Migratory Bird Division
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Québec's Waterbird Conservation Plan

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Waterbird Conservation for the Americas

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Executive summary

The province of Québec is an immense territory of 1 667 926 km^2 which appears as a vast peninsula bordered by salt water from the Gulf of St. Lawrence to the east, Hudson Strait and Ungava Bay to the north, and James Bay and Hudson Bay to the west. Also, the southern part of Québec is crossed by the St. Lawrence River and its estuary, one of the largest in the world. A total of 50 waterbird species (seabirds, waterbirds and colonial birds associated with interior wetlands) occupy different habitats during reproduction, migration, and wintering periods.

This vast territory, very diversified in terms of aquatic species and their habitats, is also characterized by six Bird Conservation Regions (BCRs), units defined by the North American Bird Conservation Initiative (NABCI) in order to facilitate the implementation of the conservation plans. This conservation plan for the Québec's waterbirds is foremost a regional plan which completes other conservation plans such as the North American Waterfowl Management Plan (NAWMP), Partners in Flight (PIF), the Important Bird Areas (IBA), the Canadian Shorebird Conservation Plan, Wings Over Water (WOW) and the North American Waterbird Conservation Plan (NAWCP).

Atlantic Puffin,
Jean-François Rail

The **general objectives** of the Québec's Waterbird Conservation Plan are:

- maintain and increase if necessary the distribution, diversity and abundance of Québec's waterbirds;
- maintain and improve the habitats to preserve their reproductive capacity and ensure year round protection;
- ensure coordinated conservation efforts between all partners to maximize Québec's waterbirds conservation efforts.

The **specific objectives** of the Québec's Waterbird Conservation Plan are:

- determine Québec's breeding waterbird population size and population trends;
- identify and characterize the important habitats and sites in the life cycle of Québec's waterbirds;
- identify the threats that could most susceptibly prevent Québec's waterbird populations from sustaining and restoring;
- identify the monitoring programs and studies which should be carried out on Québec's waterbirds in order to reach the general and specific objectives cited earlier.

The monitoring and research programs cover each waterbird species which breed in Québec and addressed to six Bird Conservation Regions in Québec. The needs for monitoring and research in general are:

- estimate as precisely as possible, the population numbers for each species of waterbird within each BCR;
- determine the waterbird population trends from the already existing monitoring programs within each BCR;
- initiate new monitoring for species for which we have little knowledge and improve the monitoring programs which already exist;
- improve and develop survey methods for species which are difficult to survey;
- share and integrate information relative to waterbird surveys to implement protection and management programs in collaboration with

other partners;
- maintain long term research on species for which the Québec region has a high level of responsibility and on species at risk;
- develop and start research on indicator species of the marine ecosystem of the Gulf of St. Lawrence Estuary and promote the ecosystemic approach.

Several governmental and non governmental agencies and universities can collaborate in different steps of this Plan according to their respective expertise. Their participation will allow multiple protection and management strategies concerning waterbird conservation to be addressed in Québec. Education and outreach programs, endangered species recovery plans, habitat management plans and university research can all contribute to waterbird conservation.

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1. Introduction

1.1 Goals and objectives

Common Tern,
François Shaffer

Québec's Waterbird Conservation Plan targets the promotion and implementation of the general goals and objectives expressed in «Wings Over Water: Canada's Waterbird Conservation Plan» (WOW) (Milko *et al.* 2003). The Québec initiative also aims to sustain the diversity and actual waterbird populations and increase their populations through conservation, protection and research. These objectives will be achieved in the following way:

- guarantee and maintain a monitoring program to detect waterbird population trends in Québec during breeding, migration and wintering periods;
- increase the acquisition and protection of essential habitats to support healthy waterbird populations in Québec;
- ensure a research program which will complete our knowledge on waterbird population dynamics, ecology, and habitats;
- make sure that conservation priorities are addressed to the most fragile species from a biological point of view, and for which the region has a high level of responsibility on a national and continental scale;
- ensure that information on waterbirds is widely available to scientists, higher level decision makers, the general public and to all those who are implicated in habitat management in Québec.

The present document is part of the process proposed by the North American Bird Conservation Initiative (NABCI) which is the outcome of an agreement between Canada, the United-States and Mexico whose primary objective is to sustain the diversity and abundance of birds in North America. By collecting basic information on the distribution and abundance of waterbirds during breeding, migration and wintering periods, we will be able to determine Québec's responsibilities towards each of these species in a national and international context. This process will enable us to target monitoring programs and research projects needed to ensure the stability and increase of waterbird populations in Québec.

1.2 The waterbird species and the Bird Conservation Regions (BCRs) of Québec in a national and continental perspective

1.2.1 Québec's waterbird species

Some precisions need to be made concerning the designations and the list of waterbirds in this plan. For example, certain species, as opposed to others, are not "colonial species" by definition. Certain species are found solely in marine habitats while others use freshwater habitats during breeding season. In this plan's context, the expression "waterbird" includes seabirds such as sulids, alcids, and several larids, waders such as the ardeids and the gruids and wetland birds such as podicipedidae (grebes), rallidae (rails) and the gavids (loons). According to the point of view or referential adopted, certain species may be qualified as ubiquist since they are found in marine as well as in freshwater habitats when their distribution is examined during breeding season, migration or wintering stages. Certain species of gulls, terns, and the Double-crested Cormorant can well be qualified as ubiquist.

A total of 50 species of waterbirds regularly use Québec's territory to reproduce, migrate or winter (Table 1). Of these, 43 species annually breed and visit the territory during migration. The Greater Shearwater, the Sooty Shearwater and Wilson's Storm-Petrel come from the southern hemisphere and visit the Gulf of St. Lawrence as summer residents. One species of procellarid, the Northern Fulmar, was observed nesting at Corossal Island in 1997, but has not been seen since. Another species of procellarid, the Manx Shearwater, visits fairly regularly the waters of the Gulf of St. Lawrence and could eventually establish itself. Finally, a species of alcid, the Dovekie, migrates and winters in the estuary and the gulf irregularly in small numbers.

In a national and international context, the majority of certain species are found in Québec during breeding season. The populations of the Northern Gannet in the Gulf of St. Lawrence and the Razorbill, who occupy both the estuary and the gulf, represent respectively 70 % and 55 % of the total North American population (Chapdelaine 1995a; Chapdelaine *et al*. 2001). Historically, the Common Murre was probably much more abundant in Québec and must have represented an important part of the American continent's population. Johnson (1940) estimated that « Halifax nest poachers » completely exploited the North Shore region and harvested up to 750 000 eggs a year. Today, this region's Common Murre population is estimated at only 38 000 pairs (Rail and Chapdelaine 2002).

