PROPOSED

Species at Risk Act
Recovery Strategy Series

Recovery Strategy for the Ivory Gull (*Pagophila eburnea*) in Canada

Ivory Gull



2013

Canada

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PREFACE

The federal, provincial, and some territorial government signatories under the Accord for the Protection of Species at Risk (1996) agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA) the federal competent ministers are responsible for the preparation of recovery strategies for listed Extirpated, Endangered, and Threatened species and are required to report on progress within five years.

The Minister of the Environment is the competent minister for the recovery of the Ivory Gull and has prepared this strategy, as per section 37 of SARA. It has been prepared in cooperation with

1) Inuit communities of Resolute Bay and Grise Fiord;
2) Nunavut Wildlife Management Board; and
3) Government of Nunavut;

The Government of Newfoundland and Labrador, Nunatsiavut Wildlife Management Board and Government of the Northwest Territories have reviewed the document as well.

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this strategy and will not be achieved by Environment Canada, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this strategy for the benefit of the Ivory Gull and Canadian society as a whole.

This recovery strategy will be followed by one or more action plans that will provide information on recovery measures to be taken by Environment Canada and other jurisdictions and/or organizations involved in the conservation of the species. Implementation of this strategy is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

ACKNOWLEDGMENTS

This document was prepared by Mark L. Mallory (Environment Canada), with continuing, collaborative efforts from H. Grant Gilchrist and Gregory J. Robertson (Environment Canada), and in cooperation with other federal departments and responsible jurisdictions described above. The preparation of this document would not have been possible without the participation of Northern communities who helped with local knowledge interviews on this species, and international collaborators who have also provided recent information on the status of Ivory Gulls outside of Canada.

EXECUTIVE SUMMARY

- The Ivory Gull is a medium-sized Arctic gull characterized by pure white plumage as an adult, with black legs and an olive-coloured bill, while immature gulls have distinctive black speckling. The Ivory Gull has a circumpolar, patchy breeding distribution, but in Canada it is found breeding only on five islands in the eastern High Arctic. Colonies can be found either on steep cliffs of nunataks (mountain tops surrounded by glaciers), isolated flat islands, or flat, limestone plateaus. The Canadian population is small and fragmented, and has declined significantly since the 1980s. The Ivory Gull is listed as endangered under the *Species at Risk Act*.

- Because of the extremely remote nature of Ivory Gull nesting sites, some areas that might support colonies have not been surveyed, but in general there has been a contraction and northward movement of the distribution of extant colonies.

- The primary threats to Ivory Gulls include: illegal shooting (principally during migration along west Greenland), predation at colonies on flat ground, and industrial activities near colonies. Other potential but unproven threats include: contaminants, activities (disturbance) by researchers, climate change, and oil pollution at sea.

- Recovery of the Ivory Gull is deemed biologically and technically feasible. The long-term goal for this species is to see the Canadian population increased to more than 1000 birds in Canadian range-wide surveys, with the breeding distribution maintained. Over the next five years, the population and distribution objectives for the Ivory Gull are to: 1) secure and maintain population numbers on eastern Ellesmere Island at 2009 levels over a five year average, 2) maintain the annual population at Seymour Island at 100 birds, 3) maintain the presence of Ivory Gulls on Baffin, Cornwallis and Devon Islands, and 4) maintain the presence of wintering Ivory Gulls which includes Canadian waters in Davis Strait, Baffin Bay, and the coast of Labrador.

- Critical habitat necessary for Ivory Gull survival or recovery is partially identified in this recovery strategy at 39 breeding colonies in the Canadian High Arctic. The following islands contain portions of critical habitat for the Ivory Gull: Seymour, Cornwallis, Devon, Ellesmere, and Brodeur Peninsula of Baffin Island. Additional critical habitat will be identified in an action plan; studies required to identify critical habitat are outlined in Section 7.2.

- An action plan for the Ivory Gull is scheduled for March 2017.

RECOVERY FEASIBILITY SUMMARY

Under the *Species at Risk Act* (Section 40), the competent minister is required to determine whether the recovery of the listed species is technically and biologically feasible. Analysis of recovery feasibility for this species, based on the four criteria outlined by the Government of Canada (2009), demonstrates that the recovery of the Ivory Gull is technically and biologically feasible for the following reasons:

1. Individuals of the wildlife species that are capable of reproduction are available now or in the foreseeable future to sustain the population or improve its abundance.

*Yes***.** As of 2009, there were 39 productive Ivory Gulls colonies in Canada with an estimated population of approximately 800 birds. Under similar conditions, individuals within these colonies are capable of reproducing and colonies are suspected to be persisting. Further surveys of suitable habitat may result in the discovery of additional colonies.

2. Sufficient suitable habitat is available to support the species or could be made available through habitat management or restoration.

Yes. Sufficient, suitable Ivory Gull breeding habitat is presently available. There do not appear to have been significant physical changes to most of the Ivory Gull breeding habitat in Canada. Wintering habitat may have altered due to global warming-induced changes to sea-ice timing and distribution, but the specific habitat requirements of Ivory Gulls during migration or the winter are not fully understood. Investigations into the specific habitat parameters will allow more effective habitat management projects to be initiated in the future.

3. The primary threats to the species or its habitat (including threats outside Canada) can be avoided or mitigated.

Yes. The primary threat to Ivory Gull recovery is illegal shooting of individuals during migration along the coast of Greenland, as well as the disturbance or anthropogenic activities near breeding colonies. Both of these threats can be mitigated.

4. Recovery techniques exist to achieve the population and distribution objectives or can be expected to be developed within a reasonable timeframe.

Yes. The main recovery techniques will be protection and international management of migrating Ivory Gulls, as well as national protection of critical habitat. These techniques should be effective. However, research into this species' ecology and habitat requirements will provide specific information on the level and severity of threats, notably those now thought to influence gulls when they are away from the breeding colony, so that additional recovery techniques can be developed.

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1. COSEWIC SPECIES ASSESSMENT INFORMATION

Date of Assessment: April 2006

Common Name (population): Ivory Gull

Scientific Name: *Pagophila eburnea*

COSEWIC Status: Endangered

Reason for Designation: Aboriginal Traditional Knowledge and intensive breeding colony surveys over the last four years indicate that the Canadian breeding population of this long-lived seabird has declined by 80% over the last 20 years. This bird feeds along ice-edge habitats in the high Arctic and breeds in very remote locations. Threats include contaminants in food chain, continued hunting in Greenland, possible disturbance by mineral exploration at some breeding locations, and degradation of ice-related foraging habitats as a result of climate change.

