuit communities in the Nunavut region (Table B-4; Priest and Usher 2004). Between 1996 and 2001, hunters reported an average annual walrus catch (landed) of 2/year from Arviat, 3/year from Chesterfield Inlet, 5/year from Rankin Inlet and none for the communities of Baker Lake or Whale Cove during that same period (NWMB 2004). Walrus hunting is subject to the terms of the Nunavut Land Claims Agreement and is legislated under the Marine Mammal Regulations of the *Fisheries Act*.

Walrus require large areas of shallow water (<80 m) with substrate that supports a productive bivalve community, the reliable presence of open water over these feeding areas, and suitable ice or land nearby upon which to haul out (Evans and Raga 2001). Atlantic walrus are highly gregarious and are associated with moving pack-ice for most of the year. In Hudson Bay, the paucity of sea-ice during summer forces walrus to haul-out in predictable locations on land. The main concentration of walruses in southern Hudson Bay is in the Belcher Islands (Sanikiluaq) (Figure B-15; DFO 2002). The main concentration of walruses in northern Hudson Bay resides on the northeast side of Coats Island and in Coral Harbour on the southeast side of Southampton Island (Figure B-15; DFO 2002). Walrus in both areas are present year-round with an estimated summer population of 2000 animals. The main concentration of walruses in Hudson Strait resides at Cape Dorset on the Foxe Peninsula (Figure B-15; DFO 2002). Walruses may occasionally haul out at the East Bay Bird Sanctuary on Southampton Island and the Bowman Bay Wildlife Sanctuary on Baffin Island (COSEWIC 2006).The general distribution of walrus and their preference for shallow near shore areas substantially reduces the potential for interaction of walrus with Project vessels in the shipping corridor (RSA). Figure B-16 provides a summary of distribution of haul-outs and areas of known important habitat for Atlantic Walrus in the Marine RSA and Adjacent Arctic Waters.

Walrus are characterized by a highly polygamous mating system, with breeding herds forming in January - April. They are long-lived animals (approximately 40 years) with a low reproductive rate. Females attain reproductive maturity at approximately 5 to 7 years of age, with a typical calving interval of 3 years (Garlich-Miller and Stewart 1999). Males reach sexual maturity at 6 to 10 years of age, although likely cannot successfully compete for females until they are older. Mating takes place in the water, usually from January to April, and pregnancy lasts 15 to 16 months. Females, therefore, can only give birth a maximum of once every 2 years, though it is more commonly 3 years between calves. This results in a pregnancy rate that is much lower than that of other pinnipeds. Walrus calves are born on land or on the pack-ice between late April and early June. The nursing period typically lasts for 2 years, with weaning occurring gradually over this time.

Behavioral responses of walrus to man-made noise are shown to be variable (DFO2002). Aircraft noise has been correlated with evidence of stampedes, with attendant mortality, as well as partial habituation to the noise (Born et al. 1995). Some individuals at haul outs may allow ships to approach quite close while others will react to ships 2 km away (Born et al. 1995). Displacement from haul outs for up to 9 hours has been noted as a result of in-air noise, with females and calves being the most susceptible to this type of disturbance (Salter 1979, Miller 1982). Suitable walrus habitat has been shown to be decreasing as human activities in the north expand

(COSEWIC 2006). Noise disturbance caused by motorized transportation and hunting have caused herds to abandon haul out near communities in favour of less accessible islands and shores (Born et al. 1995).

Interviews were conducted with Inuit hunters from Coral Harbour and Cape Dorset to document their knowledge regarding the seasonal distribution and abundance of walruses in northern Hudson Bay and western Hudson Strait (Orr and Rebizant 1987). Harvesters for Coral Harbour noted that during the winter, walruses were found along the floe edge from Leyson Point to Hut Point, with sightings of usually less than 100 walruses (Orr and Rebizant 1987). At the floe edge of Ruin Point, as many as 1,000 walruses have been noted, although usually sightings were around 500 individuals. Reports of sightings of 500 walrus at South Bay were also shared (Orr and Rebizant 1987). In the spring walrus were primarily noted in the area of South Bay, between Native Point and Ruin Point, with most sightings consisting of groups less than 100 individuals. The highest concentrations of walrus, up to 500, appeared to be at the floe edge near Renny Point. As ice breaks up in late spring, greater numbers of walrus (>500) are found near Leyson Point (Orr and Rebizant 1987). During the summer greater numbers of walrus were reported, with sightings common from Sea Horse Point, west along Bell Peninsula, to Ruin Point. Walrus Island, Bencas Island, the north and eastside of Coats Island and Evans Strait are all areas reported to have high concentrations (>1000) of walrus by hunters (Orr and Rebizant 1987). Harvesters noted that there appears to be a localized migration in the early fall, from the Coats Island and Walrus Island area, across to Evans Strait (Orr and Rebizant 1987). Harvesters reported more than 1,000 walrus hauled out or swimming in the area of Cape Pembroke (Orr and Rebizant 1987).

