COSEWIC
Assessment and Update Status Report

on the

Harbour Seal
Phoca vitulina

Atlantic and Eastern Arctic subspecies (Phoca vitulina concolor)
Lacs des Loups Marins subspecies (Phoca vitulina mellonae)

in Canada

Atlantic and Eastern Arctic subspecies – NOT AT RISK
Lacs des Loups Marins subspecies – ENDANGERED
2007

COSEWIC
Committee on the Status of Endangered Wildlife in Canada

COSEPAC
Comité sur la situation des espèces en péril au Canada
COSEWIC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:


Previous reports:


Production note:
COSEWIC would like to acknowledge Rick Smith for writing the update status report on the harbour seal, Atlantic and Eastern Arctic subspecies, *Phoca vitulina concolor*, and Lacs des Loups Marins subspecies, *Phoca vitulina mellonae*, in Canada, prepared under contract with Environment Canada, overseen and edited by Dr. Andrew Trites, Co-chair, COSEWIC Marine Mammals Specialist Subcommittee.

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Assessment Summary – November 2007

Common name
Harbour seal - Atlantic and Eastern Arctic subspecies

Scientific name
Phoca vitulina concolor

Status
Not at Risk

Reason for designation
The total population has not been estimated, and analyses have not been undertaken to determine whether there is significant subpopulation structure. Overall the subspecies is common and believed to be adaptable to change. It is often found in marine areas used by people and is susceptible to shooting. No serious immediate threats have been identified over any substantial part of its range.

Occurrence
Nunavut, Manitoba, Ontario, Quebec, New Brunswick, Prince Edward Island, Nova Scotia, Newfoundland and Labrador, Arctic Ocean, Atlantic Ocean

Status history
Species considered in April 1999 and placed in the Data Deficient category. Re-examined in November 2007 and designated Not at Risk. Last assessment based on an update status report.

Assessment Summary – November 2007

Common name
Harbour seal - Lacs des Loups Marins subspecies

Scientific name
Phoca vitulina mellonae

Status
Endangered

Reason for designation
This land-locked subspecies is endemic to Québec and may number as few as 100 individuals. It inhabits a small series of lakes in northern Québec and is the only subspecies to live entirely in fresh water. The population has declined due to hunting and may still be declining. Proposed hydro-electric development would cause pervasive changes to the habitat.

Occurrence
Quebec

Status history
COSEWIC
Executive Summary

Harbour Seal
*Phoca vitulina*

Atlantic and Eastern Arctic subspecies (*Phoca vitulina concolor*)
Lacs des Loups Marins subspecies (*Phoca vitulina mellonae*)

Species information

The harbour seal (*Phoca vitulina*) is a small pinniped species with a variable pelage colouration of mottled brown, black and yellowish-white. In eastern Canada, few individuals exceed 154 cm and 100 kg, and 30 years of age. The subspecies occurring on Canada’s west coast is *P. v. richardsi*. Harbour seals in eastern Canada comprise two designatable units (DUs) that are different subspecies. One DU, *P. v. mellonae*, consists of the freshwater seals of the Lacs des Loups Marins area of Québec’s Ungava peninsula, and is endemic to Québec and Canada. The second unit, *P. v. concolor*, consists of the harbour seals found on the Canadian Atlantic and Arctic coasts and extends into Greenland, St. Pierre and Miquelon, and the United States.

Distribution

Understanding of the current distribution of harbour seals in many areas of eastern Canada is based on anecdotal sightings rather than directed surveys. Harbour seals are still found in a number of locations in the eastern Canadian Arctic including in some rivers. In the past, harbour seals occasionally ascended the St. Lawrence River to the Great Lakes. Harbour seals are found in numerous locations along the St. Lawrence River and Estuary; around the Gulf of St. Lawrence; along the southern shore of Nova Scotia, including Sable Island; in the Bay of Fundy; and in pockets along the coasts of Newfoundland and Labrador. Changes in this distribution over time are unclear.

The inland Québec population has a much more limited distribution. The Cree and Inuit people of Whapmagoostui and Juujjuarapik (Great Whale, Quebec) consider the current range of *P. v. mellonae* to be Lacs des Loups Marins, Petit Lac des Loups Marins, and Lac Bourdel, with some reports of animals having once been in Lac à l'Eau Claire. Unlike harbour seals that move in and out of freshwater areas in other parts of the species’ circumboreal northern hemisphere range, the balance of evidence indicates long-term, year-round residency in the Lacs des Loups Marins area.
Habitat

*P. v. concolor* inhabits nearshore waters on Canada’s Arctic and Atlantic coasts and uses both aquatic and terrestrial habitat. They haul out on rocky or sandy substrates, often on isolated rocks and islets. Harbour seals lack elongated front claws and cannot excavate holes in the ice. They therefore rely on areas of permanent open water or spend the winter at the edge of the fast ice. Climate change may open new habitat for harbour seals in the Arctic. *P. v. mellonae* inhabit a small number of freshwater lakes in Quebec. All harbour seal habitat in Canada, whether aquatic or terrestrial, is under the control of provincial, territorial or federal governments.

Biology

The timing of pupping in *P. v. concolor* is variable and occurs later at higher latitudes. The estimated mean pupping date of *P. v. mellonae* is substantially earlier than for other harbour seal populations at similar latitudes, suggesting that *P. v. mellonae* may be reproductively isolated from *P. v. concolor*. Published stomach content and scat analyses for northwest Atlantic harbour seals indicate a broad diet, though little has been documented regarding the diet of harbour seals in the Arctic. Stable isotopes (carbon and nitrogen) and fatty acid analyses indicate that the diet of Lacs des Loups Marins seals is of freshwater origin. Harbour seals are often sedentary, exhibiting considerable fidelity to one or a few haulout sites, though they have also been recorded to move great distances. Tracking of *P. v. mellonae* showed that seals preferred small areas along the lakes’ shoreline and remained in the Lacs des Loups Marins area.

Population sizes and trends

There are no range-wide estimates of the abundance of *P. v. concolor* or *P. v. mellonae* in Canada. Only a few portions of the harbour seal’s eastern Canadian range have been recently surveyed, with varying methods and degrees of intensity. Summing the population estimates of the most recent studies of *P. v. concolor*’s Canadian range yields at least 10,000 animals, which is likely negatively biased. There are no clear trends in abundance. Estimates of the size of the *P. v. mellonae* population are imprecise, ranging from 100-600 animals. It is clearly a small population, and evidence indicates that it has declined over time.

Limiting factors and threats

Some opportunistic hunting of harbour seals still occurs. It is unknown if this mortality is significant. Harbour seals are also known to be killed incidentally in fishing gear, are easily disturbed by human activity, and may be threatened by environmental contaminants and some diseases. Competition with grey seals and predation by sharks are likely limiting factors on Sable Island. At present, the only known cause of human-induced mortality in *P. v. mellonae* is occasional hunting by Aboriginal people. Hydroelectric development in northern Québec would likely adversely affect this subspecies.
Special significance of the species

*P. v. mellonae* is the world’s only known population of harbour seals that is restricted to freshwater environments. It is the object of reverence by the Cree and Inuit of northern Québec.

Existing protection or other status designations

*P. v. mellonae* was listed as Special Concern by COSEWIC in April 1996, as “data deficient” by the IUCN, and as “susceptible to designation as threatened or vulnerable” by the government of Québec. It is ranked N2S1 (N “imperiled” in Canada and S “critically imperiled” in Québec) by NatureServe. None of the habitat of this population is protected. *P. v. concolor* was listed as Indeterminate (data deficient) by COSEWIC in April 1999, and as “not ranked” by NatureServe. The management of marine mammals in Canada is regulated by the Marine Mammal Regulations under the *Fisheries Act*. Current regulations do not allow harbour seal hunting in Atlantic Canada. Some haulout sites are protected from development by both provincial and federal protected areas.
COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the Species at Risk Act (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS

(2007)

Wildlife Species  A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.

Extinct (X)  A wildlife species that no longer exists.

Extirpated (XT)  A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.

Endangered (E)  A wildlife species facing imminent extirpation or extinction.

Threatened (T)  A wildlife species likely to become endangered if limiting factors are not reversed.

Special Concern (SC)*  A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

Not at Risk (NAR)**  A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.

Data Deficient (DD)***  A category that applies when the available information is insufficient (a) to resolve a species’ eligibility for assessment or (b) to permit an assessment of the species’ risk of extinction.

* Formerly described as “Vulnerable” from 1990 to 1999, or “Rare” prior to 1990.

** Formerly described as “Not In Any Category”, or “No Designation Required.”

*** Formerly described as “Indeterminate” from 1994 to 1999 or “ISIBD” (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.

Environment Canada
Canadian Wildlife Service
Environnement Canada
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The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.
Update
COSEWIC Status Report

on the

Harbour Seal
*Phoca vitulina*

Atlantic and Eastern Arctic subspecies (*Phoca vitulina concolor*)
Lacs des Loups Marins subspecies (*Phoca vitulina mellonae*)

in Canada

2007
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SPECIES INFORMATION

Name and classification

The scientific name of the harbour seal is *Phoca vitulina* (Linnaeus, 1758). Five subspecies are currently accepted (Rice 1998, Burns 2002, Reeves *et al.* 2002). The subspecies on Canada’s Pacific coast is *P. v. richardsi*, and that on Canada’s Atlantic and Arctic coasts is *P. v. concolor* (DeKay 1842). The subspecies confined to the area of Lacs des Loups Marins on Québec’s Ungava peninsula is *P. v. mellonae* (Doutt 1942). The English and French common names are harbour seal and phoque commun (loup marin), respectively. The term ranger seal is occasionally used, particularly in the Arctic. In Labrador, the term ranger seal is used for males, and dotter for females. The harbour seal is known to the Inuit as *qasigiaq*. The Cree of northern Québec refer to *P. v. mellonae* as *nuchimu-achikw* or *achikunipi* with the latter term being the older or more traditional name.