Canadian Occurrence: Nunavut, Northwest Territories, Newfoundland and Labrador

COSEWIC Status History: Designated Special Concern in April 1979. Status re-examined and confirmed in April 1996 and in November 2001. Status re-examined and designated Endangered in April 2006.

2. SPECIES STATUS INFORMATION

The global conservation status of the Ivory Gull given by NatureServe (2010) is G5 (secure). The national status in the United States is N4N (apparently secure non-breeding), and in Canada is N3B and N4N (vulnerable breeding and apparently secure non-breeding; NatureServe 2010). Provincially and territorially its status has been assessed as: S2N in Newfoundland and Labrador (imperiled non-breeding), SNRN in Northwest Territories (not ranked non-breeding), SNR in Nunavut (not-ranked), and SNA in Ontario (not applicable; NatureServe 2010). BirdLife International (2008) upgraded it to "Near Threatened" on the IUCN Redlist.

Approximately 3.5 - 5% of the current Ivory Gull world population is found in Canada. The species is listed as endangered on Schedule 1 of the *Species at Risk Act*. Ivory Gulls have been ranked as "May Be At Risk" in Nunavut and "At Risk" in the Northwest Territories (Government of Canada 2011, Working Group on General Status of NWT species 2011), and in Newfoundland and Labrador the species is listed provincially as endangered (Government of Newfoundland and Labrador 2010).

Internationally, the gull has been protected in West Greenland since 1977, and is on the Norwegian Red List as "declining, monitoring". In Svalbard it is protected under the Svalbard *Environmental Protection Act*. In Russia, Ivory Gulls are listed as Category 3 (rare) in the Red Data Book of the former USSR.

3. SPECIES INFORMATION

3.1 Species Description

The Ivory Gull is a medium-sized gull, approximately 600 g with a wingspan of 94 cm, about 10% larger and longer-winged than the common Black-legged Kittiwake (*Rissa tridactyla*). It is distinctive at all ages, but is particularly striking in its pure white adult plumage, with black legs and an olive bill (Figure 1). Young Ivory Gulls are white with black speckling. Their nests contain 1 – 3 eggs, and can be a depression in the ground or a moss cup, and these can be located on isolated islands, flat, cobble limestone plateaus, or on steep cliffs of "nunataks" (mountain tops emerging from glaciers or ice caps; effectively an inland island surrounded by glacial ice) (Haney and MacDonald 1995). Nests are incubated by both parents for 24 to 26 days, eggs typically hatch in late July, and chicks fledge at 30 – 35 days after hatch. More complete descriptions of the species are found in Haney and Macdonald (1995) and COSEWIC (2006).



Figure 1 – Adult Ivory Gull © M. Mallory

3.2 Population and Distribution

Ivory Gulls are distributed around the circumpolar region (Figure 2). Key breeding areas are the islands of northern Russia (Severnaya Zemlya, Franz Joseph Land), Norway (Svalbard), eastern Greenland, and the Canadian Arctic archipelago. A recent estimate of the global population is between 8,000 to 11,500 breeding pairs (Gilchrist et al. 2008), with declines noted in Svalbard and certain colonies in Russia, as well as Canada. Approximately 840 Ivory Gull individuals have been counted in Canada, or roughly 400 breeding pairs (Robertson et al. 2007). Wintering areas of Canadian birds are thought to be in the pack ice and marine waters between Greenland and Newfoundland/Labrador (Figure 2). A higher proportion of the global population winters in Canada than breeds here (an estimated 50-75%, or in some years perhaps as high as 100%), but the wintering population varies annually in response to sea ice distribution.

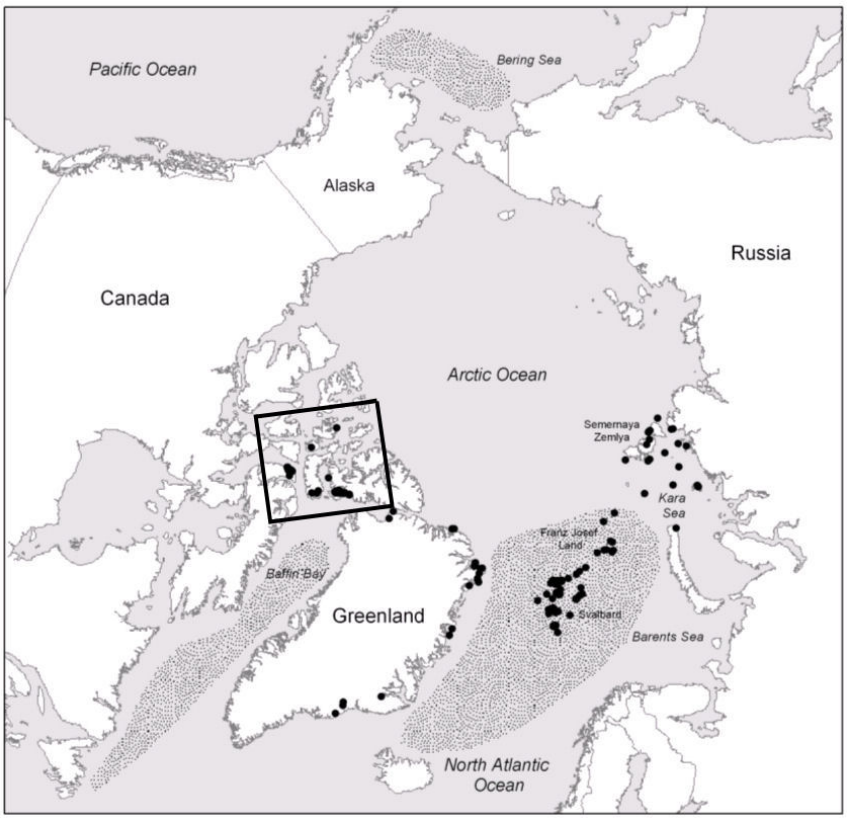


Figure 2. Known breeding colonies (black dots) of Ivory Gulls in the circumpolar Arctic. Stippled areas indicate the wintering range. Box around islands outlines approximate location of Figure 3.