Table 1: List of the 50 species which are regular summer residents, breeders, migrants or winter residents in Québec, according to David 1996 (the status of the Manx Shearwater has been changed to be included in this list)

English name	Latin name	Status in Québec
Pied-billed Grebe	*Podilymbus podiceps*	bm
Horned Grebe	*Podiceps auritus*	bm
Red-necked Grebe	*Podiceps grisegena*	bm
Red-throated Loon	*Gavia stellata*	bm
Pacific Loon	*Gavia pacifica*	bm
Common Loon	*Gavia immer*	bm
Northern Fulmar	*Fulmarus glacialis*	sm
Greater Shearwater	*Puffinus gravis*	sm
Sooty Shearwater	*Puffinus griseus*	sm
Manx Shearwater	*Puffinus puffinus*	sm
Wilson's Storm-Petrel	*Oceanites oceanicus*	sm
Leach's Storm-Petrel	*Oceanodroma leucorhoa*	nm
Double-creasted	*Phalacrocorax auritus*	bmw
Great Cormorant	*Phalacrocorax carbo*	bmw
Northern Gannet	*Morus bassanus*	bm
American Bittern	*Botaurus lentiginosus*	bm
Least Bittern	*Ixobrychus exilis*	bm
Great Blue Heron	*Ardea herodias*	bm
Great Egret	*Ardea alba*	bm
Green-backed Heron	*Butorides virescens*	bm
Black-crowned Night-	*Nycticorax nycticorax*	bm
Yellow Rail	*Coturnicops noveboracensis*	bm
Virginia Rail	*Rallus limicola*	bm
Sora	*Porzana carolina*	bm
Common Moorhen	*Gallinula chloropus*	bm
American Coot	*Fulica americana*	bm
Sandhill Crane	*Grus canadensis*	bm
Pomarine Jaeger	*Stercorarius pomarinus*	bm
Parasitic Jaeger	*Stercorarius parasiticus*	bm
Long-tailed Jaeger	*Stercorarius longicaudus*	bm
Little Gull	*Larus minutus*	b(?)m
Black-headed Gull	*Larus ridibundus*	bm
Bonaparte's Gull	*Larus philadelphia*	bm
Ring-billed Gull	*Larus delawarensis*	bm
Herring Gull	*Larus argentatus*	bmw
Iceland Gull	*Larus glaucoides*	bmw
Glaucous Gull	*Larus hyperboreus*	bmw
Great Black-backed Gull	*Larus marinus*	bmw
Black-legged Kittiwake	*Rissa tridactyla*	bm
Caspian Tern	*Sterna caspia*	bm
Roseate Tern	*Sterna dougallii*	bm
Common Tern	*Sterna hirundo*	bm
Arctic Tern	*Sterna paradisaea*	bm
Black Tern	*Chlidonias niger*	bm
Dovekie	*Alle alle*	m
Common Murre	*Uria aalge*	bm
Thick-billed Murre	*Uria lomvia*	bm
Razorbill	*Alca torda*	bm
Black Guillemot	*Cepphus grylle*	bmw
Atlantic Puffin	*Fratercula arctica*	bm
s=summer resident b=breeder m=migrant w=winter resident		

We must not neglect to mention the immensity of Québec's territory which encompasses almost a quarter of the North American distribution range of certain species. This is the case for the Common Loon and the Arctic Tern. This vast territory is also surrounded by three large marine ecosystems which are the Estuary and the Gulf of St. Lawrence, Hudson Bay and Ungava Bay which offer kilometres of coastline separated by cliffs and interspersed with islands and islets where the Black Guillemot is omnipresent. On a continental scale, this particular habitat represents more than a third of this species' North American distribution range.

Other species deserve special attention since they are listed as special concern, threatened, endangered, or extinct on a provincial, federal or North American scale (COSEPAC 2001; Beaulieu 1992). This is the case of the Horned Grebe, the Least Bittern, the Yellow Rail, the Caspian Tern, and the Roseate Tern who all nest in Québec. The Canadian Wildlife Service (CWS), Québec region, has already prepared action plans for some of these species (Robert *et al*. 1995; Shaffer *et al*. 1994). These plans are part of a specific strategy of the Endangered Species Program and are discussed with provincial, Canadian and American partners.

Certain species such as the Red-throated Loon, the Pomarine Jaeger and the Parasitic Jaeger use the Estuary and the Gulf of St. Lawrence during migration to then move on to their breeding grounds farther north. The river portion of the St. Lawrence and the Richelieu River Valley are also natural corridors for several species of discrete nature such as the Yellow Rail, the Virginia Rail and the Sora.

Québec's territory therefore offers a number of good habitats for waterbird survival for breeding, migration or wintering. This is why we have a shared responsibility on a North American continental scale to protect waterbird species and their habitats.

1.2.2 Characterization of the Québec's waterbird conservation regions

Even if descriptions exist for all North American Bird Conservation Regions (Anonymous 2000a), we find it necessary to describe them differently in order to better reflect the different types of waterbird habitats encountered in Québec's BCRs (Figure 1). In fact, certain designations poorly reflect the presence of seabirds such as BCR 14 whose title is «Atlantic maritime forest» which makes it difficult to believe there are seabirds in this BCR.