Morphological description

The pelage colouration of harbour seals is extremely variable, ranging from nearly uniform brown or black to nearly uniform yellowish-white. Between these extremes there are many different variations of dark and light irregular spotting on dark or light backgrounds (Allen 1880; Doutt 1942; Bigg 1981) (Figure 1). Harbour seals usually lose their lanugo (prenatal pelage) *in utero*, though some exceptions have been reported (Boulva 1971; Oftedal *et al.* 1991).

Figure 1. Adult harbour seal.
Male adult harbour seals in eastern Canada reach a length of about 154 cm compared with about 143 cm for females (Boulva and McLaren 1979). Mean length at birth is approximately 80 cm and does not differ significantly between males and females (Boulva and McLaren 1979). Mature weight averages 90 kg for adult males, and 70 kg for females (Boulva and McLaren 1979). Males rarely exceed 100 kg and females rarely exceed 90 kg (Härkönen and Heide-Jørgensen 1990). In mature females, drastic changes in body condition and weight occur from pupping through lactation. On Sable Island, females lost 32% of postpartum body mass and 62% of body energy by late lactation (Bowen et al. 2001a).

Doutt’s (1942) subspecific description of *P. v. mellonae* was partly based on its unusually dark pelage and an enlarged coronoid process on the mandible. Though disputed by some authors (Mansfield 1967, Smith and Horonowitsch 1987), the craniological distinctiveness of *P. v. mellonae* was confirmed by Smith et al. (1994).

The Cree of northern Québec contend that *P. v. mellonae* is smaller and darker, behaves differently, and tastes different than oceanic harbour seals (Atkinson 1818; Doutt 1942; Posluns 1993; Petagumskum 2005). Historical references to the morphological dissimilarity between *P. v. mellonae* and oceanic harbour seals include Hendry’s (1828) mention of the “fine quality” (p. 84) of the freshwater seal skins, and the Hudson’s Bay Company’s distinguishing freshwater seal pelts in trade at its Little Whale River post (Smith 1999). Flaherty (1918) noted that the Inuit considered the pelt of the freshwater seal to be darker, softer and more lustrous than that of the saltwater variety. Based on his extensive work in Inuit communities, Graburn (1969) described freshwater seal skins as being the softest and most beautifully marked of all.

**Genetic description**

A study of worldwide patterns in harbour seal mitochondrial DNA (mtDNA), excluding *P. v. mellonae*, by Stanley et al. (1996) indicated that harbour seal populations of the Atlantic and Pacific Oceans are significantly genetically differentiated, and have been isolated for 1.7-2.2 million years. There is also evidence of differentiation between subpopulations in the eastern and western Atlantic with the pattern of genetic divergence suggesting that colonization proceeded from west to north and then east. The degree of divergence between European and western Atlantic populations suggested that this colonization began between 0.9 and 1.3 million years ago (Stanley et al. 1996).

Kappe et al. (1997) assessed harbour seal genetic variation in eastern Pacific (*P. v. richardsi*), western Atlantic (*P. v. concolor*), and European harbour seals (*P. v. vitulina*). They concluded that *P. v. richardsi* is clearly separated from the other two subspecies and is significantly more heterozygous. Two recent microsatellite DNA studies (Coltman et al. 1998a, 1998b) provide evidence of inbreeding-like effects in harbour seal pups from Sable Island and a low level of polygyny in this population. Recent studies of mitochondrial DNA in harbour seals along the west coast of North
America have indicated substantial geographic substructure (e.g. Lamont et al. 1996; Burg et al. 1999; Westlake and O’Corry-Crowe 2002); no similar data exist for harbour seals in the western North Atlantic.

Smith (1999) found a total of 14 different mitochondrial DNA haplotypes among 6 P. v. mellonae and 11 P. v. concolor samples (n = 17). Within the 480 b.p. examined the observed number of pairwise differences among haplotypes ranged from 1 to 19. Corrected DNA distances for comparisons between the 17 sequenced samples ranged from 0.008 to 0.05.

Lacs des Loups Marins had four haplotypes, three of which were similar and grouped together 64.7% of the time. The fourth Lacs des Loups Marins haplotype was more differentiated than those of the other harbour seals that were sequenced, with a mean of 16 ± 0.6 substitutions as compared to a mean of 6.6 ± 0.4 substitutions for all 17 samples. The P. v. concolor sample contained 10 haplotypes. No haplotypes were found in both groups.

When compared with the sequences from Stanley et al. (1996), all P. v. mellonae and the majority of the P. v. concolor samples examined by Smith (1999) grouped with other harbour seals from the western Atlantic. The number of pairwise substitutions in the combined sample of 17 sequences was very similar to that observed by Stanley et al. (1996) (1 to 23 substitutions in 435 b.p.). Burg et al. (1999) and Lamont et al. (1996) found higher numbers of pairwise substitutions in their sampling of Pacific animals (average of 2.6%± 0.29%, and 1 to 16 among 320 b.p. respectively).

Designatable units

The eastern Canadian harbour seal population is comprised of two designatable units (DUs), each attributed to a different subspecies by recent authors (Rice 1998; Burns 2002; Reeves et al. 2002).

One DU (P. v. mellonae) consists of the freshwater seals of the Lacs des Loups Marins area of Québec’s Ungava peninsula. Morphological, genetic, and behavioural evidence derived from both published and traditional Aboriginal sources supports the description of P. v. mellonae as a DU (Doutt 1942; Smith et al. 1994; Smith et al. 1996; Smith 1999; Petagumskum 2005; Smith et al. 2006). This DU is endemic to Québec and Canada.

The second DU (P. v. concolor) consists of the harbour seals found on the Canadian Atlantic and Arctic coasts. This DU ranges into the waters of southern and western Greenland (Teilmann and Dietz 1994), the northeastern United States (Waring et al. 2003), and Saint-Pierre and Miquelon (Ling et al. 1974; Lawson 2006). Despite the conclusions of Temte et al. (1991) and Temte (1994) that birth timing in P. v. concolor implies one interbreeding stock, it is very likely that this unit, comprised of groups of harbour seals with high site fidelity distributed over an extremely large area, has within it significant geographic substructure. In their study of worldwide harbour seal genetic
diversity, Stanley et al. (1996) suggested that harbour seal females are only regionally philopatric, which would support the notion of population or management units on the scale of a few hundred kilometres. On the Pacific coast of North America, extensive evidence of geographic substructure has prompted the United States National Marine Fisheries Service to recognize six harbour seal management units between California and Alaska (Angliss and Lodge 2004; Caretta et al. 2005). Though Boulva and McLaren (1979) speculated on geographic substructure within *P. v. concolor* based on variations in dental patterns, and more recent authors have provided further evidence supporting such substructure (see Lesage et al. 2004 for telemetry data; Lebeuf et al. 2003 and Sjare et al. 2005 for analyses of contaminant profiles; Gilbert et al. 2005 and Bowen et al. 2003 for region-specific differences in population dynamics), these data are not yet sufficient to define multiple DUs of *P. v. concolor*.

Figure 2. Global range of the harbour seal, *Phoca vitulina*. 
DISTRIBUTION

Global range

Harbour seals have the broadest distribution of any pinniped species, occurring over a latitudinal range from about 30°N to 81°N in the eastern Atlantic and 28°N to 62°N in the eastern Pacific (Figure 2). In the western North Atlantic, they are distributed from the eastern Canadian Arctic and western Greenland (approximately 73°N), south to New York and New Jersey (approximately 40°N), with occasional animals being reported as far south as the Carolinas (Allen 1880; Mansfield 1967; Boulva and McLaren 1979; Wiig 1989; Waring et al. 2004). Ambient air temperature may limit the global distribution of harbour seals (Hansen et al. 1995).

Harbour seals are known to be vulnerable to overexploitation and various forms of disturbance by humans and have been eliminated from some parts of their global range such as in Greenland (Teilmann and Dietz 1994) and Hokkaido, Japan (Wada et al. 1991).

Canadian range

Understanding of the distribution of harbour seals in many areas of eastern Canada and the Arctic is based on opportunistic or anecdotal sightings rather than directed surveys.

*Phoca vitulina concolor* – Hudson Bay and Arctic

There are historical records of harbour seals as far north as Ellesmere Island (Anderson 1934; Dunbar 1949; Mansfield 1967). Based on information gathered from the Inuit, Mansfield (1967) reported harbour seals to occur as far west as Admiralty Inlet along the north shore of Baffin Island, and on the west side of Hudson Bay as far north as Repulse Bay. Based on sightings, and their own collecting expeditions, both Mansfield and McLaren (1958) and Mansfield (1967) considered the distribution of harbour seals in the high Arctic to be localized to: Cumberland Sound, Frobisher Bay and the Foxe peninsula of southwest Baffin Island; Southampton Island and Chesterfield Inlet; and Ungava Bay. These authors also indicated that, as of the 1950s, the harbour seal had already been eliminated from some of this area. Similarly, Smith and Horonowitsch (1987) quoted an unpublished report indicating that harbour seals were more widely distributed in the Ungava Bay area before the advent of rifle hunting. The Nunavut Wildlife Harvest report indicates that 9 of 27 Nunavut communities reported harvesting a total of 59 harbour seals between 1996 and 2001 (Priest and Usher 2004). These included the communities of Arviat, Baker Lake, Chesterfield Inlet, Coral Harbour, Rankin Inlet, Kugaaruk, Cape Dorset, Iqaluit, and Kimmirut.