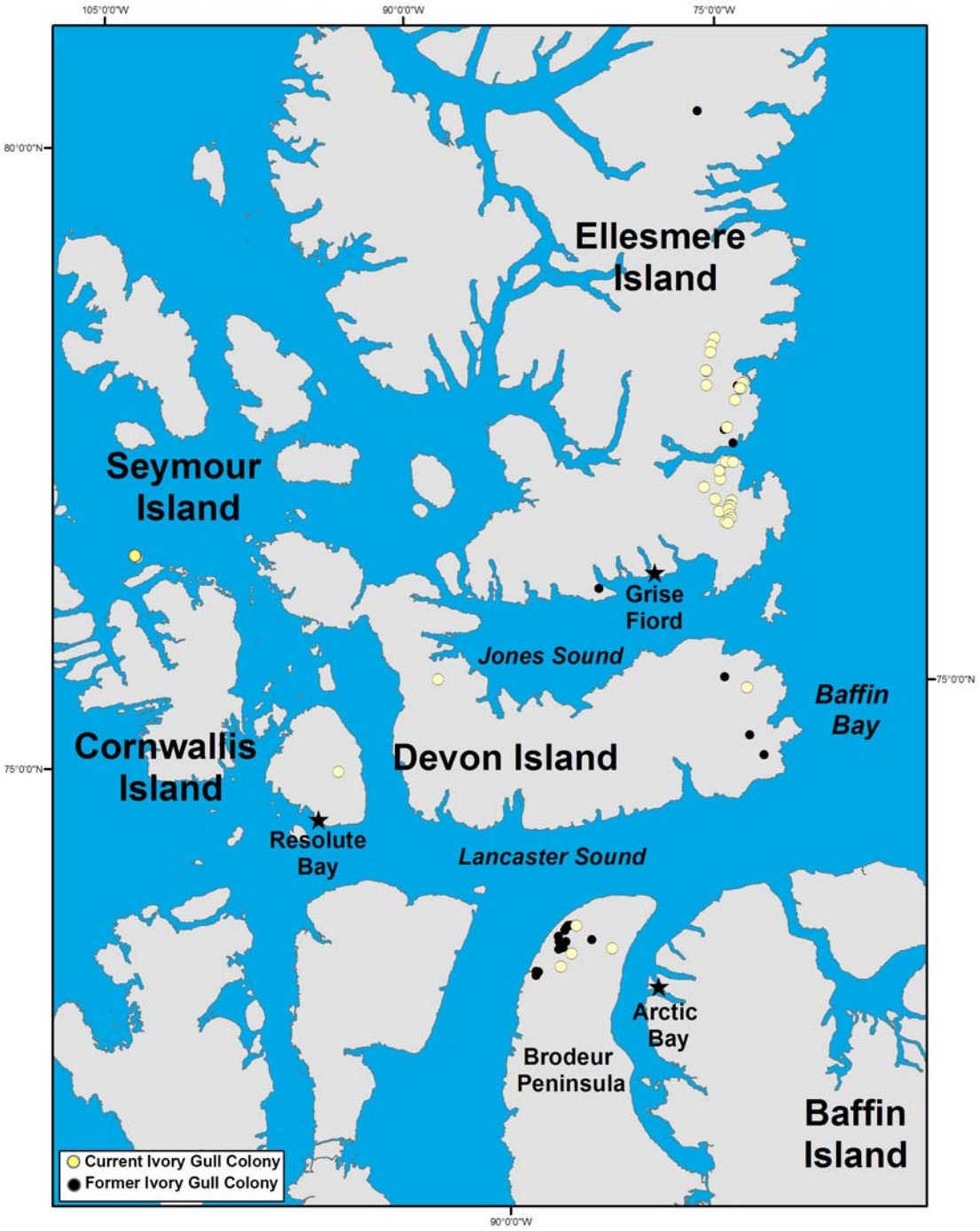


Figure 3. Known nesting colony locations of Ivory Gulls in Canada. Current colonies are those that are known to have been used at least once since 2002, while former nesting colonies are those which were last known to be used by Ivory Gulls before 2002.

Within Canada, Ivory Gulls are known to nest only in Nunavut at the following five locations: Ellesmere Island, Devon Island, Cornwallis Island, Seymour Island, and the Brodeur Peninsula of northern Baffin Island (Figure 3). As of 2009, almost all of the extant colonies were located on central, eastern Ellesmere Island (M. Mallory, unpubl. data.). Helicopter surveys of all known breeding locations were conducted each year from 2002 – 2006, and then again in 2009 (Gilchrist and Mallory 2005, Robertson et al. 2007, Mallory unpubl. data). Although additional breeding locations were discovered after 2002 (Robertson et al. 2007), of all 64 known breeding colonies in Nunavut, 25 (39%) have not supported any birds since 2002.

In 2006, the known Canadian population size was approximately 842 individuals (Robertson et al. 2007), or roughly 400 breeding pairs. In the 1980s, Ivory Gull colonies were found in all of the areas identified in Figure 3, but by 2010, both the number of colonies and birds at extant colonies had decreased (Figure 4; COSEWIC 2006, Robertson et al. 2007), representing a >80% decline at colonies that were known in the 1980s. Including the new colonies found along east-central Ellesmere Island in 2006 (reconfirmed in 2009), the estimated population in 2009 (~ 800 birds) was 67% lower than the population estimated in the 1980s (~ 2400 birds; Thomas and MacDonald 1987).