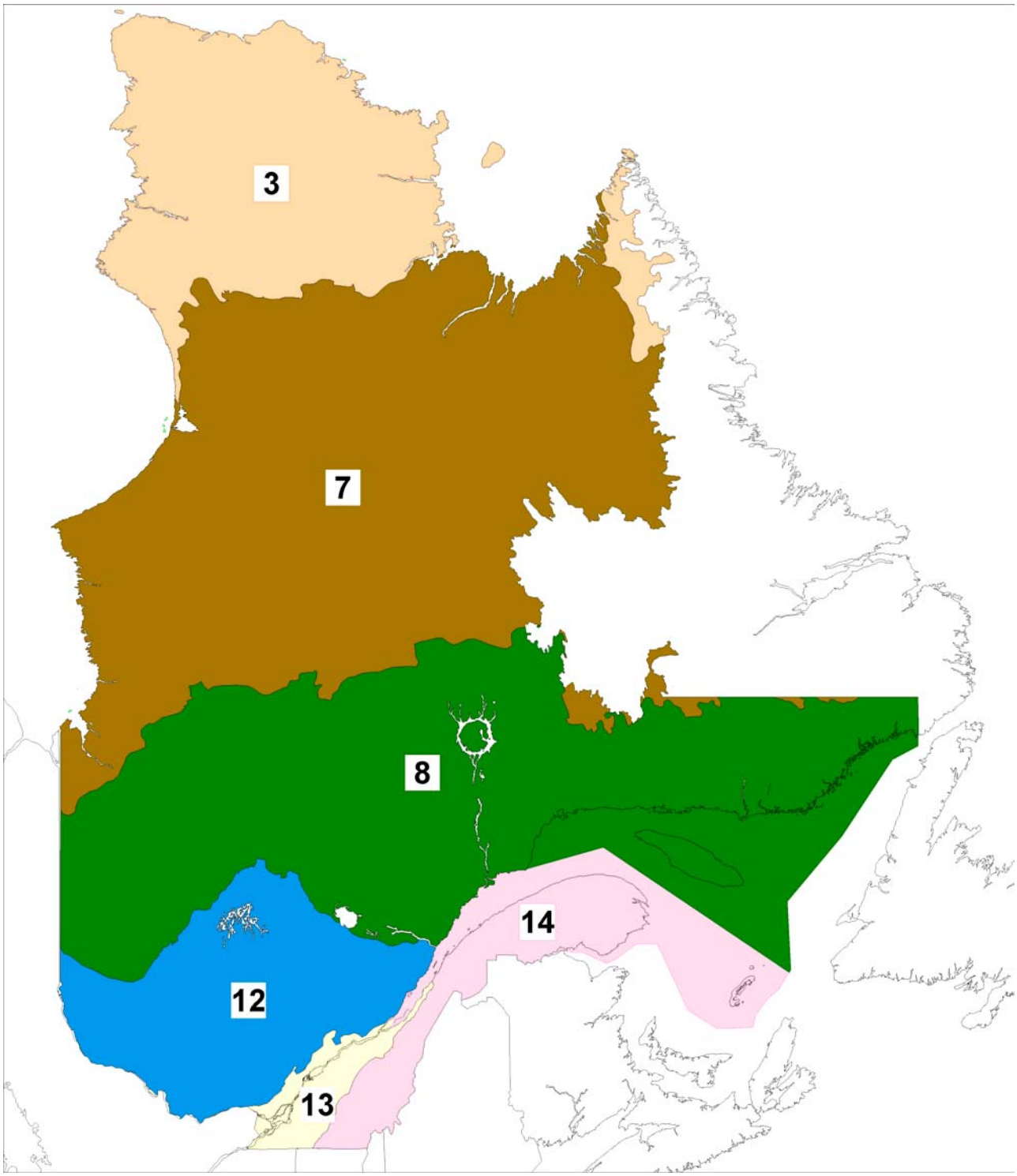


Figure 1: Map of the Bird Conservation Regions in Québec

- **Atlantic Northern Forest (BCR 14)**

Bonaventure Island,
Jean-François Rail

In the Gulf of St. Lawrence and Estuary, this BCR's large stretches of salt water, islands with steep cliffs and ledges attract several seabirds to nest. Close to 70 % of North America's Northern Gannet population is found within this region. Other species such as the Black-legged Kittiwake, the Common Murre, the Razorbill and the Black Guillemot, are typical of these inland areas of the gulf and the estuary.

Wetlands can be divided into three groups: those influenced by tides, riparian wetlands bordered by a stretch of freshwater, and finally lakes, bogs and inland marshes. These wetlands are used during the breeding season by the Common Loon, the Pied-billed Grebe, the American Bittern and a few species of rails. The Great Blue Heron also visits these habitats even though this BCR almost represents its distribution limit in Eastern Québec. This BCR includes all the islands in the estuary starting from the eastern point of Île aux Grues to the Sept-Îles Archipelago which is part of BCR 8. The Magdalen Islands are part of BCR 14.

- **Lower Great Lakes and St. Lawrence Plain (BCR 13)**

The portion of the Québec territory included in BCR 13 is mainly characterized by freshwater wetlands including flooded forests and shrubland of the St. Lawrence lowlands and the Outaouais and Richelieu Valley basins. Over 63 000 hectares of freshwater wetlands are found in the freshwater reaches of the St. Lawrence (Lehoux *et al.* 1995). Inland bogs and marshes usually of small surface areas are dispersed in this region, but represent a small proportion of freshwater areas. Some of the most representative species of these wetlands are the Pied-billed Grebe, the Green-backed Heron, the American Bittern, the Sora and the Virginia Rail. All the islands of the freshwater reaches of the St. Lawrence to Île aux Grues are part of BCR 13.

- **Boreal Hardwood Transition (BCR 12)**

At first glance, this BCR seems most attractive to landbirds due to the absence of large bodies of water such as the St. Lawrence River or the Richelieu River basin in BCR 13. However, many rivers and lakes whose banks have floating or submerged vegetation are of great interest to the Common Loon, the American Bittern, the Great Blue Heron, the Pied-billed Grebe and certain rails. On the other hand, many rivers in this BCR have been, in the past, very interesting for hydro-electric energy production and several reservoirs may have modified the landscape either by widening certain bodies of water or decreasing floodplains in other parts of rivers.

Such modifications may certainly have modified the distribution and abundance of the aquatic species mentioned earlier.

- **Boreal Softwood Shield (BCR 8)**

This BCR extends from Newfoundland to the Saskatchewan / Alberta limit forming a U shape over Québec and Ontario. This region is particularly important for seabirds since it includes all coastal islands of the Lower North Shore as well as the high cliffs on the North East side of Anticosti Island. The most representative species belong to the alcids among which are the Common Murre, the Razorbill, the Black Guillemot and the Atlantic Puffin. For the larids, important colonies of Herring Gulls and Common and Arctic Terns are found especially in the Mingan Archipelago. Concerning species which are said to be "wetland waterbirds", their numbers appear less important since several of them are at their extreme distribution limit as it is the case for the rails and the grebes. However, the Great Blue Heron is very common while the Common Loon is very representative of the numerous lakes dispersed in this BCR.

Boreal Forest,
Daniel Bordage

- **Taiga Shield and Hudson Plains (BCR** 7)

This BCR extends from East to West and corresponds in part to the Canadian Shield. Much like BCR 8, the diversity of the waterbird species of these wetlands is limited. The Common Loon is certainly the most abundant species. We can also note the presence of the Red-throated Loon which nests on tiny ponds of coastal islands of James Bay and Hudson Bay as well as on inland ponds. We can find the Sandhill Crane on coastal marshes and bogs of James Bay. Certain seabird species such as the Arctic Tern and the Black Guillemot are representative of the marine ecosystem of this BCR.

- **Arctic Plains and Mountains (BCR 3)**

This BCR is characterized by arctic tundra and a rocky landscape. There are important colonies of Thick-billed Murres and Black Guillemots along the rocky coasts and on coastal islands with very steep cliffs. Akpatok Island, Digges Island and Cape Wolstenholme together shelter over one million pairs of Thick-billed Murres. On coastal islands, we can find the Red-throated Loon and the Glaucous Gull. The Pacific Loon also nests on coastal lakes, but in small numbers.

1.2.3 Habitats of Québec's waterbird conservation regions

The types of habitat for waterbirds for all BCRs must be divided into 2 distinct groups, (1) habitats for seabirds and (2) habitats for wetland birds, such as marshes.