There are no records of anything other than sporadic harbour seal occurrences on the east coast of Hudson Bay and James Bay, with the exception of an extirpated group of animals that used to frequent Kasegalik Lake on the Belcher Islands (Doutt 1942;
Dunbar 1949; Manning 1946; Harper 1961; Mansfield 1967; James Bay and Northern Québec Native Harvesting Research Committee 1988; Petagumskum 2005; Prefontaine 2005). In contrast, a variety of sources, both historical and contemporary, point to the continued presence of harbour seals in rivers and river mouths along the west shore of Hudson Bay (Harper 1956; Mansfield 1967; Beck et al. 1970; Stewart and Lockhart 2005). The group of animals that frequent the Churchill River estuary have been the best studied (Harper 1956; Remnant 1997; Bernhardt 2005).

*Phoca vitulina concolor* – St. Lawrence and Atlantic

In the past, harbour seals occasionally ascended the St. Lawrence River to the Great Lakes. One animal was recorded killed at the mouth of the Gatineau River near Ottawa in 1865 (Anderson 1946) and Allen (1880) reported two animals killed in Lake Champlain in the 19th Century. DeKay (1842), based on an 1824 article in the Kingston Chronicle newspaper, reported an animal killed opposite Kingston at Cape Vincent, New York. This same newspaper report quoted Indian traders as saying that harbour seals occasionally frequented Lake Ontario. Harper (1961) summarized multiple historical reports of harbour seals along the north shore of the St. Lawrence River and Labrador, including records of animals ascending rivers in these areas. Finally, Voegelin (1969) noted that “In aboriginal times the habitat of the harbor seal included the Ottawa River as far up as present-day Ottawa, Lake Champlain, Onondaga Lake, and Lake Ontario; the habitat could not extend westward beyond Lake Ontario, for the harbor seal could not negotiate Niagara Falls”.

The most complete source of information on harbour seal distribution on Canada’s Atlantic coast, excluding Labrador, is Boulva and McLaren (1979). These authors compiled their data through questionnaires sent to fisheries officers, information from bounty kills and personal interviews with fishermen in most parts of Nova Scotia, New Brunswick, Prince Edward Island, and Québec during 1972 and 1973, and direct monitoring of the harbour seal population on Sable Island. Their study indicated the presence of seals in a variety of locations along the St. Lawrence River and Estuary; around the Québec, New Brunswick, Prince Edward Island and Nova Scotia coasts of the Gulf of St. Lawrence; along the southern shore of Nova Scotia, including Sable Island; in the Passamaquoddy and Digby areas of the Bay of Fundy; and in pockets along the Northern Peninsula, west, south, and northeast coasts of Newfoundland.

Only a very few studies have been conducted since the work of Boulva and McLaren (1979) to update harbour seal distributional information.

In the Bay of Fundy, harbour seals are present along the coast and offshore islands of the Bay of Fundy region from Machias Seal Island to Quaco Head, New Brunswick, and from Parkers Cove to Cape Sable Island, Nova Scotia (Stobo and Fowler 1994; Jacobs and Terhune 2000; Browne and Terhune 2003). Though diminished in number, harbour seals are still present on Sable Island (Bowen et al. 2003).
Boat-based and aerial surveys, shore-based counts and interviews with coastal residents allowed Sjare et al. (2005) to confirm that the broad patterns of local distribution in Newfoundland remain consistent with those observed by Boulva and McLaren (1979), though little is known regarding the presence of seals in some large coastal areas such as Bonavista Bay. Sjare et al. (2005) also concluded that the same areas remain important as harbour seal habitat in Labrador as were noted in the 1970s (Brice-Bennett 1977).

The distribution of harbour seals in the Estuary and Gulf of St. Lawrence, with the exception of the eastern and northeastern portions of the Gulf, was recently assessed using aerial surveys (Robillard et al. 2005). In the Estuary, the distribution of harbour seals was non-uniform, with animals observed from the western limit of the survey area at Battures aux Loups Marins, to Matane and Godbout to the East, and to the upstream limit of the survey area in the Saguenay River at St-Fulgence. Few animals were observed along the North shore between Baie Comeau and Longue-Pointe-de-Mingan, or along the shore of the Gaspé peninsula between Matane and Forillon. In addition, only one individual was seen along the coast of New Brunswick, including Baie des Chaleurs. In the Gulf, with a few exceptions, seals were concentrated at Anticosti and Prince Edward islands, and to a lesser extent near Gaspé, in the Mingan Archipelago, and at Îles-de-la-Madeleine.

Data derived from a 1997 questionnaire sent to fishermen in Prince Edward Island indicated that harbour seals are concentrated in the southeastern part of the province (Cairns et al. 2000).

*Phoca vitulina mellonae*

The Cree people of Whapmagoostui, who have lived and hunted in the area in question for at least a millennium (Crowe 1991), consider the current range of *P. v. mellonae* to be Lacs des Loups Marins, Petit Lac des Loups Marins, and Lac Bourdel, with some reports of animals having once been in Lac à l'Eau Claire (Posluns 1993; Petagumskum 2005) (Figure 3). This information is corroborated by the Cree toponyms in this area, which make reference to *achikw* (seal) and *achikunipi* (seal lake) (Consortium Gilles Shooner & Associés 1991). Inuit hunters, interviewed by Hydro-Québec contractors, reported seeing or killing freshwater seals in Lac Guillaume-Delisle, Rivière Nastapoca, Rivière Boniface, Rivière Niagurnaq, Rivière Kuunga, Rivière Longland, Lac Tasialuk, and Lacs des Loups Marins (Archéotec 1990).

Though Atkinson’s (1818) sighting of seals in Upper Seal Lake (Petit Lac des Loups Marins), during one of the earliest Hudson’s Bay Company expeditions into the Ungava interior, is the first written description of these animals, the French cartographer Nicolas Bellin (1744) seems to have coined the term “Lacs des Loups Marins”, establishing a written record of seals in this area dating back over 250 years. Subsequently, other sightings were made in the vicinity of Lac d’Iberville and Petit Lac des Loups Marins (Clouston 1820) and Lacs des Loups Marins (Hendry 1828; Finlayson 1830; Low 1898; Lewis 1904).
Figure 3. Core range of the Lacs des Loups Marins harbour seal, *Phoca vitulina mellonae*. 
Doutt’s (1942) subspecific description of *P. v. mellonae* was based on a premise first advanced by Low (1898) that the population had been isolated for 3000-8000 years, trapped by the Ungava peninsula's isostatic rebound since the retreat of the Laurentian ice sheet. Since Doutt’s description, a number of seal sightings from all times of the year have been made in Lacs des Loups Marins (Doutt 1954, Power and Gregoire 1978, Berrouard 1984, Smith and Horonowitsch 1987, Smith 1999). There are historical references to the presence of seals in Lac Minto, at the head of Rivière aux Feuilles (Flaherty 1918; Manning 1946), and Lac Beneta, situated in the basin of Rivière aux Mélèzes (Manning 1946). A summary of seal sightings by Hydro-Québec contractors and employees between 1970 and 1990 indicate the presence of animals in a variety of lakes and rivers in the Lacs des Loups Marins area (Consortium Gilles Shooner & Associés *et al.* 1991).

Unlike harbour seals that move in and out of freshwater areas in other parts of the animal’s global range, *P. v. mellonae* appear to be long-term, year-round residents of the Lacs des Loups Marins area.

**HABITAT**

**Habitat requirements**

*P. v. concolor* inhabits the near-shore, coastal waters on both Canada’s Arctic and Atlantic coasts and uses both aquatic and terrestrial habitats. They are well known for their use of estuaries and rivers, and have been recorded in excess of 200 km inland (e.g. Erlandson 1834; Strong 1930; Dunbar 1949; Wheeler 1953; Mansfield 1967; Beck *et al.* 1970; Paulbitski 1974; Roffe and Mate 1984; Williamson 1988; Bernhardt 2005). They haul out on both rocky and sandy substrates, often on isolated rocks and islets. Though Lesage *et al.* (1999) confirmed that the majority of dives performed by St. Lawrence estuary harbour seals were to depths of less than 4 m, data from other areas such as Sable Island demonstrate that harbour seals often dive to 80 m or more (Bowen *et al.* 2001a). On Sable Island, females spent more time diving and individual dives were deeper and longer as lactation progressed (Bowen *et al.* 2001a).

Because they lack elongated front claws, harbour seals cannot excavate holes in the ice like ringed seals (*Pusa hispida*). During Arctic winters, they are therefore reliant on permanent areas of open water that occur because of moving water or, where such areas do not exist, they must spend the winter at the edge of the fast ice (Mansfield 1967; Stewart and Lockhart 2005). Most seals monitored with satellite telemetry in the Churchill River wintered along the offshore sea ice edge near the river mouth (Bernhardt 2005). Animals also ventured into the pack ice during the winter, but did not move into water deeper than 50 m. Animals generally returned to the Churchill area during ice break up, and remained in open water until ice in the Churchill River estuary broke and animals were able to return to the haul-out (Bernhardt 2005).
Studies of *P. v. mellonae* have found no permanent haulout sites on Lacs des Loups Marins and Lac Bourdel (Consortium Gilles Shooner & Associés *et al.* 1991). In winter, when the vast majority of the lakes and rivers are covered in ice, the seals may rely on several physical features for their sources of air: areas that remain ice-free because of strong currents, fissures in the ice, and air pockets created by the shoreline’s complicated geometry or by the undulations in the bottom of the sheet ice on the lake’s surface (Smith and Horonowitsch 1987; Consortium Gilles Shooner & Associés *et al.* 1991; Dean Consulting & Research Associates 1991). It is not known where pupping occurs. Several authors have postulated that pupping takes place in under-ice shelters since the lakes are still iced over at the time of pupping, and no births have been observed on the ice (Consortium Gilles Shooner & Associés *et al.* 1991).