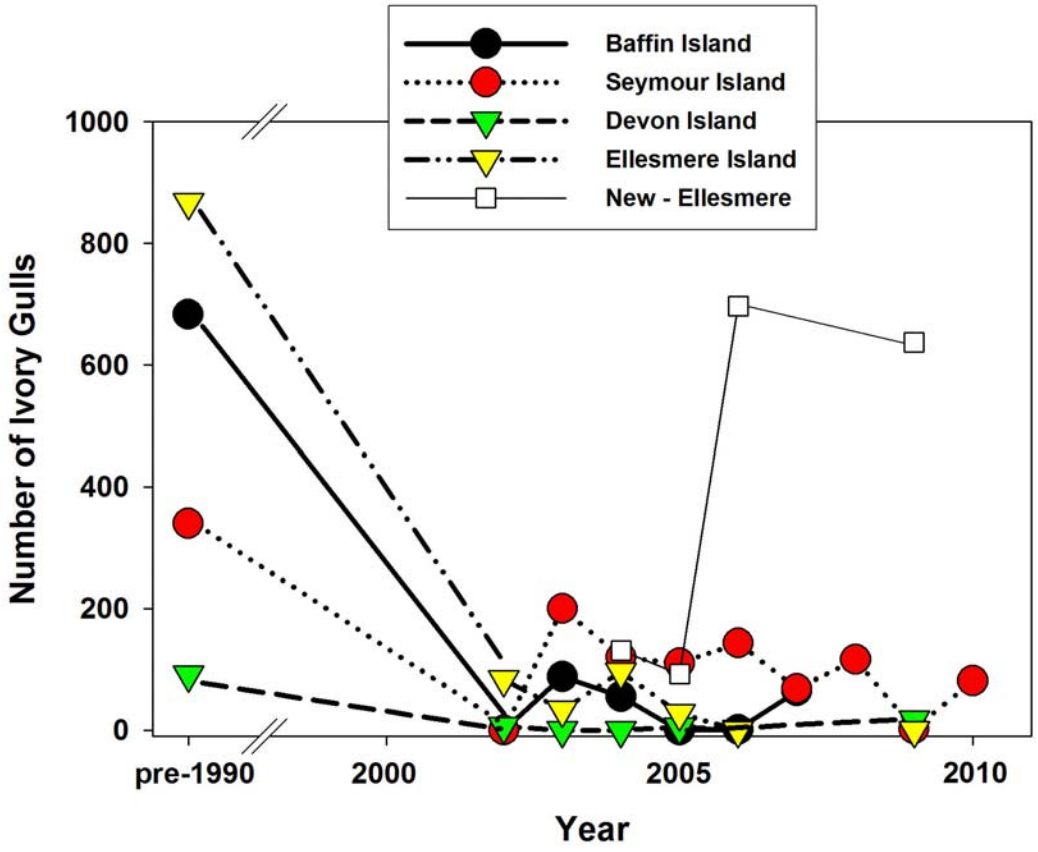


Figure 4. Trends in numbers of Ivory Gulls counted on different island nesting areas in the Canadian Arctic, using maximum counts before 1990. Counts between 2002 and 2010 include new colonies found in the same general nesting area as the pre-1990 surveys. White squares show new colonies found on east-central Ellesmere Island, north of the old survey area, starting in 2004.

Colony size has declined markedly at the largest known colony on Seymour Island, at 2.7% per year (Robertson et al. 2007). Most colonies on the Brodeur Peninsula of Baffin Island have disappeared as have most colonies on eastern Devon Island and all colonies on southeast Ellesmere Island (south of Makinson Inlet) have declined or disappeared. The only region that supports apparently robust colonies of Ivory Gulls is the glaciated nunatak mountains of east-central Ellesmere Island. Collectively, the "centre of gravity" of the Ivory Gull breeding distribution in Canada appears to have shifted north.

Local Ecological Knowledge

Local ecological knowledge (or Aboriginal Traditional Knowledge, ATK, or *Inuit Qaujimajatuqangit*, IQ) from Nunavut shows that Ivory Gulls are not concentrated near communities like they were in the past (Mallory et al. 2003). In fact, interviews with hunters and elders in Arctic Bay, Resolute Bay, and informally in Grise Fiord all suggested that the birds have generally been uncommon, but that local residents tend to see fewer now than in the past. It was the concerns of a local wildlife officer in Arctic Bay as well as hunters in Resolute Bay that first alerted the government to the decline of the Ivory Gull. In Newfoundland and Labrador, local ecological knowledge suggests that most birds are observed between September and May, typically as individuals or small groups (depending on wind and ice conditions), and that populations are at best stable, but possibly declining (Ryan et al. 2006).

3.3 Needs of the Ivory Gull

In Canada, Ivory Gulls have simple but specialized habitat requirements. Specifically, they require breeding sites that are safe from terrestrial predators (particularly the Arctic Fox, *Alopex lagopus*), but in proximity (~ 50 km) of open water for feeding (closer than the 100 – 200 km stated in COSEWIC 2006, based on more recent data; M. Mallory, unpubl. data). The latter aspect potentially limits their breeding distribution, as the amount of ice-free ocean at the time that birds return to the High Arctic to breed is relatively small, except for certain polynyas (areas of open water surrounded by sea ice) and recurrent shore leads (COSEWIC 2006). Consequently, breeding sites tend to be remote islands, remote polar desert, or cliff faces of nunataks (COSEWIC 2006) near polynyas or a recurrent sea-ice / open water interface. The remoteness of these sites may be important in protecting breeding Ivory Gulls from potentially adverse effects associated with human and other disturbances.

Ivory Gulls are scavengers and predators, feeding at high trophic levels in the marine food web. They forage along the ice-water interface on fish and zooplankton, use multi-year ice as perches to sight feeding areas, follow polar bears to scavenge from marine mammal kills, and feed among the pack ice on seal afterbirth at whelping patches (Haney and MacDonald 1995). Sea-ice is extremely important to Ivory Gulls as a feeding and perching platform.

Species' needs during the winter are largely unknown for Canada, in part because there is no tracking of Canadian birds to wintering sites (but see below). Birds winter in pack ice, near polynyas, or occasionally along marine shorelines (COSEWIC 2006). Orr and Parsons (1982) found many Ivory Gulls in Baffin Bay / Davis Strait, and recent satellite telemetry information suggests that this area is a main wintering site for Canadian birds as it is for birds from

Greenland and Norway (H. Strøm, pers. comm.). Scientists believe that Ivory Gulls scavenge among pack ice and particularly near seal haul outs and whelping patches, where they scavenge for food in order to gather sufficient resources to migrate north again to breed.

4. THREATS

The most important threat to Ivory Gulls is illegal shooting in Greenland (COSEWIC 2006), but other factors such as predation on nests, industrial activity, contaminants, human disturbance due to monitoring, climate change and oil pollution also have the potential to negatively affect Ivory Gull populations (see Table 1).