Islands covered with forest or grassland, steep, rocky islands characterized by abrupt cliffs and if possible distant from shore with very jagged coasts are privileged nesting habitats for seabirds. We must not neglect to mention upwellings which represent a key habitat for seabird foraging both during the breeding season and during migration. These areas of accentuated water movement allow an increased availability of prey at the water's surface for several species of seabirds during the nesting period as well as during migration and wintering.

Salt water marshes,
Jean-Luc DesGranges

For species associated with wetlands, several categories of habitat can be identified. There are the habitats influenced by tides such as large marshes which are often confined to the mouths of rivers and where there is sediment accumulation. In the Gaspé region, the areas where we find these saltwater marshes are called barachois. Concerning riparian wetlands, these include areas along freshwater bodies (rivers, streams, lakes and ponds) which are affected by annual spring flooding and sometimes fall floods as well as summer low-water periods. The islands of freshwater lakes can also be used as nesting sites by colonial species such as the Great Blue Heron and the Black-crowned Night-Heron.

1.3 Waterbird Conservation in Québec

1.3.1 HISTORY

1.3.1.1 Seabirds and the naturalist period

We have to go back to the period of Jacques Cartier in 1534 to obtain the first descriptions of seabirds in Canada (Biggar 1924). In his writings, he noted the presence of the Great Auk, a species now extinct and which has become a symbol of the fragility of seabird colonies in the Gulf of St. Lawrence (Laporte 1974; Robert and Gosselin 1995). Then, the 19th century naturalists made us realize that the Gulf of St. Lawrence harboured immense seabird colonies (Lucas 1887; Frazar 1887; Couper 1868; Verrill 1862; Bryant 1861; Fortin 1859; Audubon 1835); many of which today are mere reflections of the abundance and diversity observed at that period. Toward the end of the 19th and the beginning of the 20th century, other naturalists continued to publish interesting articles on the distribution and abundance of seabirds and confirmed the catastrophic situation of their population status. They unanimously agreed that governmental authorities should act on conservation matters, like creating migratory bird sanctuaries (MBS) (Hewitt 1915; Clarke 1915; Wood 1913; Comeau 1909; Townsend and Allen 1907; De Puyjalon 1893). Regulations of the Migratory Bird Convention (1916) lead the Canadian federal government to intervene in migratory bird management by creating a series of sanctuaries in the Gulf of St. Lawrence. These sanctuaries aimed to ensure seabird protection.

1.3.1.2 Monitoring and research on seabirds by universities, governmental and non governmental organizations (NGO)

Thanks to seabird population monitoring of the North Shore sanctuaries (BCR 8) conducted by CWS from 1925 until now, we are able to trace the population dynamics for several species regularly observed in the Gulf of St. Lawrence (Rail and Chapdelaine 2002; Chapdelaine 1995a; Chapdelaine and Brousseau 1991, 1984; Chapdelaine 1980; Nettleship and Lock 1973; Moisan and Fyfe 1967; Moisan 1962; Lemieux 1956; Tener 1951; Hewitt 1950; Lewis 1942, 1937, 1931, 1925). Other surveys describing North Shore seabird communities have been made by CWS outside the Migratory Bird Sanctuaries (Brousseau and Chapdelaine 1987; Chapdelaine and Bourget 1981; Chapdelaine 1977a) and by Parks Canada in the Mingan Archipelago (Vaudry 1995; Grenier and Kavanagh 1993; Grenier 1989; Simard 1986), as well as at Forillon (Quenneville 1990; Briard and Quenneville 1988).

Surveys conducted by CWS also cover the estuary and the Gulf of St. Lawrence and particularly the Gaspé Peninsula and the Magdalen Islands. These studies enabled us to obtain information on seabird populations in general and on species particularly important in the Québec region (Chapdelaine *et al*. 2001; Reed 1973; Nettleship 1975; Chapdelaine 1976; DesGranges *et al*. 1984; Chapdelaine *et al.* 1987; Chapdelaine and Bédard 1995; Chapdelaine and Brousseau 1992; Brousseau and Chapdelaine 1987;

Chapdelaine and Brousseau 1989; Nettleship and Chapdelaine 1987). During the 70's, the Centre de recherches écologiques de Montréal carried out several seabird surveys on Magdalen Islands (Mousseau *et al*. 1976). A detailed review of all historical observations related to seabirds in the Magdalen Islands area, as well as an analysis of the *Études des populations d'oiseaux du Québec* (EPOQ) database are available in Fradette's work (1992). Punctual surveys conducted by the Société Duvetnor were also carried out in the St. Lawrence Estuary islands and provided us with information on seabird trends (Bédard and Nadeau 1995; Société Duvetnor Ltée 1999). The *Société de la faune et des parcs du Québec* (FAPAQ) also carries out Double-crested Cormorant colony status reports because this species is under their jurisdiction.

In northern regions, such as along the coasts of Hudson Bay and Ungava Bay, certain surveys have enabled us to describe seabird communities, but without precisions as to their population numbers (Chapdelaine and Tremblay 1979; Chapdelaine *et al*. 1986; Gaston 1982; Gaston *et al*. 1985). The Makivik Corporation has also contributed to seabird surveys especially in Hudson Bay where we have little knowledge on the status of several species (Nakashima and Murray 1988).

The results of past or recent seabird surveys, whether conducted by governmental or non-governmental agencies or other organizations, are usually collected in the Québec Seabird Database (BIOMQ). This data bank is maintained by CWS, Québec region.

Double-creasted Cormorant, Jean-François Rail

Research projects have been conducted on several species of seabirds. Let us mention the works of Dr. H.F. Lewis, CWS seabird research pioneer on Double-crested Cormorant feeding (Lewis 1929). Later on, studies on reproduction and feeding of the Double-crested Cormorant as well as on the Great Cormorant on Magdalen Islands were conducted by Dr. R. McNeil's team of the Université de Montréal (Pilon 1981; Pilon *et al*. 1983a; Pilon *et al*. 1983b). An original study on the influence of human activities on the reproduction of the Double-crested Cormorant, sponsored by Université Laval, was carried out in the St. Lawrence Estuary (Cleary 1977). CWS also conducted studies on the Double-crested Cormorant in relation to habitat types, juvenile growth and diet (DesGranges and Reed 1981; DesGranges *et al*. 1984; Rail and Chapdelaine 1998). The Double-crested Cormorant's influence on forested areas of the Mingan Archipelago National Park Reserve of Canada has also been the subject of a study by the Université du Québec à Chicoutimi for Parks Canada (Potvin 1996). Since the Double-crested Cormorant is a species which relies on the provincial legislature, studies have been conducted by the Société Duvetnor for the Ministère du Loisir, de la Chasse et de la Pêche (now FAPAQ) within the context of population control in the St. Lawrence Estuary (Bédard 1988; Bédard 1991; Bédard *et al*. 1995a; Bédard *et al*. 1995b).