**Habitat trends**

Archeological data from bone assemblages suggest that during periods of warmer weather and presumably less ice, harbour seal bones had a higher frequency of occurrence compared to those of ringed seals in excavations along the coast of northern Labrador and southeastern Baffin Island. The opposite was true when the weather was cooler and there was more ice (Woolett *et al.* 2000). With current evidence indicating a shrinkage of Arctic ice (e.g. Grumet *et al.* 2001), some authors have suggested that harbour seals might become more abundant in the Arctic due to an increase in open water (Stirling and Derocher 1993; Derocher *et al.* 2004). Preliminary data from Inuit harvests and fatty acid signatures in polar bears indicate that harbour seals may be increasing in the area of western Hudson Bay (Derocher *et al.* 2004; Bernhardt 2005).

Lucas and Stobo (2000) speculated that harbour seals could be shifting their distribution southward because of changing environmental conditions. However, no shift in distribution has been reported in Newfoundland (Sjare *et al.* 2005). Broad patterns of local distribution recently observed by Sjare *et al.* (2005) are also consistent with those observed during the 1970s in Labrador by Brice-Bennett (1977) and Boulva and McLaren (1979).

**Habitat protection/ownership**

All harbour seal habitat in Canada (aquatic and terrestrial) is under the control of the provincial, territorial, or federal governments.

**BIOLOGY**

Harbour seals have the broadest distribution and occur in more different habitats than any other pinniped species. They exhibit considerable plasticity in their biology and behaviour (Burns 2002).
Life cycle and reproduction

The sex ratio for harbour seals after the first year is close to one, with some evidence of a higher mortality rate in subsequent years for males (Boulva and McLaren 1979; Härkönen and Heide-Jørgensen 1990). Females reach sexual maturity at around 4 years of age, with males becoming sexually mature slightly later (Boulva and McLaren 1979; Härkönen and Heide-Jørgensen 1990). Average age of mature females (generation time) was estimated to be about 9 years (based on an annual survival rate of 81% for harbour seals in the Maritime provinces and reproductive rates of 27% at age 4 y, 55% at 5 y, 79% at 6 y and 95% for ages 7+ y – from Boulva and McLaren 1979).

Females generally have one pup every year on land, and the pupping season in any particular area can extend for one to two months with a two-week peak (Bigg 1981). Pups often follow their mothers into the water within hours of their birth (Lawson and Renouf 1985) and evidence from Sable Island suggests that pups of younger females gain mass at a lower rate than those of older females through mid-lactation (Bowen et al. 2001b). Pups are weaned at about four weeks of age (on Sable Island at around 24 days), and mating occurs in the water at around this time (Bigg 1981; Muelbert and Bowen 1993). In 2000 in the St. Lawrence River estuary, the median date of weaning was 26 June (Dubé et al. 2003).

Unlike harbour seals in Europe, which pup mainly in late June and show no significant latitudinal variation, pupping in *P. v. concolor* is more variable and is positively related to latitude (Bigg 1969; Temte et al. 1991). The southern limit of pupping appears to be Maine where pupping occurs in late May. It becomes progressively later by about 1.7 days per degree latitude, with the latest being late June or early July on Southampton and Baffin islands (Bigg 1969; Temte et al. 1991; Stewart and Lockhart 2005), though the median pupping date in the St. Lawrence River estuary (26 May in 2000) occurs somewhat earlier than that predicted by this relationship (Dubé et al. 2003). Pupping in the Churchill River is thought to occur around the beginning of June (Bernhardt 2005). Twomey (1938) found afterbirth on a rock at Kasegalik Lake on the Belcher Islands around this time.

Temte (1994) was able to statistically differentiate crania of local populations of *P. v. richardsi*, the harbour seal subspecies on the Pacific coast of North America. He found a significant relationship between differences in cranial morphometry and population differences in birth timing, and suggested that these “allochronic”, as well as allopatric factors, may be acting to promote population differentiation.

With respect to *P. v. mellonae* there is evidence that, in addition to the population’s apparent geographic isolation from other harbour seal populations, similar allochonic mechanisms may be at play. From his conversations with the indigenous peoples of Northern Québec, Doutt (1942) reported that the mean pupping date of *P. v. mellonae* occurred in early May. This date has also been corroborated by more recent observations (Consortium Gilles Shooner & Associés et al. 1991). Using data collected by Doutt (1942) and growth curves calculated by Boulva and McLaren (1979) and
Bigg (1969), Smith et al. (1994) arrived at two different estimated pupping dates for Lacs des Loups Marins: Between 6 and 31 May; and 10 May. Both of these estimates for the mean birth date of *P. v. mellonae* are substantially earlier than for other harbour seal populations at similar latitude (Smith et al. 1994). If Temte et al. (1991) and Temte (1994) were correct in their conclusion that birth timing in harbour seals has a heritable component and therefore functions to create reproductive barriers between adjacent populations, these data support the hypothesis that *P. v. mellonae* is reproductively isolated from *P. v. concolor*. However, it is unclear to what extent timing of pupping in harbour seals is an inherited characteristic or one that varies in response to local environmental conditions.

The moult generally occurs during midsummer to early autumn, within 2 or 3 months of the pupping season (Burns 2002). In Lacs des Loups Marins, animals hauled out in the spring months are usually in small groups, whereas at the end of the summer, they are usually hauled out singly or in pairs, a behaviour that has been linked by some observers to the moulting process (Consortium Gilles Shooner & Associés et al. 1991). However, Krieber and Barrette (1984) noticed an increase in group size from spring to autumn at a haulout in Forillon National Park, Québec.

As was noted by Härkönen and Heide-Jørgensen (1990) it is difficult to compare mortality rates between different harbour seal populations because in some areas hunting is included in the mortality. Boulva and McLaren (1979) tried to factor out hunting in their mortality rate calculation of about 17.5% for 1+ animals in one harbour seal population in Nova Scotia. On Sable Island, Lucas and Stobo (2000) estimated shark-inflicted mortality of pups to be under 10% during 1980-93, roughly 25% in 1994-95, and 45% in 1996, with shark-related deaths in all age groups recorded year-round. The maximum lifespan of harbour seals appears to be around 30 years (Härkönen and Heide-Jørgensen 1990).

### Diet

Published stomach content and scat analyses for northwest Atlantic harbour seals indicate a broad diet consisting of invertebrates as well as planktivorous and omnivorous fish (Boulva and McLaren 1979; Payne and Selzer 1989; Lesage et al. 1999). Based on their examination of isotopic signatures, Lesage et al. (2001) concluded that harbour seals occupy the highest trophic position in the St. Lawrence River estuary and that these animals fed primarily on estuarine, as opposed to Gulf of St. Lawrence, prey species. In their comparison of two areas off Nova Scotia and New Brunswick, Bowen and Harrison (1996) documented geographic and interannual variability in prey taken by harbour seals. Approximately 40 prey species were identified in harbour seal stomachs sampled from near shore areas of Newfoundland and Labrador, including 32 fish species and 18 invertebrate species (Sjare et al. 2005). Little has been documented regarding the diet of harbour seals in the Arctic. Beck et al. (1970) found lake whitefish (*Coregonus clupeaformis*) and lake trout (*Salvelinus namaycush*) in the stomach of one animal killed in the Thlewiaza River (located south of the western Hudson Bay Inuit community of Arviat).
The Cree of Whapmagoostui have long contended that the Lacs des Loups Marins seals feed in fresh water and that these animals taste different than oceanic harbour seals, making them a favoured target for hunting (Twomey 1938; Posluns 1993; Petagumskum 2005). The Cree also consider that this freshwater diet is one of the reasons why the Lacs des Loups Marins seals’ pelage is darker and more lustrous than its saltwater counterpart (Posluns 1993; Petagumskum 2005).

An examination of the only four *P. v. mellonae* stomachs available indicated that the diet of these animals consisted, in large part, of resident lake whitefish, lake trout, and brook trout (*S. fontinalis*) (Smith *et al.* 1996). Power and Gregoire (1978) conducted a study in which fish from Lacs des Loups Marins were compared with samples caught in nine nearby Ungava peninsula lakes. After determining that brook trout was the dominant fish species in Lacs des Loups Marins, and that lake trout and lake whitefish populations in the lake were depressed compared to the other lakes, they concluded that seal predation on the latter two species was responsible for the observed alterations in the Lacs des Loups Marins fish community.

Smith *et al.* (1996) analyzed stable-carbon and nitrogen isotope values in three groups of seals: *P. v. concolor* from Kasegalik Lake, Belcher Islands, Nunavut; *P. v. concolor* from the northwest Atlantic Ocean; and *P. v. mellonae*. Fatty acid values were examined for the latter two of these groups, in addition to *P. v. richardsi* from the Pacific Ocean. Results from both the stable-isotope and fatty acid analyses confirmed that the diet of Lacs des Loups Marins seals was of freshwater origin. Carbon isotopic signatures (δ¹³C) of hair and blood sampled over three years of collection indicated freshwater feeding over a prolonged period.