Cape Dorset hunters noted that during the winter months, walrus are sporadically distributed along the coast of Foxe Peninsula from Cape Dorchester to Chamberlain Island, with the largest number of walruses around Cape Dorchester (Orr and Rebizant 1987). Salisbury Island and Nottingham Island reported as many as 500 walruses in the area between the two islands. Most sightings documented were in groups from 20 to 50 individuals during the winter months (Orr and Rebizant 1987). Cape Enavolik, Shuke Island and Sakkiak Island were all noted to support as many as 1,000 walruses, with most individuals observed either swimming or hauled out on floating pack ice near the floe edge. During the spring, walruses can be found from Cape Dorchester to Dorset Island, commonly in groups of ~1,000 animals along the coast, while the groups from around the tip of Salisbury Island and the southeast side of Nottingham Island were similar to the winter numbers of approximately 500 individuals. In the spring, walrus were most commonly observed hauled out on floating pack ice (Orr and Rebizant 1987). In the summer months, walrus numbers decline in the vicinity of Cape Dorset; hunters suggested that walrus prefer the area along the west coast of Foxe Peninsula, from Lloyd Point to the group of islands north of Cape Dorchester during this time (Orr and Rebizant 1987). Walruses are known to travel around the islands of Mills, Salisbury and Nottingham in late summer, but hunting usually occurs along the west coast of Foxe Peninsula. Large groups of walrus of 500 to1000 individuals have been noted in the summer along the south, west and north coast of Salisbury Island and along the southeast coast of Nottingham Island (Orr and Rebizant 1987). In July and August, concentrations of over 1,000 walruses were reported around Cape Dorchester. During the fall, reports by hunters are similar to those made during the summer, with a slight decrease in the numbers along the northwest coast of Foxe Peninsula. This may be due to a seasonal migration of these animals to islands in Hudson Strait with noted increases in the number of animals observed around Nottingham and Salisbury Islands during this time (Orr and Rebizant 1987).

The main changes in seasonal distribution of the Northern Hudson Bay-Davis Strait walrus population occurred in the early to mid-1900 (COSEWIC 2006). This included the abandonment of haul outs along the west coast of Hudson Bay north to Chesterfield Inlet, Digges Island, Cumberland Sound, and on the Gyrfalcon Islands (Born et

al. 1995). During this time, walruses were rare in western Hudson Bay, but were moving northward where the coastline offered more suitable haul out (COSEWIC 2006). Walruses were numerous at islands near the community of Whale Cove from 1942 to 1945, but are uncommon in this area now (Fleming and Newton 2003). Small groups are sometimes seen at the floe edge south of Whale Cove (Gamble 1988; Fleming and Newton 2003). Inuit report that walruses were more numerous in the Chesterfield Inlet area in the early 1990s than in times previous (Fleming and Newton 2003). Some haul out in western Hudson Bay have been abandoned, but walrus have been noted to be hauled out (Figure B-16) in small numbers in summer at:

- Bibby Island (61°53'N, 93°05'W);
- Term Point (62°08'N, 92°28'W);
- “Little Walrus Island” in Mistake Bay;
- Sentry Island (61°10'N, 93°51'W);
- Wag Island (63°23'N, 90°38'W);
- Marble Island (62°41'N, 91°08'W); and
- Fairway Island (63°15'N, 90°33'W;Low 1906; Degerbøl and Freuchen 1935; Loughrey 1959; Reeves 1978; Born et al. 1995; DFO 2000; Fleming and Newton 2003).