Let us also highlight the work of Dr. J. Bédard, under the supervision of Dr. G. Moisan of Université Laval, concerning the breeding seabird community

on the Sainte-Marie Islands (Bédard 1963). He also published a monography on the natural history of the Razorbill (Bédard 1969), which remains a much consulted reference. Other studies pertaining to contamination, reproduction, feeding, demography and populations of the Razorbill were conducted during the 80's and 90's by CWS (Chapdelaine *et al*. 2001; Chapdelaine 1997; Chapdelaine and Brousseau 1996; Chapdelaine and Laporte 1982).

It was with Dr. D.A. Munro and A.G. Loughrey of CWS that a research contract was awarded to Université Laval (under the supervision of Dr. G. Moisan) in 1966 and 1967 to begin a study on the reproduction of the Northern Gannet on Bonaventure Island (Poulin 1968). Later on, research on this species was the object of scientific publications pertaining to reproduction, contamination and feeding habit (Nettleship 1975; Chapdelaine 1977b; Burton 1980; Chapdelaine *et al*. 1987; Rail *et al*. 1996).

In 1978, a master's thesis was initiated under the responsibility of J. Bédard of Université Laval, to study the ecology of the Black Guillemot in the Estuary and Gulf of St. Lawrence (Cairns 1981, 1980, 1978). D.K. Cairns continued his doctorate level studies on the Black Guillemot on the North East of Hudson Bay (Cairns 1987a ,1987b) directed by Dr. A.J. Gaston of CWS.

Common and Arctic Terns have been the object of studies on comparative ecology and the influence of contamination on reproduction (Razurel 1994; Chapdelaine *et al*. 1985; Chalifour 1982). Because of the impact of gulls on certain Common Tern colonies, CWS requested an applied research study on the Carleton Beach Ridge colony in the Baie des Chaleurs (Guillemette and Brousseau 2001; Guillemette 1994; Guillemette 1993).

The Ring-billed Gull, a species found in both marine and freshwater environments, has been the object of several research projects dealing with reproduction and feeding, but solely in the freshwater reaches of the St. Lawrence. These studies were carried out under the responsibility of Dr. R. McNeil of the Université de Montréal (Dulude 1989, 1988, 1986, 1984; Lagrenade et Mousseau 1981; Lagrenade 1980; Mousseau and Lagrenade 1980, 1979). CWS also conducted research on this species' diet (Brousseau *et al*. 1996).

Some studies on fisheries' impact on Herring Gull populations of the North Shore, as well as on diet and reproduction, were made by CWS and McGill University (Boyne and Guillemette 2001; Rail and Chapdelaine 2000; Boyne 1999; Chapdelaine and Rail 1997). An original study concerning the kleptoparasitism of the Parasitic Jaeger on the Common Tern, the Black-legged Kittiwake and the Ring-billed Gull in the St. Lawrence Estuary (Bélisle and Giroux 1995) was carried out by the Université du Québec à Montréal under the supervision of Dr. J.-F. Giroux.

1.3.1.3 Waterbirds other than seabirds

For this group of species, the available literature is mostly in the form of annotated lists, which at the time were a major tool in describing the distribution of bird species in general. We invite the reader to consult Ouellet's work (1974), who revised the numerous notes and annotated lists for the Montréal region and its surroundings since the beginning of colonisation. The geographic coverage of his work corresponds approximately to BCR 13. In Todd's work (1963), we also find the waterbird distribution for BCRs 8, 7 and 3. This monumental work summarizes the observations and annotated lists of naturalists who explored Québec's Great North.

1.3.1.4 Monitoring and research on waterbirds other than seabirds by universities, governmental and non-governmental organizations (NGO)

Monitoring programs for waterbirds other than seabirds are few and do not cover the entire array of species in this group. Nonetheless, a few monitoring programs do exist for certain species. For example, in La Mauricie National Park of Canada, Parks Canada carries out annual surveys of the Common Loon in order to examine the impact of increased tourism whose activities can interfere with reproduction (Masse 2000). This survey, specific to the Common Loon, began in 1987.

We must also mention the study on the Red-throated Loon on the North Shore which was initiated by the Québec-Labrador Foundation (QLF) in 1988 (Nash 1989; Blanchard 1995).

In 1977, CWS established a monitoring program of 38 Great Blue Heron colonies in Québec under the supervision of Dr. J.-L. DesGranges (DesGranges *et al*. 1979; DesGranges and Laporte 1979). These heron colony surveys are now carried out for the most part by the FAPAQ (Desrosiers 1993), although CWS does contribute. The Québec heron colony surveys have been retained as a monitoring indicator in the framework of the St. Lawrence Action Plan (SLAP). A master's thesis on the Great Blue Heron movement toward feeding sites at Lake St-Louis has been carried out under the direction of Dr. R. McNeil of Université de Montréal (Benoît *et al*. 1993; Benoît 1991). Research on behaviour, feeding, reproduction and contamination of the Great Blue Heron have been done by CWS (Champoux *et al*. 2002; DesGranges 1980; DesGranges 1978). The section on contaminants has also been integrated in the heron colony monitoring program of the St. Lawrence Action Plan phase III (SLAP-III).

Some research and monitoring have been carried out on the Horned Grebe and the Yellow Rail in the Species at Risk program of the SLAP phase I and II, and of CWS (Shaffer 1992; Shaffer and Laporte 1993; Robert and Laporte 1997; Robert and Laporte 1999).

2. Waterbird populations and species nesting in Québec

2.1 BCR 14

2.1.1 Waterbird populations and species in BCR 14

30 species breed within this BCR (Table 2). The marine habitat characterizes this region and offers hundred kilometres of coastal habitat and several islands with sharp cliffs, which partially explains the large diversity and abundance of seabirds. At least, this is the case for the Québec portion of BCR 14 which also encompasses part of New Brunswick, Prince-Edward Island, Nova Scotia and the States of Maine, New Hampshire, Vermont and Massachusetts. In addition to these seabird habitats, there are several coastal and inland marshes which harbour non-colonial waterbird species such as the grebes, the rails and the Common Loon for example.

Within BCR 14, there are 3 species whose reproductive populations are all in Québec: the Horned Grebe, the Northern Gannet and the Thick-billed Murre. Five other species of seabirds are found mainly on the Québec side: the Black-headed Gull, the Ring-billed Gull, the Black-legged Kittiwake, the Common Murre and the Razorbill. When we look at these species' population trends, we notice that the Black-legged Kittiwake is the only species showing short term signs of decrease in BCR 14. From a conservation point of view, Québec has a high responsibility toward these species because of their respective demographic importance in BCR 14, and also on a North American continental scale with respect to the Northern Gannet.