In the same study, *P. v. concolor* from northwest Atlantic marine populations showed δ¹³C values that are typical of marine mammals measured elsewhere in north-temperate regions (Smith *et al.* 1996). The Kasegalik Lake sample was intermediate in δ¹³C signature between the marine and Lacs des Loups Marins values, indicating that seals collected from Kasegalik Lake had access to both freshwater and marine-derived carbon, either because of their use, or because of their prey’s use, of both kinds of aquatic habitat.

The stable-nitrogen isotope values found by Smith *et al.* (1996) for the marine *P. v. concolor* sample indicated that it occupied at least two trophic levels, which is consistent with a broad diet. The *P. v. mellonae* and Kasegalik Lake *P. v. concolor* were similar in δ¹⁵N values, suggesting that they occupy similar trophic positions, and the freshwater seals showed less variation in trophic position, probably due to fewer dietary alternatives in high-latitude lakes compared with Arctic marine environments.
Physiology

A variety of studies have investigated the relationship between environmental variables and thermoregulation in harbour seals. Hind and Gurney (1998) provided experimental evidence that the timing of pupping may be influenced by the thermoregulation cost of hauling out. This study indicated that the most energetically favourable time for lactation is June and July, a period coincident with the timing of pupping in the European harbour seal population they examined. The winter survival rate in harbour seal pups has been significantly correlated with their autumn body mass (Harding et al. 2005). Because there is increasing thermal stress with decreasing body size of pups, low winter water temperatures induce a negative energy balance in these smaller animals. Colder air temperatures may also be partly responsible for lower numbers of seals appearing on the haul-out sites during late autumn and early winter (Pauli and Terhune 1987).

A recently published study found a significant relationship between the weaning mass of harbour seal pups and their body condition in their first weeks of independence (Muelbert et al. 2003).

Movements

Harbour seals are often sedentary, exhibiting considerable fidelity to one or a few haul-out sites. They have also been recorded to move great distances. Burns (2002) suggested that generalizations are inappropriate given the harbour seal’s wide distribution and varied population dynamics, and that their kinds of movement include “migrations, juvenile dispersal, seasonal shifts, shifts related to breeding activity, responses to seasonal habitat exclusion, responses to acute or chronic disturbance, and immigration/emigration, occasionally on a relatively large scale.”

Only a few studies have provided insight into the movement patterns of eastern Canadian harbour seals.

*Phoca vitulina concolor*

In Hudson Bay, harbour seals tagged in Churchill ranged over a fairly large area, extending from the Nelson River to the south and the vicinity of Arviat to the north (Bernhardt 2005). During the autumn, animals made 1-8 day long excursions from the Churchill River haul-out site to offshore areas. Home ranges became smaller and movement patterns less linear during winter, likely because land fast ice prevented animals from returning to haul-out sites in river mouths. Home ranges were comparable in size to previous reports for harbour seals in other jurisdictions (100-55,000 km²) (Bernhardt 2005).

On the Atlantic coast, significantly greater numbers of seals were seen in Saint John harbour at high tide and with lower temperatures. Seal abundance peaked in early May and coincided directly with the presence of alewife (*Alosa pseudoharengus*)
(Browne and Terhune 2003). A southward movement from the Bay of Fundy to southern New England waters occurs in autumn and early winter (Rosenfeld et al. 1988), and a northward movement from southern New England to Maine and eastern Canada occurs prior to the pupping season in May and June (Whitman and Payne 1990).

Lesage et al. (2004) reported four of the seven harbour seals they were monitoring left their summer haul-out areas and migrated 266 ± 202 km (range 65-520 km) to over-wintering sites. During the ice-free period, the seals remained near the coast (generally between 6 and 11 km from shore), in shallow water (generally less than 50 m in depth), and travelled only short distances (15-45 km) from capture sites. None of the monitored seals crossed the 350 m deep Laurentian channel, indicating that this feature may restrict the animals' movements.

Juvenile harbour seals that have been tagged on Sable Island have been subsequently observed at various mainland sites (Bowen 2005). There is some evidence of immigration to Sable in the early 1980s, which led to elevated pup production. An important contributor to decreased pup production in recent years could be emigration of adult females or female recruits (Bowen et al. 2003; Bowen 2005).

Phoca vitulina mellonae

Smith et al. (2006) tracked eight seals in the area of Lacs des Loups Marins between August and January (1995 and 1996). Daily distances travelled averaged 1.5 to 9.8 km. The overall ranges (95% probability distribution) of seals varied from 82.9 km² to 890.8 km² (median 368.4 km²). All seals exhibited considerable site fidelity to particular areas along the Lake’s shore during the tracking periods. Overall, the eight seals used two primary zones. Seven of them used Lacs des Loups Marins/Lac Bourdel proper, and one animal used the river between Lacs des Loups Marins and Petit Lac des Loups Marins. The total area used (95% probability distribution) was 672.3 km².

No other data on the seasonal movements of P. v. mellonae exist, though the sporadic observations of Consortium Gilles Shooner & Associés et al. (1991) hint at seals spending the winter months in larger bodies of water like Lacs des Loups Marins, Lac Bourdel, and Petit Lac des Loups Marins, with some dispersal into outlying, smaller bodies of water upon the melting of the ice. These investigators reported finding many worn trails between bodies of water frequented by the seals, some as long as 0.15 km, and on inclines as steep as 25°.

There is no evidence that harbour seals are able to navigate the waterfalls on the Rivière Nastapoca and move between the area of Lacs des Loups Marins and Hudson Bay, or into Ungava Bay (Smith 1999).

Additional censuses of the waterways of this region of Québec are warranted to better document the presence or absence of the Lacs des Loup Marins harbour seals. Spatial distribution and seasonal dynamics should also be determined to verify the sedentary hypothesis and identify the areas most frequented.
Interspecific interactions

Shark-inflicted mortality on pups and adult females reduced pup production on Sable Island by 43 to 154 pups annually between 1993 and 1997 and occurred in all months except December, January and February (Lucas and Stobo 2000). It has also been speculated that harbour seals on Sable have been affected adversely by interactions with grey seals (Bowen et al. 2003).

Adaptability

In recent years on Sable Island, the mean birth date of harbour seals has become significantly later (by approximately 2 weeks) suggesting nutritional stress of females and slower fetal growth (Bowen et al. 2003; Bowen 2005). At the same time, the grey seal (Halichoerus grypus) population of the island has been pupping earlier, indicating that this species may be outcompeting harbour seals for scarce resources (Bowen 2005).

POPULATION SIZES AND TRENDS

There are no range-wide estimates of the abundance of P. v. concolor or P. v. mellonae in Canada. Much of the range of both DUs has never been surveyed. Range-wide trends in abundance cannot be calculated.

Phoca vitulina concolor

Boulva and McLaren (1979) estimated 12,400 harbour seals in Canadian Atlantic waters in 1973 (excluding Labrador), with most found on Sable Island and the Atlantic coast of Nova Scotia (5,250). The population is estimated to have declined at a rate of approximately 4%/year between 1950 and 1973 because of bounty kills (Boulva and McLaren 1979; Malouf 1986). Hammill and Stenson (2000) calculated that if the population had continued to decline at 4% per annum until 1976, when the bounty program ended, and thereafter increased at 5.6% per annum, the population size in 1996 would be 31,900, but it is generally acknowledged that no reliable abundance estimate currently exists for the harbour seal population in eastern Canada (Anonymous 2003).

The count of animals hauled out on Sable Island in the summer of 2004 was approximately 150, a population size that has remained fairly stable in recent years (Bowen 2005). However, the population had previously undergone a large decline (Bowen et al. 2003).

Harbour seals were counted on some portions of the New Brunswick coastline of the Bay of Fundy in the autumn and early winter of 1984, 1987 and 1998 (Jacobs and Terhune 2000). Semi-monthly fixed wing aerial and shipboard surveys produced a similar maximum count of just over 1,000 seals in each of the three years of
observation. In 1985-87 and 1991-92, Stobo and Fowler (1994) conducted helicopter surveys of harbour seals along some portions of the Bay of Fundy coast on both the New Brunswick and Nova Scotia sides. The maximum number of seals observed was 3,534 in 1992. These are minimum estimates of total population size given that some portion of the population was at sea when the seals were counted on shore.

Generally, the New Brunswick side of the Bay supported greater numbers of harbour seals (84% of the total) than the Nova Scotian side, and the shoals and islands off the seaward coasts of Grand Manan accounted for 53-60% of harbour seals counted during the five surveys. In contrast to the lack of a trend reported by Jacobs and Terhune (2000), Stobo and Fowler (1994) reported that over the 8-year time period of the surveys, the abundance of harbour seals increased on both sides of the Bay, the greatest increase being observed on the New Brunswick side, but cautioned about the uncertainty of their estimated rates of change due to the limitations of the survey design and execution.