4.1 Threat Assessment

Table 1. Threat assessment table

Threat	Level of Concern[1]	Extent	Occurrence	Frequency	Severity[2]	Causal Certainty[3]
Biological Resource Use						
Illegal shooting	High	Localized	Historic, Current	Seasonal	High	Medium
Changes in Ecological Dynamics or Natural Processes						
Predation on nests	High	Localized	Current	Seasonal	High	High
Disturbance or Harm						
Industrial activities	Medium	Localized	Current, anticipated	Seasonal	Medium	Low
Human disturbance - monitoring	Low	Localized	Historic, Current, Anticipated	Seasonal	Low	Medium
Pollution						
Contaminants	Medium	Widespread	Historic, Current, Anticipated	Continuous	Medium	Low
Oil pollution	Low	Localized	Historic, Current, Anticipated	Continuous	Unknown	High
Climate and Natural Disasters						
Climate change	Low	Widespread	Current, Anticipated	Continuous	Unknown	Low

[1] *Level of Concern: signifies that managing the threat is of (high, medium or low) concern for the recovery of the species, consistent with the population and distribution objectives. This criterion considers the assessment of all the information in the table.*

[2] *Severity: reflects the population-level effect (High: very large population-level effect, Medium, Low, Unknown).*

[3] *Causal certainty: reflects the degree of evidence that is known for the threat (High: available evidence strongly links the threat to stresses on population viability; Medium: there is a correlation between the threat and population viability e.g. expert opinion; Low: the threat is assumed or plausible).*

4.2 Description of Threats

1. Illegal shooting

As a long-lived bird with low annual reproductive output, Ivory Gulls rely on high annual survival of adults to maintain their population. As such, mortality of adults can greatly reduce the overall population size, and thus human harvest of adults is a serious problem (Stenhouse et al. 2004). In Greenland, subsistence, sport and commercial harvest of numerous species of birds, many of which are birds that breed in Canada, still occurs. Ivory Gulls are susceptible to hunting mortality (Stenhouse et al. 2004), because they fly along coastlines during migration where other marine birds are being hunted. In particular, Ivory Gulls from Canadian colonies are shot in Greenland (Neilsen and Dietz 1989), despite being protected in that country since 1977. Based on banding records, most of these birds are shot during spring or fall migration, or on their way to or coming from Canadian colonies (Stenhouse et al. 2004). Currently, in Canada subsistence harvest by Inuit is minimal (Priest and Usher 2004; M. Mallory pers. comm.) and probably has negligible effect on populations. Although 20% of interviewees in Newfoundland and Labrador reported hunting Ivory Gulls in the past, hunting during winter rarely occurs nowadays (Ryan et al. 2006).

2. Predation on nests

Ivory Gulls appear to choose extremely remote nesting locations to avoid predators (Haney and MacDonald 1995). If predators are encountered (e.g. polar bears, Arctic foxes, common ravens *Corvus corax*), gulls have few defenses to stop predation. Consequently, colonies can be decimated in a single season (MacDonald 1976). In Canada, there is no other wildlife observed near Ivory Gull colonies on the Brodeur Peninsula (Baffin Island), or on the nunataks of eastern Devon and Ellesmere islands (Gilchrist and Mallory 2005, Mallory et al. 2008). In two (2002, 2009) of six years of surveys at Seymour Island, virtually no birds were counted at the large colony (generally > 100 birds), presumably due to predation (Gilchrist and Mallory 2005, M. Mallory, unpubl. data). In two other years (2007, 2008), predators hit the island and consumed all but a few of the eggs (M. Mallory, unpubl. data). Polar bears have been seen regularly there, and they are probably the main predator at that colony. Changes in ecological dynamics and natural processes due to industrial activities and climate change may lead to increased predation rates.

3. Industrial activities

Ivory Gulls are apparently tolerant of brief colony visits, but like many other colonial birds may be less tolerant of repeated visits, such as would occur near industrial sites. The community of Arctic Bay has been particularly concerned that industrial activities might be affecting nesting birds and other wildlife in northern Baffin Island. Activities near such sites include the placement of fuel caches, gravel landing sites for fixed-wing air craft, seasonal camps, and drilling sites. The one breeding area in Canada near industrial activity (diamond exploration on the Brodeur Peninsula) also happens to be the area where a formerly robust breeding population (> 500 birds) has effectively disappeared (Gilchrist and Mallory 2005, Robertson et al. 2007).

Establishment of industry (e.g. mining) in the Arctic also tends to attract predators (COSEWIC 2006), which can decimate gull colonies.

4. Contaminants

Contaminants deposited in the Arctic by long-range transport are a potential threat to the health of many wildlife species living there (Fisk et al. 2005). Ivory Gulls may be particularly susceptible because they forage high in the food chain. Ivory Gull eggs have the highest mercury concentration of any Arctic bird (Braune et al. 2006), and have high levels of other organic contaminants (Buckman et al. 2004, Braune et al. 2007, Miljeteig et al. 2009). Although studies have not been performed directly on Ivory Gulls, other Arctic gulls show negative effects on reproduction, behaviour, development, immunology and on their genetic structure at lower contaminant concentrations than found in Ivory Gulls (Gabrielsen 2007).

5. Human disturbance - monitoring

Some researchers and Inuit communities (e.g., Grise Fiord) have suggested that visits by researchers to colonies could have caused declines through disturbance during the nesting season. Haney and MacDonald (1995) suggested that Ivory Gulls were sensitive to ground and air traffic near their colonies. Evidence from Canada and Norway suggests that this is probably not always the case. In these two countries, colonies have been visited briefly by helicopter, at which time some of the gulls leave the cliffs but quickly return to their nests (< 1 minute; COSEWIC 2006). Similarly, researchers camped on an island with an Ivory Gull colony for several years in the 1970s, and the gull population returned in good numbers each year to breed. Nonetheless, there may be a threshold level of disturbance that is important, below which gulls are tolerant, and above which they abandon breeding for the year, or possibly the colony site. This requires further investigation to confirm.