Horned Grebe,
François Shaffer

Other species have more modest populations but are important nonetheless from a conservation point of view and in terms of shared responsibility with other political entities. They are, in order: the Black Guillemot, the Double-crested Cormorant, the Black-crowned Night-Heron, the Common Loon, the Great Blue Heron, the Common Tern, the Great Black-backed Gull, the Great Cormorant and the Pied-billed Grebe. Within this group, the Great Blue Heron and the Common Tern seem to show a decreasing trend in the short term. The Common Tern's situation in the Gaspé Peninsula is particularly preoccupying.

Finally, we encounter other species for which we have very little information even if they breed within BCR 14. We are referring to the Leach's Storm-Petrel, the Least Bittern, the American Bittern, the Virginia Rail, the Sora, the Common Moorhen, the American Coot and the Yellow Rail. Many freshwater waterbird species are at the limit of their distribution range which may explain the limited amount of attention they have been given up to now.

Table 2: Populations, population trends and representativeness of waterbirds of BCR 14 in Québec

Species	Breeding population (individuals)			Proportion of the population			Trend(s)[2]		References[3]
	BCR 14 (Qc)[1]	North Am.	BCR 14	BCR 14 (Qc) vs BCR 14	BCR 14 (Qc) vs North Am.	BCR 14 vs North Am.	BCR 14 (Qc)	North Am.	
Pied-billed Grebe	?	?	?	10,00%[4]	0,07%[4,5]	0,71%[5]	+ ?	= -	1,2,4,20
Horned Grebe	24 (4)	200000	24	100.00%	0.01%	0.01%	- =	- ?	1,3,4,10
Common Loon	1000 (3)	600000	4000	25.00%	0.17%	0.67%	+ =	+ ?	1,2,4,5,10,15
Leach's Storm-Petrel	20 (3)	15275000	12000+	0.17%	traces	0.08%	- -	? =	1,4,6,18
Double-crested Cormorant	45000 (4)	740000	161008	27.95%	6.08%	21.76%	+ =	+ +	1,4,6,7,18
Great Cormorant	1320 (4)	11600	10476	12.60%	11.38%	90.31%	+ =	+ =	1,4,6,18
Northern Gannet	107640 (4)	155050	107640	100.00%	69.42%	69.42%	++	++	1,6,19
American Bittern	?	?	?	19,00%[4]	0,93%[4,5]	4,09%[5]	? -	- ?	1,2,4,20
Least Bittern	2 (3)	?	?	traces[4]	traces[4,5]	traces[5]	?	- ?	1.4
Great Blue Heron	394 (3)	83000	2407[5]	16,37%[5]	0.47%	2,90%[5]	= -	= -	1,2,4,18,20
Green-backed Heron	30 (1)	?	1000[4]	3,00%[4]	traces[4,5]	0,35%[5]	? ?	+ ?	1,4,20
Black-crowned Night-Heron	1250 (2)	50000	5000[4]	25,00%[4]	2.50%	0,54%[5]	+ ?	- -	1,2,4,6,18,20
Yellow Rail	12 (3)	9350	?	?	0.26%	?	?	- -	1,4,8,9,10,16,17
Virginia Rail	?	?	?	19,00%[4]	0,09%[4,5]	0,46%[5]	?	- ?	1,4,20
Sora	?	?	?	19,00%[4]	0,02%[4,5]	0,08%[5]	?	- -	1,4,20
Common Moorhen	<20 (1)	?	?	?	traces[4,5]	0,02%[5]	?	- ?	1,10,20
American Coot	<50 (1)	1300000	?	?	traces[5]	traces[5]	?	= +	1,10,20
Black-headed Gull	12 (4)	40	12	100.00%	30.00%	30.00%	+ =	+ =	1,6,10,18
Ring-billed Gull	40844 (4)	1700000	44251	92.30%	2.40%	2.60%	+ +	+ +	1,4,6,18
Herring Gull	42500 (3)	246000	?	?	17.28%	4,56%[5]	+ -	+ -	1,4,6,10,18,20
Great Black-backed Gull	12500 (3)	121430	65950	18.95%	10.29%	54.31%	+ +	+ +	1,4,6,18
Black-legged Kittiwake	107500 (4)	3126000	111076	96.78%	3.44%	3.55%	+ -	+ -	1,4,6,10,18,21
Roseate Tern	8 (4)	16000	800	1.00%	0.05%	5.00%	? =	- +	1,3,4,6,10,18
Common Tern	6949 (4)	300000	33657	20.65%	2.32%	11.22%	- -	- =	1,6,10,18,19
Arctic Tern	325 (3)	500000	9373	3.47%	0.07%	1.87%	? -	? -	1,6,10,11,22
Common Murre	63150 (3)	4250000	63390	99.62%	1.49%	1.49%	+ =	+ =	1,4,6,12,18
Thick-billed Murre	1160 (4)	8000000	1160	100.00%	0.01%	0.01%	? ?	- =	1,4,6,18
Razorbill	14461 (4)	76238	17179	84.18%	18.97%	22.53%	- +	- +	1,6,13
Black Guillemot	10652 (2)	150000	23652	45.04%	7.10%	15.77%	? ?	? ?	1,6,14,18
Atlantic Puffin	694 (3)	755000	3304	21.00%	0.09%	0.44%	? ?	+ =	1,6,10,18,21

[1]The number in parenthesis indicates the confidence level of the estimation: (1)=very low; (2)=low; (3)=average; (4)=good; (5)=very good

[2]The first sign=long term tendency (50 years); 2nd sign=short term tend. (10 years). "+": increase; "=": stable; "-": decline; "?": unknown.

[3]1=Atlas of the Breeding Birds of Québec; 2=Breeding Bird Survey; 3=F.Shaffer (pers. comm.); 4=The Birds of North America; 5=L.Champoux (pers. comm.); 6=BIOMQ; 7=Nettleship and Duffy (eds) 1995; 8=David 1996; 9=Robert *et al*. 1995; 10=Anonymous 2000b; 11=del Hoyo *et al*. (eds) 1996; 12=Vermeer *et al.* 1993; 13=Chapdelaine *et al*. 2001; 14=Nettleship and Birkhead 1985; 15=D.Bordage (pers. comm.); 16=M.Robert (pers. comm.) 17=Alvo and Robert 1999; 18=Anonymous 2001b; 19=SCF Unpubl. data; 20=Rocky Mountain Bird Observatory; 21=Lock *et al*. 1994; 22=Diamond 1999

[4]From the percentage of the area occupied by the species in Québec vs in BCR 14