Aerial surveys were flown in the St. Lawrence Estuary in June 1995, 1996 and 2000, and in August 1994, 1995, 1996 and 1997 (Robillard et al. 2005). Two surveys were flown in June 1996 and 2001 in complementary areas of the Gulf of St. Lawrence. A 4-hour survey window around low tide was generally respected during surveys of the Estuary with a few exceptions. These surveys did not cover the eastern and northeastern portions of the Gulf of St. Lawrence, though some historical evidence exists of harbour seals in this area (Robillard et al. 2005). Correcting for seals in the water resulted in abundance estimates of 811-1,008 harbour seals in August 1997 and 721-858 animals in June 2000 in the Estuary, 635-757 seals for areas of the Gulf covered in June 1996, and 575-685 seals for those areas covered in June 2001. Combining the count for the two complementary areas of the Gulf, converting them to a density estimate (0.23-0.28 seals/km), and applying this estimate to the unflown portion of the Gulf, resulted in a total of 3,108-3,744 harbour seals in the Estuary and Gulf of St. Lawrence. Adding to this estimate the average of the Estuary accounts resulted in an abundance index of 4,000-5,000 (rounded to the nearest 1,000) harbour seals in the Estuary and Gulf of St. Lawrence. Trends in abundance of harbour seals in the Estuary were examined using the June and August estimates, first considering the study area as a whole, but also the different sectors separately, and four major haul-out sites. With one exception, none of the rates of increase were significantly different from zero, and none of the regression analyses were associated with homogeneous variances. A power analysis indicated that these results were expected given the small sample size. Growth rates varied widely depending on sectors or sites, and were in some cases, larger than the maximum growth rate of 12-13% estimated for pinniped populations not subjected to immigration, and with constraints on reproductive life history typical of harbour seals. Several growth rates approached zero or encompassed zero or negative values in their 95% confidence interval (Robillard et al. 2005).

In Newfoundland, Sjare et al. (2005) conducted boat-based reconnaissance surveys of 7 areas thought to be important for harbour seals between May and September from 2001-2003. Opportunistic shore-based counts from an elevated
viewing position were done at a variety of locations, and aerial observations of the northern tip of the Port au Port peninsula were also conducted. Information on the distribution and relative abundance of harbour seals in areas not surveyed by boat, aircraft or shore was collected from interviews with long-time coastal residents and from discussions with experienced hunters participating in the biological collection program. Many areas along the Newfoundland coast were not surveyed, and it is not known what proportion of the population was documented in each of the surveys. Disturbance caused by hunting likely influenced the survey results at St. Pauls Inlet, Point May and Southwest Arm. During 2002 and 2003, three small boat surveys conducted from Renews to Chance Cove Provincial Park counted a maximum number of 164 harbour seals. A maximum count of 296 animals was derived from surveys of a portion of Placentia and St. Mary’s Bays. The maximum count at Point May was 46, and at Pass Island was 24. An aerial assessment north of Port au Port peninsula produced a minimum count of 40 animals in 2003-2004, and five shore-based surveys in the St. Pauls Inlet area produced a maximum count of 88 seals. Compared to Boulva and McLaren (1979), these recent data indicate that abundance at some well known haul-out sites in the more southern portions of the province may have increased while abundance at sites in more northern areas and the northeast coast still remain low relative to the early 1980s. Sjare et al. (2005) caution, however, that a better understanding of annual and seasonal seal movement patterns is needed before any conclusions on site specific and local abundance trends can be made.

Table 1. Summary of Canadian harbour seal (*Phoca vitulina concolor*) population sizes and trends.

<table>
<thead>
<tr>
<th>Area</th>
<th>Population Estimate</th>
<th>Trend</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hudson Bay</td>
<td>&gt;100</td>
<td>Increasin</td>
<td>Bernhardt (2005); Derocher et al. (2004)</td>
</tr>
<tr>
<td>Arctic</td>
<td>?</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>Estuary and Gulf of St. Lawrence</td>
<td>~4-5,000</td>
<td>?</td>
<td>Robillard et al. (2005)</td>
</tr>
<tr>
<td>Bay of Fundy, SW Coast of Nova Scotia</td>
<td>3,534</td>
<td>Increasin</td>
<td>Stobo and Fowler (1994)</td>
</tr>
<tr>
<td>Sable Island</td>
<td>~150</td>
<td>Stable</td>
<td>Bowen (2005)</td>
</tr>
<tr>
<td>Newfoundland</td>
<td>~1,000</td>
<td>?</td>
<td>Sjare et al. (2005)</td>
</tr>
<tr>
<td>Total</td>
<td>~9784</td>
<td>?</td>
<td></td>
</tr>
</tbody>
</table>

*Jacobs and Terhune (2000) were not able to discern a trend in their surveys of the New Brunswick side of the Bay of Fundy in 1984, 1987 and 1998.

Few quantitative data are available for harbour seals in Labrador, save for some anecdotal information regarding a group of as many as 100 seals in the Paradise River near Cartwright, and the observation of as many as 40-50 animals in the Sandy Island area near Natuashish (Sjare et al. 2005).

Along the west shore of Hudson Bay, the only aggregations of animals that have been counted are the 39 seals observed hauled out in the Churchill River in 2003 and 50-60 animals observed along the Seal River in 2002 (Bernhardt 2005).
From the above-noted studies, the total population of harbour seals in eastern Canada numbers at least 10,000 (Table 1). It should be stressed that this estimate is imprecise and likely negatively biased as it includes only portions of the harbour seal’s eastern Canadian range. Moreover, the estimates in Table 1 were obtained using varying methods and are based on surveys of differing degrees of thoroughness. In addition to their fragmentary nature, the existing data – and any trends in abundance – are difficult to interpret given uncertainty related to the degree of discreteness of harbour seal colonies in Atlantic Canada and the northeastern United States (Robillard et al. 2005).

The corrected 2001 abundance estimate for harbour seals in the northeastern United States was 99,340 individuals (Gilbert et al. 2005). Between 1981 and 2001 the uncorrected counts of seals there increased at an annual rate of 6.6%. Approximately 1,200 animals were counted in a 2001 aerial survey between Eastern Bay, Maine and the New Brunswick border. That number does not appear to be increasing in contrast to harbour seals elsewhere in the US northeast, leading Gilbert et al. (2005) to speculate on geographic substructure of the population.

Seal numbers at St. Pierre and Miquelon (a French dependency), off the south coast of Newfoundland, appeared to increase between 1970 and 1982 (Ling et al. 1974; Davis and Renouf 1987). Since that time, the summer breeding aggregation at Grand Barachois (Miquelon, 16 km off the south coast of Newfoundland) decreased from a high of 908 animals in 1982 to 200 animals in June 2006 (Lawson 2006). Harbour seals in Greenland have declined substantially over the past few decades, likely as a result of overhunting (Teilmann and Dietz 1994).

*Phoca vitulina mellonae*

Estimates of the size of this subspecies population are imprecise, though it is clearly a small population.

In three years of intensive summer field work at Lacs des Loups Marins, which all evidence indicates is the core of the *P. v. mellonae* range, Smith (1999) observed only 39 animals in total, nearly all sightings of single individuals. A maximum of 500 animals was the "guess" of Doutt (1957), cited in Scheffer (1958). Power and Gregoire (1978) estimated 200 and 600 animals by two different summations. The most recent estimate by Consortium Gilles Shooner & Associés et al. (1991) was approximately 100 animals, or 0.1 seals/km², in Lacs des Loups Marins and Lac Bourdel. These two lakes, with the possible addition of Petit Lac des Loups Marins, appear to be the core (and quite possible the sum total) of the current range. There is evidence that the range was larger in the past.

Population trends over time obviously cannot be calculated, though some evidence exists that the population had a larger range, and was more abundant, in the past. During his 1896 traverse of the Ungava peninsula for the Geological Survey of Canada, A.P. Low observed seals in Lacs des Loups Marins and reported that “the Indians kill
annually more than thirty, showing that the animal breeds freely in the fresh water” (Low 1898, p. 13). On July 22, 1818, George Atkinson reached the neighbourhood of Petit Lac des Loups Marins and recorded in his journal: “At these ripples is a fishing place where the Indians set nets for seals in the winter; they are quite a different species to those on the sea coast; their skin being covered with short silky hair; yesterday and this day we saw several in the lakes and rivers” (Atkinson 1818). This ease of sighting, and estimate of hunting effort, suggests the population may have been larger than exists today.

Smith and Horonowitsch (1987) quoted an unpublished manuscript from the Arctic Biological Station, which: “Indicates that local knowledge in Ungava Bay pointed to a widespread occurrence of harbour seals in inland lakes which were collectively called Kasigiaxiovik (place of the harbour seal) by the Inuit. The advent of rifle hunting and the high desirability of harbour seal pelts for decorative use probably resulted in a rapid reduction in numbers of harbour seals in both the rivers and lakes close to Inuit hunting grounds” (Smith and Horonowitsch 1987, p. 8). This view that the present-day distribution of harbour seals in lakes in the Hudson Bay-Ungava Bay watershed has been limited by hunting was shared by Mansfield (1967).

The apparent reproductive seasonality of *P. v. mellonae* (Smith et al. 1994) and the population’s geographic isolation means that any rescue effect from neighbouring oceanic harbour seal populations is improbable. Recolonization is further compounded by the distance from the coast and the current small size of the oceanic populations in both Hudson Bay and Ungava Bay.

**LIMITING FACTORS AND THREATS**

*Phoca vitulina concolor*

Harbour seals were the target of bounty programs in eastern Canada as recently as the 1970s, This drastically reduced the size of the population and eliminated them from some areas of their range (Boulva and McLaren 1979). Some direct hunting of harbour seals still goes on (Sjare *et al.* 2005; Yetman 2005) although the species is officially protected from hunting in Atlantic Canada. Stewart *et al.* (1986) note a low-level hunting effort for harbour seals in communities throughout the Arctic.

Harbour seals are also shot by fishermen because of interactions with fish and aquaculture operations (Jacobs and Terhune 2000; Conway 2005). Though difficult to quantify, this mortality may be significant in some areas (Conway 2005). In St. Pierre and Miquelon a small number of seals are shot by hunters and tourists each year (Lawson 2006). Harbour seals are also known to be killed incidentally in fishing gear in Newfoundland, Labrador, Gulf of St. Lawrence and Bay of Fundy groundfish gillnets, Atlantic Canada and Greenland salmon gillnets (which are still pursued for subsistence), Atlantic Canada cod traps, and Bay of Fundy herring weirs (Read 1994; Réseau d’observation de mammifères marins 2004). In addition, harbour seals are killed in
PEI fixed gear fisheries and at least one mobile fishery for bluefin tuna (*Thunnus thynnus*) (Cairns *et al.* 2000). The scale of this incidental mortality is unknown (Baird 2001).