6. Climate change

Warming temperatures are affecting the distribution, timing of formation and break up, and extent of sea-ice in Baffin Bay (e.g., Stirling and Parkinson 2006), such that ice tends to be less extensive, forms later and breaks up earlier than in the past. Such a strongly ice-associated species might be faced with challenges when encountering less extensive ice, and ice cover for shorter periods, somewhat analogous to the situation with polar bears (Stirling and Parkinson 2006). Similarly, the core of the current, known breeding population of Ivory Gulls is in the nunatak region of east-central Ellesmere Island. Depending on the configuration of the nesting location, melting (receding) glaciers (a consequence of global warming) may have two effects at nesting sites: (1) direct breaking off of ice can physically alter or destroy a nesting site; and (2) increased rock and ground cover revealed by receding glaciers may allow other species to flourish (e.g. vegetation and lemmings*, Dicrostonyx* spp.), which in turn makes it likely that predators will be able to access currently remote breeding locations.

7. Oil pollution

Chronic oil pollution off of Newfoundland and Labrador kills many marine birds every year (Wiese and Robertson 2004). This region includes part of the known wintering area of the Ivory Gull (Haney and MacDonald 1995). Gulls are considered to be highly vulnerable to oil pollution (Camphuysen 1998), and thus Ivory Gulls are probably affected, although to date no carcasses have been found. This could in part be related to the offshore location where the gulls reside relative to areas where people might find dead birds.

5. POPULATION AND DISTRIBUTION OBJECTIVES

The long-term goal for this species is to see the Canadian population increased to more that 1000 birds in Canadian range-wide surveys, with the breeding distribution maintained. There are four population and distribution objectives for the Canadian Ivory Gull. These are considered as objectives until 2016, and may be modified as more information is obtained. Given current available information these objectives will maintain population and distribution, but it is expected that achieving these objectives will help reverse population declines.

1. Maintain the 2009 distribution and abundance of Ivory Gulls on eastern Ellesmere Island, over a five-year average (i.e., abundance will vary annually, but over 5 years, maintain at 2009 levels).

   An estimated 700 Ivory Gulls populated nunataks north of Makinson Inlet in 2006 and again in 2009. This is the core of the known breeding population in Canada.

2. Maintain the Seymour Island colony at ≥ 100 individuals annually.

   The Seymour Island colony was traditionally the largest known colony in Canada, and may represent genetic distinctiveness from nunatak colonies to the east. Surveys since 2002 show that there is a "pool" of up to 200 gulls that may return to the island.

3. Maintain the presence of breeding Ivory Gulls on Baffin Island, Cornwallis Island, and Devon Island.

   Small colonies of Ivory Gulls persist on these islands, and may be intermittent in occupation. It is currently unknown whether these populations (flat, ground-nesting groups) are genetically distinct from nunatak or island colonies, or the possible degree of movement (i.e. recovery potential) between colonies. However, population viability analyses suggest that colonies on Baffin and Devon islands are not expected to persist (Robertson et al. 2007), if current conditions continue.

4. Maintain the presence of wintering Ivory Gulls that breed in Canada and Europe, which includes Canadian waters in Davis Strait and Baffin Bay as well as off the coast of Labrador.

   Historical surveys (Orr and Parsons 1982) and recent satellite telemetry data (Gilg et al. 2010; Mallory, unpublished data) suggest that these ice-covered waters may support a significant portion of the world's population of Ivory Gulls.

6. BROAD STRATEGIES AND APPROACHES TO RECOVERY

6.1 Actions Already Completed or Currently Underway

An early step towards protecting this species was the establishment of the Seymour Island Migratory Bird Sanctuary, which at that time protected the only known breeding site for this marine bird. Most of our knowledge on Ivory Gull breeding biology in Canada comes from work at this colony in the 1970s.

More recently, local ecological knowledge interviews were undertaken to determine the geographical extent of declines, and the degree to which northern residents had recognized this. Aerial surveys were undertaken in 2002 – 2006 and 2009, to revisit all known Ivory Gull colonies in Canada (except for one far to the north on eastern Ellesmere Island; Figure 3). These surveys were the first comprehensive efforts to assess the national population status of this species in a single year, and these showed the marked declines in the number of colonies and the number of birds at known colonies (Gilchrist and Mallory 2005). These surveys also discovered many new colonies, and allowed the development of an initial population viability analysis (Robertson et al. 2007). In 2005-2007, a collaborative effort was underway with Diamondex Resources Ltd., whereby this exploration company reported observations of gull colonies on the Brodeur Peninsula, and instituted a buffer zone around those sites so that their surveys did not intrude in nesting habitat. Indian and Northern Affairs Canada (now Aboriginal Affairs and Northern Development Canada), which issues licenses for exploration, has also been made aware of possible nesting locations, and provide an information package to all prospecting license applicants.

The key elements of the strategy to recover Ivory Gulls in Canada are outlined in Table 2.

6.2 Strategic Direction for Recovery

Table 2. Recovery Planning Table. Priorities are defined as: High – top priority action; Medium – needed to evaluate and guide conservation actions; Low – action would be helpful to the understanding of the species but not a priority.

Threat or Limitation	Priority	Broad Strategy	General Description of Research and Management Approaches
Industrial activities; human disturbance – monitoring; oil pollution	High	Inventory and monitoring	- Comprehensive surveys of known and potential breeding areas, the latter determined from habitat suitability study - Develop approaches to conducting a winter population inventory
Contaminants; human disturbance – monitoring; oil pollution	High	Research	- Conduct satellite tracking study to determine movements and habitat use, for identifying critical habitat away from breeding sites - Conduct research into the impact that human disturbance and contaminants have on the reproductive ecology of Ivory Gulls - Genetic analyses to determine possible distinctiveness of regional populations (e.g., nunatak vs. flat-ground nesters) or international populations
Illegal shooting	High	Habitat Protection; Population Management and Enforcement	- Work with international partners to reduce illegal harvest of Ivory Gulls. - Continue to work with Greenland government for local enforcement of rules preventing harvest of Canadian birds migrating along west Greenland coast - Develop a joint Canada-Greenland monitoring and management strategy - Continue outreach work in Newfoundland, Labrador and Nunavut to reduce incidental aboriginal or other harvest of Ivory Gulls
Predation on nests; Industrial activities; contaminants	Medium	Habitat Protection; Population Management and Enforcement	- Develop and enforce protocols for activities near Ivory Gull colonies, migration corridors and wintering locations - Identify sites suitable for protection and initiate stewardship or securement plan
All	Medium Low	Communications and Outreach	- Develop and implement a communication and outreach program - Conduct local knowledge study in Grise Fiord on Ivory Gulls