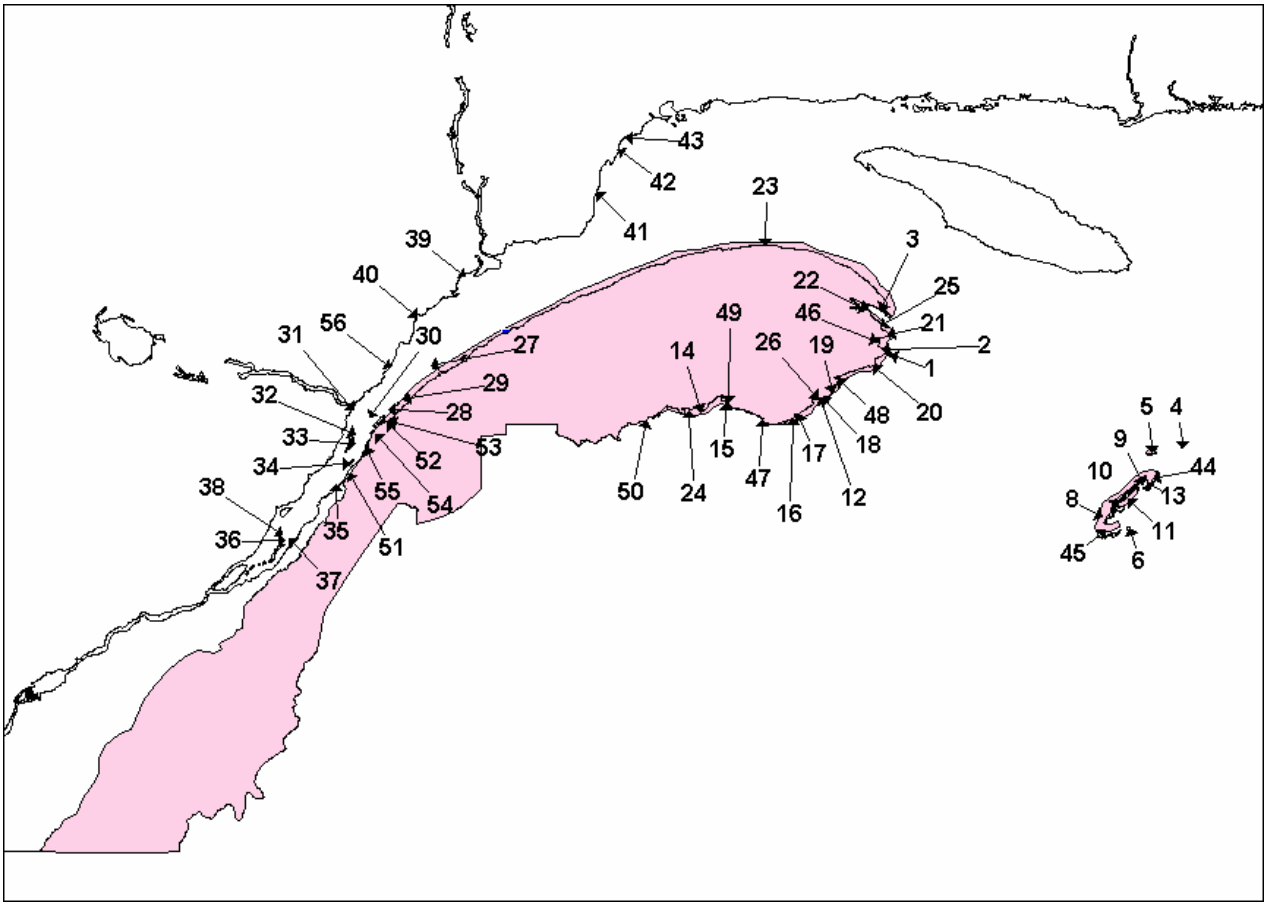
[5]From the percentage of the North Am. population situated in BCR 14, according to the Rocky Mountain Bird Observatory database

[6]From the percentage of the surface area of BCR 14 situated in Québec

2.1.2 Important areas and nesting sites for waterbirds in BCR 14

For seabirds, at least 43 important sites have been identified (Figure 2): (1) Île Bonaventure and Rocher Percé Conservation Park, (2) Les Trois Soeurs, (3) Forillon National Park of Canada, (4) Rochers aux Oiseaux (Madgalen Islands), (5) Brion Island (Madgalen Islands), (6) Île d'Entrée (Madgalen Islands), (7) Paquet Island (Madgalen Islands), (8) Île aux Goélands (Madgalen Islands), (9) Grande Entrée Lagoon Islets (B and C) (Madgalen Islands), (10) Îlets des Étroits (Madgalen Islands), (11) Shag Island (Madgalen Islands), (12) Pointe Reddish (Madgalen Islands), (13) Île aux Loups Marins (Madgalen Islands), (14) Carleton Beach Ridge and Lagoon, (15) Taylor Island, (16) Paspébiac / Shigawake sector, (17) Saint-Godefroi, (18) Shigawake / Newport Coastal Cliffs, (19) Mahy Islets, (20) Cap d'Espoir, (21) Île Plate, (22) Sandy Beach (Gaspé Bay), (23) Cloridorme / Marsoui Coastal Cliffs, (24) Saint-Omer Migratory Bird Sanctuary (MBS), (25) Pointe Saint-Pierre / Douglastown Coastal Cillfs, (26) La Vieille, (27) Bicquette Island, (28) Île aux Pommes, (29) Îles aux Basques and the Razades, (30) Île Rouge, (31) Alouettes Flats, (32) Île Blanche, (33) Îles du Pot à l'Eau-de-Vie, (34) Îles Pèlerins, (35) Kamouraska Islands, (36) Île Le Pilier de Bois, (37) Île Le Pilier de Pierre, (38) Battures aux Loups Marins, (39) Ragueneau Archipelago, (40) Laval Island, (41) Île aux Oeufs, (42) Îles de Mai, (43) Brunelle Bay.

Figure 2: Important nesting sites for waterbirds in BCR 14 in Québec



The sites listed for waterbirds excluding seabirds must be considered as having some potential. Even if the habitat's profile appears to correspond to several species' needs, such as rails for example, there is very little information and a limited number of surveys to enable us to validate these sites in terms of bird densities: (44) Pointe de l'Est (Madgalen Islands) (45) Havre aux Basques Lagoon and Plage de l'Ouest (Madgalen Islands), (46) Barachois de Malbaie, (47) Barachois de Bonaventure, (48) Barachois de Chandler, (49) Barachois de New Richmond, (50) Pointe-à-la-Croix Marsh, (51) Saint-André-de-Kamouraska Marsh (52) Baie de l'Isle-Verte, (53) l'Isle Verte Marsh, (54) Cacouna Marsh, (55) Rivière-du-Loup Marsh, (56) Îlets Boisés.