Harbour seals occur in coastal areas and frequently come into contact with humans. Robillard *et al.* (2005) summarized a variety of studies that have pointed to motorized boats, kayaks and canoes, barking dogs and people walking on beaches as important sources of disturbance of seals at haul-out sites. Experimental evidence indicates that harbour seals are easily disturbed by small boats (Henry and Hammill 2001). Seismic activity from proposed oil and gas exploration (e.g. southeastern Gulf of St. Lawrence) could cause physical damage to hearing and result in distribution changes due to noise or changes in food distribution (Hammill *et al.* 2001).

Contaminants in eastern Canadian harbour seals such as heavy metals, trace elements, persistent organic pollutants (POPs) and polybrominated diphenyl ethers (PBDEs) (Lebeuf *et al.* 2003; Sjare *et al.* 2005) are potentially toxic for marine wildlife (Ross *et al.* 1997; O'Hara and O'Shea 2001). Sjare *et al.* (2005) reported that the levels in harbour seals were generally low. However, there is uncertainty about the levels of exposure that are potentially harmful to marine mammal populations. Disease may be a limiting factor for harbour seals, particularly morbillivirus (Duignan *et al.* 1995) and influenza A (Nielsen *et al.* 2001), though other diseases such as giardiasis may be relevant (Measures and Olson 1999).

Competition with gray seals has been mentioned as a potentially major contributing factor in the exclusion of harbour seals from some areas of habitat (Robillard *et al.* 2005; Bowen *et al.* 2003), though it is unclear whether this competition results in their moving to other areas that are equally suitable. The grouping of harbour seals on haul-out sites likely has an anti-predator function (Terhune and Brillant 1996), and given the significance of killer whale (*Orcinus orca*) predation on harbour seals in the Pacific (Deecke *et al.* 2002) this may be a factor in the Atlantic as well. Shark predation has been a major contributor to the decline of harbour seal numbers on Sable Island in recent years (Lucas and Stobo 2000).

In the Arctic, seals are killed opportunistically in many communities (Stewart *et al.* 1986; Bernhardt 2005). Given the distribution of harbour seals in small groups, the impact of this low-level hunting could be significant. In the Churchill area, hunting is conducted by a few residents who kill less than 5 animals a year (Bernhardt 2005). Historically, Manitoba Conservation personnel killed harbour seals to be used for bait in their polar bear control program. Up to 10 animals were killed annually, but this has not occurred since 1999, when a voluntary hunting moratorium was implemented. Harbour seals are killed during the open water hunt at Arviat (Bernhardt 2005). Shipping traffic into Churchill is a potential disturbance to harbour seals, but the current rate of traffic is low and is not thought to have any effect on harbour seals in the Churchill estuary.
Hydroelectric development along the Churchill and Nelson rivers has included the diversion of flow from the Churchill River into the Nelson during the mid-1970s. It is not known what effect this may have had on harbour seals, but anecdotal accounts indicate that harbour seals may be less numerous in the Churchill River since the diversion. More recently, a rock-fill weir was constructed across the Churchill River at a location just upstream of tidal influence. This project resulted in the displacement of harbour seal haul-out sites downstream by approximately 1 km. Numerous hydroelectric generating stations have been developed along the Nelson River but the effect these stations may have on harbour seals is unknown (Bernhardt 2005).

**Phoca vitulina mellonae**

At present, the only known cause of human-induced mortality is occasional hunting of this small seal population by Aboriginal people (Clouston 1820; Low 1898; Flaherty 1918; Doutt 1942; Doutt 1954; Consortium Gilles Shooner & Associés et al. 1991; Petagumskum 2005).

None of the habitat of this population is protected. It is entirely on Crown land that could be adversely affected – through changes to lake and river levels – by Hydro-Québec's construction of the proposed Grande Baleine hydroelectric project (Rosenthal and Beyea 1989; Rougerie 1990; Woodley et al. 1992; Smith 1999), which, though indefinitely postponed by the Québec government, has not been cancelled altogether. The Rupert Diversion, a new Hydro-Québec project further south of Grande Baleine, has already begun and overlaps with areas where some freshwater seals have been sighted.

Current fossil fuel energy prices, and concerns regarding air pollution, have prompted a renewed interest in aggressive new hydroelectric development right across Canada (Canadian Hydropower Association 2005). The 2004 Hydro-Québec Annual Report, entitled “Growing Strong”, indicates that “The past year confirmed the resumption of major hydroelectric development projects” (Hydro-Québec 2004, p. 4). One of the results of the Grande Baleine environmental assessment process has been that Hydro-Québec is now required to evaluate the likely impacts of the project on the population, prior to construction (Review Bodies 1994). Some of these potential impacts include the disappearance of ice-free areas and under-ice shoreline shelters, upon which the seals may rely in the winter, in watercourses with altered flows arising from hydroelectric development. The Grande Baleine project may also affect the distribution and abundance of the seals’ prey, and contaminate the animals with methyl mercury released from the flooded, decomposing vegetation (Woodley et al. 1992). The negative effects of this habitat destruction could lead to a decline in the seal population and a reduction in its genetic diversity (Alfonso and McAllister 1994).
SPECIAL SIGNIFICANCE OF THE SPECIES

Harbour seals in some areas (e.g. PEI, Bay of Fundy, Halifax) are important, and reliable, parts of commercial whale/seal watching, and as such make a contribution to the local economies (Hammill et al. 2001).

*Phoca vitulina mellonae* is the only subspecies of harbour seals that is restricted to fresh water. It is endemic to Canada (northern Québec) and is the object of reverence by the Aboriginal peoples of northern Québec (Posluns 1993; Archéotec 1990; Richardson 1991; Smith 1999, Petagumskum 2005) – and its biology is unusual in a number of respects (Smith et al. 1994, 1996; Smith 1999). In addition, the population has acquired a public profile (e.g. Dubreuil 1987; Picard 1990; Duncan 1996; Saint-Laurent 2001) including being one of the featured species at risk of Québec’s *Projet Rescousse* (www.rescousse.qc.ca).

EXISTING PROTECTION OR OTHER STATUS DESIGNATIONS

*P. v. mellonae* was listed as Special Concern by COSEWIC in April, 1996 (Smith 1997), and *P. v. concolor* was listed as Indeterminate in April 1999 (Baird 2001). This former COSEWIC Indeterminate status is now called Data Deficient. NatureServe ranks *P. v. mellonae* as rank-N “imperiled” in Canada and rank-S “critically imperiled” in Québec (N2S1), and *P. v. concolor* as “not ranked” (NatureServe 2006).

The management of marine mammals in Canada is regulated by the Marine Mammal Regulations under the *Fisheries Act*. The Department of Fisheries and Oceans has set no allowable hunting season for harbour seals on the Atlantic Coast, and would have to issue a permit to allow legal killing of these animals (Anonymous 2003). Some haul-out sites are protected from development as part of either provincial or federal protected areas.

In the Arctic, the hunting of harbour seals is not managed at this time by the Nunavut Wildlife Management Board (Calder 2005). Hunting of harbour seals is not permitted north of 55th parallel in Québec, but Québec does not have jurisdiction over James Bay, Hudson Bay and Ungava Bay. These waters fall under the jurisdiction of Nunavut, which has not placed any restrictions on hunting.

Freshwater seals north of the 55th parallel are reserved for the exclusive use of the Crees, the Inuit and the Naskapis under the James Bay and Northern Québec Agreement.
Based on a 1996 assessment, *Phoca vitulina mellonae* is currently listed by the World Conservation Union (IUCN) as being "data deficient" (Seal Specialist Group 1996). The government of Québec has listed the population as "susceptible to designation as threatened or vulnerable" (Québec 2003) and has, in the past, considered giving legal protection to a portion of *P. v. mellonae*’s habitat (Dubreuil 1983; Québec 1992).
**TECHNICAL SUMMARY (1)**

**Phoca vitulina concolor**  
Harbour seal Atlantic and eastern Arctic  
subspecies  
Range of Occurrence in Canada: Nunavut, Manitoba, Ontario, Quebec, New Brunswick, Prince Edward Island, Nova-Scotia, Newfoundland and Labrador, Arctic Ocean, Atlantic Ocean

### Extent and Area Information

<table>
<thead>
<tr>
<th>Item</th>
<th>Information</th>
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</thead>
<tbody>
<tr>
<td>Extent of occurrence (EO) (km²)</td>
<td>~ 270,000 km²</td>
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<tr>
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<td>Are there extreme fluctuations in EO?</td>
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<tr>
<td>Area of occupancy (AO) (km²)</td>
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<tr>
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<tr>
<td>Are there extreme fluctuations in AO?</td>
<td>No</td>
</tr>
<tr>
<td>Number of known or inferred current locations</td>
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</tr>
<tr>
<td>Specify trend in #</td>
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</tr>
<tr>
<td>Are there extreme fluctuations in number of locations?</td>
<td>No</td>
</tr>
<tr>
<td>Specify trend in area, extent or quality of habitat</td>
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</tr>
</tbody>
</table>