6.3 Narrative to Support Recovery Planning Table

Efforts to recover the Ivory Gull population in Canada will be feasible, but difficult to implement, in large part because of the extreme remoteness, as well as the challenging logistics and weather that are involved with working near the breeding or wintering range of this species. Additionally, many of the threats affecting Ivory Gulls are international (or are long-term environmental issues that will be slow to change (e.g., climate change)). For example, most of the illegal harvest of adult Ivory Gulls has occurred in Greenland (COSEWIC 2006), despite the fact that there were laws in place to protect the birds since 1977 for West Greenland (where Canadian birds migrate through), and for all of Greenland in 1988 (COSEWIC 2006). Hunting is an important, traditional and commercial activity in Greenland, and this country is not bound by the laws governing North American harvest of birds, so continued scientific collaboration and community outreach are needed.

Inventory and Monitoring

Inventory and monitoring are required to update the status of known colonies and to discover new ones which are prerequisites to the assessment of threats to Ivory Gulls posed by existing and proposed industrial activities. Known Ivory Gulls colonies have declined in size or been extirpated (Robertson et al. 2007), but new colonies were found in 2006 on eastern Ellesmere Island, while regions farther north have not yet been searched. A comprehensive survey through the area determined from a habitat suitability study is required to obtain an overall count on the number of Ivory Gulls in Canada. This should be done in a single year to account for the possibility that gulls could be switching sites among years. Also, the apparent intermittent occupation of some colonies requires that known colonies be resurveyed regularly (e.g., once every 3 years) to track the known breeding population. Seymour Island is the most cost-effective and largest colony to follow, so annual monitoring is recommended for this location. Additional information from the wintering area is recommended, such as a repeat of the winter aerial surveys conducted by Orr and Parsons (1982).

Research

Information on the breeding ecology of Ivory Gulls is scant everywhere in the circumpolar Arctic (Mallory et al. 2008), and that which exists is outdated. An investigation of the reproductive ecology of Ivory Gulls would provide information necessary for understanding possible contaminant effects for developing population models, refining critical habitat identification, and developing setback distances for activities near colonies. Key elements to be identified are: (1) proportion of the adult population that breeds each year; (2) nesting success; (3) fledging success; and (4) recruitment to breeding populations.

As well, tracking birds throughout their annual cycle will provide novel and critical information on sites that these birds require for these life stages away from their colonies. Knowledge of where and when birds move, and how long they stay in different locations provides essential information for identifying other important (e.g. marine protected area) or critical habitat.

Habitat Protection, Population Management, and Enforcement

A number of best management practices for activities occurring near concentrations of birds in Arctic Canada have been developed by Environment Canada, but these have not been refined for Ivory Gulls. Nonetheless, they are an appropriate starting point for implementing important activities near known colonies, particularly in areas with active human disturbance like the Brodeur Peninsula, Baffin Island. Appropriate enforcement of such activities is needed, such as intermittent inspections of mining or prospecting camp activities near known colonies (e.g., getting flight paths).

Stewardship and possibly securement in the form of new protected areas (e.g., national wildlife areas) may be the best option for certain areas, such as the cluster of colonies along the east coast of Ellesmere Island.

Communication and Outreach

The plight of the Ivory Gull has been well-communicated in Arctic Canada through literature, consultations, local knowledge studies, posters, and pamphlets. This effort will need to be increased once plans are in place to implement recovery actions. A good basis exists for cooperation, including with industry, but regular, tailored communication will need to continue. Outreach activities are needed in Newfoundland and Labrador, where people are generally unaware of the status of Ivory Gulls.

7. CRITICAL HABITAT

7.1 Identification of the Species' Critical Habitat

Ivory Gulls have simple but specialized habitat requirements. Specifically, they require breeding sites that are safe from terrestrial predators (particularly the Arctic Fox, *Alopex lagopus*), but in proximity (~ 50 km) of open water for feeding (closer than the 100 – 200 km stated in COSEWIC 2006, based on more recent data; M. Mallory, unpubl. data). The biophysical attributes of critical breeding habitat for ivory gulls can be characterized as remote islands, remote polar desert or cliff faces of nunataks in proximity (~50 km) of open water for feeding.

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

Currently, there is insufficient information on migration, wintering or feeding habitats to identify critical habitat for those locations or part of the species' annual cycle. Critical habitat for the Ivory Gull is identified in this recovery strategy to the extent possible based on the best available information. It is recognized that the critical habitat identified below is insufficient to achieve the population and distribution objectives for the species. The schedule of studies (Section 7.2) outlines the activities required to identify additional critical habitat necessary to support the population and distribution objectives of the species.

Critical habitat locations were identified based on the following criterion:

1) Colonies where at least one Ivory Gull has been observed nesting at least once from 2002-2009 (since one gull can represent a nesting pair). Ivory Gulls may use colonies in one year, then move to another location in the following year and return to the initial colony in a following year (collectively as a predator avoidance strategy), so all recently occupied sites are considered critical habitat.

For each location identified using the above criterion, a 2-km radius around the approximate centroid of the colony was used as the extent of critical habitat around a colony. Six years of survey work suggests that disturbance within a 2-km radius of the centre of a colony may affect the ability of the Ivory Gulls to use the habitat for nesting.

Critical habitat for the Ivory Gull is identified in this recovery strategy in 39 locations in the Canadian High Arctic, outlined in Appendix A. These locations are all breeding colonies for Ivory Gulls, either on flat ground (Seymour Island, Cornwallis Island, western Devon Island, Brodeur Peninsula of Baffin Island), or on nunataks (eastern Devon Island, eastern Ellesmere Island). Each colony is identified by a geo-referenced co-ordinate, and the critical habitat includes all land within a 2 km radius of that co-ordinate.

Other locations where Ivory Gulls have been found to occur were not identified as critical habitat at this time as they did not meet the criterion for identifying critical habitat.

There was not sufficient information available for identifying additional critical habitat at the time this document was prepared. Studies to determine additional critical habitat are outlined in Section 7.2. Additional critical habitat will be identified in an action plan following completion of the schedule of studies.