### Population Information

<table>
<thead>
<tr>
<th>Item</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation time (average age of parents in the population)</td>
<td>9 y</td>
</tr>
<tr>
<td>Number of mature individuals</td>
<td>Unknown but total population size is likely greater than 10,000.</td>
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<tr>
<td>Total population trend:</td>
<td>Unknown</td>
</tr>
<tr>
<td>% decline over the last/next 10 years or 3 generations.</td>
<td>Unknown</td>
</tr>
<tr>
<td>Are there extreme fluctuations in number of mature individuals?</td>
<td>No</td>
</tr>
<tr>
<td>Is the total population severely fragmented?</td>
<td>No</td>
</tr>
<tr>
<td>Specify trend in number of populations</td>
<td>Not available</td>
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<tr>
<td>Are there extreme fluctuations in number of populations?</td>
<td>No</td>
</tr>
<tr>
<td>List populations with number of mature individuals in each:</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

### Threats (actual or imminent threats to populations or habitats)

- Hunting and incidental killing, human disturbance

### Rescue Effect (immigration from an outside source)

<table>
<thead>
<tr>
<th>Item</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status of outside population(s)?</td>
<td>Some growing, some declining</td>
</tr>
<tr>
<td>Is immigration known or possible?</td>
<td>Yes</td>
</tr>
<tr>
<td>Would immigrants be adapted to survive in Canada?</td>
<td>Yes</td>
</tr>
<tr>
<td>Is there sufficient habitat for immigrants in Canada?</td>
<td>Yes</td>
</tr>
<tr>
<td>Is rescue from outside populations likely?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Quantitative Analysis

Not available

### Current Status

- COSEWIC: Indeterminate (data deficient) (April 1999)
- NatureServe: Not Ranked
### Status and Reasons for Designation

<table>
<thead>
<tr>
<th>Status: Not at Risk</th>
<th>Alpha-numeric code: Not applicable</th>
</tr>
</thead>
</table>

**Reasons for Designation:**
The total population has not been estimated, and analyses have not yet been undertaken to determine whether there is significant subpopulation structure. Overall the subspecies is common and believed to be adaptable to change. It is often found in marine areas used by people and is susceptible to shooting. No serious immediate threat have been identified over any substantial part of its range.

### Applicability of Criteria

| **Criterion A:** (Declining total population). Population size is unknown, and there is no evidence of a significant decline in numbers. |
| **Criterion B:** (Declining total population). Population size is unknown, and there is no evidence of a significant decline in numbers. |
| **Criterion C:** (Small total population size and decline). There is no information about population trends. Number of mature individuals is unknown, but total population likely exceeds 10,000. |
| **Criterion D:** (Very small population or restricted distribution). The distribution is not restricted and the mature population exceeds 1,000 animals. |
| **Criterion E:** (Quantitative analysis). None has been undertaken. |
Phoca vitulina mellonae
Harbour seal Lacs des Loups Marins subspecies  Phoque commun de la sous-espèce des Lacs des Loups Marins

Range of Occurrence in Canada: Quebec

**Extent and Area Information**

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Extent of occurrence (EO)</strong> (km²)</td>
<td>Approximately 900 km²</td>
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<tr>
<td><strong>Specify trend in EO</strong></td>
<td>Unknown</td>
</tr>
<tr>
<td><strong>Are there extreme fluctuations in EO?</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>Area of occupancy (AO) (km²)</strong></td>
<td>Approximately 670 km²</td>
</tr>
<tr>
<td><strong>Specify trend in AO</strong></td>
<td>Unknown</td>
</tr>
<tr>
<td><strong>Are there extreme fluctuations in AO?</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>Number of known or inferred current locations</strong></td>
<td>3 lakes (Lacs des Loups Marins, Lac Bourdel, and possibly Petit Lac des Loups Marins)</td>
</tr>
<tr>
<td><strong>Specify trend in #</strong></td>
<td>Unknown</td>
</tr>
<tr>
<td><strong>Are there extreme fluctuations in number of locations?</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>Specify trend in area, extent or quality of habitat</strong></td>
<td>Unknown</td>
</tr>
</tbody>
</table>

**Population Information**

<table>
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<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Generation time (average age of parents in the population)</strong></td>
<td>Unknown</td>
</tr>
<tr>
<td><strong>Number of mature individuals</strong></td>
<td>Small (most recent 1991 estimate was 100 and included all ages)</td>
</tr>
<tr>
<td><strong>Total population trend:</strong></td>
<td>Unknown but likely declining</td>
</tr>
<tr>
<td><strong>% decline over the last/next 10 years or 3 generations.</strong></td>
<td>Unknown, though major decline occurred historically</td>
</tr>
<tr>
<td><strong>Are there extreme fluctuations in number of mature individuals?</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>Is the total population severely fragmented?</strong></td>
<td>Unknown but possibly</td>
</tr>
<tr>
<td><strong>Specify trend in number of populations</strong></td>
<td>Unknown</td>
</tr>
<tr>
<td><strong>Are there extreme fluctuations in number of populations?</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>List populations with number of mature individuals in each:</strong></td>
<td>Unknown</td>
</tr>
</tbody>
</table>

**Threats (actual or imminent threats to populations or habitats)**

- Hunting, hydro-electric development

**Rescue Effect (immigration from an outside source)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Status of outside population(s)?</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Is immigration known or possible?</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>Would immigrants be adapted to survive in Canada?</strong></td>
<td>Unknown</td>
</tr>
<tr>
<td><strong>Is there sufficient habitat for immigrants in Canada?</strong></td>
<td>Unknown</td>
</tr>
<tr>
<td><strong>Is rescue from outside populations likely?</strong></td>
<td>No</td>
</tr>
</tbody>
</table>

**Quantitative Analysis**

| Details | Not available |

**Current Status**

- COSEWIC: Special Concern (April 1996)
- IUCN: Data Deficient (based on older data)
- Province of Québec: Susceptible to designation as threatened or vulnerable
- NatureServe: Imperiled (Canada); Critically Imperiled (Québec)
### Status and Reasons for Designation

**Status:** Endangered  
**Alpha-numeric code:** Endangered [C2 a(i,ii); D1].

**Reasons for Designation:**
This land-locked subspecies is endemic to Québec and may number as few as 100 individuals. It inhabits a small series of lakes in northern Québec and is the only sub-species to live entirely in fresh water. The population has declined due to hunting and may still be declining. Proposed hydro-electric development would cause pervasive changes to the habitat.

### Applicability of Criteria

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Criterion A:</strong></td>
<td>(Declining total population). Population trend is unknown, but suspected to be declining.</td>
</tr>
<tr>
<td><strong>Criterion B:</strong></td>
<td>(Small distribution, and decline or fluctuation). The area of occupancy (~670 km$^2$) is &lt;2,000 km$^2$ and the extent of occurrence is &lt;5,000 km$^2$ (~900 km$^2$) and numbers are suspected to have declined. They live in an interconnected system of small lakes and rivers within a small geographic area (~900 km$^2$). Number of locations is difficult to determine, but is fewer than 10. A continuing decline is inferred in quality of habitat and number of mature individuals. It meets criterion B1ab (iii,v) for Threatened.</td>
</tr>
<tr>
<td><strong>Criterion C:</strong></td>
<td>(Small total population size and decline). A population decline is inferred and the number of mature individuals is &lt;250. Meets Endangered criteria C2a(i,ii).</td>
</tr>
<tr>
<td><strong>Criterion D:</strong></td>
<td>(Very small population or restricted distribution). There are &lt;250 mature individuals. Meets Endangered criteria D1.</td>
</tr>
<tr>
<td><strong>Criterion E:</strong></td>
<td>(Quantitative analysis). None has been undertaken.</td>
</tr>
</tbody>
</table>
ACKNOWLEDGEMENTS

Thank you to Andrew Trites, Randy Reeves and the other members of the Marine Mammals Specialist Subcommittee for their thoughtful comments. Lara Cooper and Sheryl Fink were of considerable assistance in tracking down sources. Cecilia Lougheed and Ruben Boles kept the production of this report on track. A special thanks to Dave Lavigne for his critical eye and long-standing interest in Lacs des Loups Marins and its unique seal population.

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AUTHORITIES CONSULTED

Baillargeon, Danielle. September 2005. Coordinator, Aboriginal Fisheries Division. Fisheries and Oceans Canada, 104 Dalhousie St., Québec, Quebec, G1K 7Y7.
Curley, Rosemary. February 2005. Program Manager, Protected Areas and Biodiversity Conservation, PEI Dept. of Environment and Energy, 11 Kent St., Charlottetown, PEI, C1A 7N8.
Lynch, Wayne. September 2005. Director, Fisheries and Sealing, Government of Nunavut, Iqaluit, NU, X0A 0H0.
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Review Bodies responsible for the environmental assessment of the proposed Great Whale hydroelectric project. 1994. Joint report on the conformity and quality of the environmental impact statement for the proposed Great Whale River hydroelectric project. 120 pp.


Yetman, L. pers. comm. 2005. Program Officer, Fisheries and Oceans Canada, 80 White Hills Rd. E., St. John’s, NL, A1C 5X1.

**BIOGRAPHICAL SUMMARY OF REPORT WRITER**

Dr. Rick Smith obtained his Ph.D. from the University of Guelph in 1999 for his study of the Lacs des Loups Marins harbour seal, which he completed in cooperation with the nearby Cree community of Whapmagoostui. Dr. Smith is the author of a number of articles on harbour seals and other marine mammals, including the 1996 COSEWIC status report on the Lacs des Loups Marins harbour seal. He has worked on species at risk both in his current role as Executive Director of the Toronto-based charity Environmental Defence and in his previous role as Executive Director of the Canadian branch of the International Fund for Animal Welfare.