7.2 Schedule of Studies to Identify Critical Habitat

Table 3. Schedule of studies to identify critical habitat for the Ivory Gull

Description of Activity	Rationale	Timeline
Inventory and monitor occupied or potentially occupied breeding habitats	• Identification of site-specific habitat threats, including additional study to verify 2 km buffer against disturbance of nesting birds	2013 – 2015
Survey similar unoccupied breeding habitat	• Identification of additional critical habitat, particularly north of current sites on Ellesmere Island	2013 – 2015
Conduct research to quantify habitat requirements and use during breeding and non-breeding seasons.	• Identification of breeding habitat requirements for species • Satellite transmitter studies to identify key sites away from the colony, including Canadian wintering sites. Some of these areas may be non-breeding, critical habitat.	2013 – 2015

7.3 Activities Likely to Result in Destruction of Critical Habitat

Destruction is determined on a case by case basis. Destruction would result if part of the critical habitat were degraded, either permanently or temporarily, such that it would not serve its function when needed by the species. Destruction may result from a single or multiple activities at one point in time or from the cumulative effects of one or more activities over time (Government of Canada 2009).

Destruction of Ivory Gull critical habitat is any alteration to the breeding colony that can adversely modify the biological, chemical or physical features (e.g., topography, geology, microclimate) to the extent that the critical habitat no longer exists or cannot be used. It should be noted that some activities may not destroy critical habitat initially, but when occurring repeatedly over time or in conjunction with other damaging activities, there can be a destructive effect on critical habitat.

Examples of activities that may result in the destruction of critical habitat include, but are not limited to:

1. **Long-term anthropogenic activity near a breeding colony site.** Activities that create removal, covering or chronic disturbance of land surface such as building construction, excavation of nesting substrate, industrial activities (e.g., mineral exploration, mine development) can destroy critical habitat by three means. First, activities can directly alter the physical structure and functional integrity of the habitat, rendering it unsuitable or impossible for birds to nest on. Second, establishment of long-term camps near a breeding colony may attract predators (e.g. foxes, corvids) that would not normally frequent the area, which may lead birds to stop choosing this suitable nesting area. Third, spills of petroleum or other pollutants (including garbage) may accumulate around nest sites, rendering them unattractive to nesting.

8. MEASURING PROGRESS

The performance indicators presented below provide a way to define and measure progress toward achieving the population and distribution objectives. Specific progress towards implementing the recovery strategy will be measured against indicators outlined in subsequent action plans.

Table 4. Ivory Gull recovery strategy performance measures.

Population and Distribution objectives	Performance Measure
1. Maintain the 2009 distribution and abundance of Ivory Gulls on eastern Ellesmere Island, over a five-year average	• The 5 year average abundance of Ivory Gulls on eastern Ellesmere Island are maintained or increased. • The distribution of Ivory Gulls on eastern Ellesmere Island is maintained or enlarged.
2. Maintain the Seymour Island colony at ≥ 100 individuals annually.	• A minimum of 100 Ivory Gulls occur at Seymour Island each year.
3. Maintain the distribution of breeding Ivory Gulls on Baffin Island, Cornwallis Island and Devon Island.	• The recent distribution of Ivory Gull colonies on Baffin Island, Cornwallis Island and Devon Island is maintained.
4. Maintain the presence of wintering Ivory Gulls that breed in Canada and Europe, which includes Canadian waters in Davis Strait and Baffin Bay as well as off the coast of Labrador.	• The presence of wintering Ivory Gulls is maintained in these areas.

9. STATEMENT ON ACTION PLANS

One or more action plans for the Ivory Gull will be completed by 2017.

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11. RECOVERY TEAM MEMBERS

Currently, the members of the Ivory Gull Recovery Team are the contributors to this Recovery Strategy, and include:

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APPENDIX A: IVORY GULL CRITICAL HABITAT LOCATIONS

Breeding colony locations identified as critical habitat for Ivory Gulls (includes a 2 km radius around the co-ordinate) based on Ivory Gull occupation between 2002 – 2009.

Island	Latitude (°N)	Longitude (°W)
Cornwallis	75.0833	94.25
Devon	75.8	90.82
Devon	75.3408	80.7444
Ellesmere	76.7095	80.1292
Ellesmere	76.6925	80.0593
Ellesmere	76.7139	80.0028
Ellesmere	76.7298	79.8995
Ellesmere	76.7563	79.9171
Ellesmere	76.8	79.9167
Ellesmere	76.8217	79.8375
Ellesmere	76.828	79.8476
Ellesmere	76.8632	79.7473
Ellesmere	76.8037	80.2608
Ellesmere	76.9075	80.2921
Ellesmere	77.0236	80.5943
Ellesmere	77.0577	79.9422
Ellesmere	77.1185	79.8917
Ellesmere	77.124	79.9111
Ellesmere	77.1842	79.591
Ellesmere	77.1667	79.3333
Ellesmere	77.45	79.2333
Ellesmere	77.6504	78.6662
Ellesmere	77.7245	78.3465
Ellesmere	77.725	78.3741
Ellesmere	77.7328	78.3835
Ellesmere	77.7674	78.2267
Ellesmere	77.823	79.5952
Ellesmere	77.9318	79.441
Ellesmere	77.9394	79.4703
Ellesmere	78.0767	79.1227
Ellesmere	78.1262	79.019
Ellesmere	78.1778	78.8293
Ellesmere	79.9667	76.9167
Baffin	73.5144	86.9067
Baffin	73.6467	87.3017
Baffin	73.3235	87.9067
Baffin	73.4167	86.3533
Baffin	73.42	87.5483
Seymour	76.817	101.267

APPENDIX B: EFFECTS ON THE ENVIRONMENT AND OTHER SPECIES

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that strategies may also inadvertently lead to environmental effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non-target species or habitats. The results of the SEA are incorporated directly into the strategy itself, but are also summarized below in this statement.

Because most Ivory Gull colonies are extremely remote, and in general have no other birds or mammals nearby, most recovery actions in this strategy will have no effect on other species. The exception may be for birds nesting at Seymour Island (where several other species also nest), but in this case, the area is already a Migratory Bird Sanctuary and thus accrues the benefits of existing federal protection.