2.1.3 Conflicts and threats for waterbirds during breeding season in BCR 14

- **Human disturbance, tourism and predators**

Anthropogenic disturbances can be intentional or non-intentional. The presence of humans in a seabird colony can disturb breeding (Burger and Gochfeld 1994). In the past, non-restricted harvesting of seabird eggs, meat and feathers led certain species from BCR 14, such as the Northern Gannet at Rochers aux Oiseaux (MI), to the brink of extinction (Fisher and Vevers 1943-44) and to the disappearance of the Great Auk (Gaskell 2000). The installation of a lighthouse on Rochers aux Oiseaux in 1887 ruined the chances for the Northern Gannet and other seabird species to recolonize the top level they once occupied in great numbers before human occupation (Audubon 1835). Only after 1987, when the lighthouse was automated and abandoned by the keepers, could the Northern Gannet population recolonize part of the superior level. The structures (houses, an antennae held by steel cables, a helicopter platform) left by Transport Canada (now Fisheries and Oceans Canada) are actually preventing the seabirds from completely using the superior level. Let's not forget that this site has been designated as a Migratory Bird Sanctuary (MBS) since 1919.

Other significantly important sites which might be affected by tourist disturbance are the Île Bonaventure and Rocher Percé Conservation Park and Forillon National Park of Canada, managed respectively by the provincial and federal governments. These ensure surveillance to prevent seabird colony disturbance. Despite their efforts, certain disturbances remain difficult to control (e.g. low altitude flights, deep-sea diving activities and personal watercrafts close to colonies).

In addition to anthropogenic disturbance problems, there are those caused by predation. Throughout their long evolution, seabirds and other waterbirds have dealt with terrestrial predators (fox, skunk, rat, raccoon, mink) which partially explains their propensity to nest on offshore islands. Whether it's due to the introduction of animals by man or to climatic conditions that favour the formation of ice bridges in winter used by predators (e.g. the fox of Brion Island), terrestrial predators do sometimes end up on islands or sand bars occupied by seabirds where they have a devastating impact. Brion

Island, a provincial Ecological Reserve, is invaded by Red Fox from the Magdalen Islands. These are most likely responsible for the disappearance of the Leach's Storm-Petrel from this site. They also confine the Atlantic Puffin to the sides of the cliffs which are marginal sites for this species. The habitat on Brion Island is similar to the habitat found on Baccalieu Island (Newfoundland) where over 3 million pairs of Leach's Storm-Petrel as well as a population of over 80 000 pairs of Atlantic Puffin (Montevecchi 1987) breed in spite of the Red Fox's presence. Whereas this predator's population appears in equilibrium with the seabird populations at Baccalieu Island, it is not the case for Brion Island. A fox population control in this area would probably allow the recovery of the Leach's Storm-Petrel and probably the recovery of the Atlantic Puffin, who prefers grassy slants to dig its burrow. Elsewhere in BCR 14, the St. Lawrence Estuary islands, like Îles Pèlerins and Îles du Pot à l'Eau-de-Vie, which harbour the third most important concentration of Razorbills in North America (Chapdelaine *et al*. 2001), are also subject to an invasion by the Red Fox. The Société Duvetnor, dedicated to the conservation of these islands, has succeeded in reducing these predators' impact until now, although the organization would greatly benefit from an increased support in terms of resources in order to control them more efficiently.

Moreover, the Herring Gull and the Black-backed Gull's impact on the Common Tern colonies of the Gaspé Peninsula and of the Magdalen Islands is significant. The population numbers of the colonies of the Carleton Beach Ridge in the Baie des Chaleurs and of Sandy Beach in the Gaspé Bay have greatly declined due to increased predation by gulls during the 1990s. Some techniques have been successfully experimented, especially in Ontario, to improve the tern's reproductive success (Blokpoel and Tessier 1992). Similar techniques must be used in order to restore Common Tern colony populations of the Gaspé Peninsula.

A project is actually taking place to restore the Sandy Beach colony. The partners involved in this project are: the Micmacs of Gespeg, Parks Canada, the Union québecoise pour la conservation de la nature through the IBA program, the FAPAQ, the Ministère de l'Environnement du Québec (MENVIQ) and CWS.

- **Accidental seabird captures in fishing nets**

A large part of the marine waters of BCR 14 corresponds to the St. Lawrence Estuary and the south west portion of the Gulf of St. Lawrence. The number of Québec fishermen and boats has decreased in the last 15 years (Fisheries and Oceans Canada 2000) which is largely due to the moratorium imposed on cod fishing in 1994. Since bottom sea fishing is the most likely to catch seabirds because of the use of gill nets, we tend to believe that the impact has lessened since the moratorium. However, circumstantial observations near Brion Island and a few kilometres off Bonaventure Island in June 2000 (G. Chapdelaine, pers. obs.; Y. Simard, pers. comm., DFO), indicate that this impact is still present. If cod fishing were to gradually increase (Fisheries and Oceans Canada 2000) it would be appropriate to establish a data taking

protocol on the accidental captures in collaboration with Fisheries and Oceans Canada. The sectors near the Magdalen Islands and Bonaventure Island are the most vulnerable areas, because it is where we find the most important seabird concentrations of BCR 14. We can consider that fishing activities using gill nets within a radius of 12 to 20 kilometres from the islands are a threat for seabirds.

Accidental captures of Northern Gannets are also reported, not only in BCR 14, but also along the American Atlantic coast (Forsell 1999). Since the majority of this species' North American population is confined to BCR 14, but migrates along the Atlantic coast to the Gulf of Mexico, it is very important to address the Northern Gannet's management in collaboration with our American colleagues involved in the BCRs of the Atlantic coast. It should be highlighted that the same situation exists for the Razorbills who migrate to the latitude of Cape Cod, Massachussets (Chapdelaine 1997).

- **Competition for the resource with fisheries and direct and indirect effects**

Seabirds need marine resources in order to survive and breed. Their principal prey consists of pelagic and invertebrate fishes. Potential conflicts with the fishing industry, using the same resources, can occur (Tasker *et al*. 2000). Also, fishing activities can indirectly influence waterbird communities (Montevecchi 2001; Chapdelaine and Rail 1997; Duffy and Schneider 1994). Presently, there does not seem to be any conflicts between fisheries and seabirds in BCR 14, although potential conflicts do exist: (1) a reduction in ground fish, particularly cod, could lead the fishing industry to turn toward other resources (e.g. the mackerel, main prey of the Northern Gannet of Bonaventure Island; it is unknown if an increase in mackerel fishing quotas would affect the Northern Gannet); (2) a new increase for ground fish activities might bring us back to a period where there was an abundance of fish debris by the docks and out at sea which favoured an increase in the gull populations who, when overabundant, can affect predation sensitive species such as the alcids and the terns (Furness and Monaghan 1987); (3) an overexploitation of forage fish (capelin and sandlance) can have an impact on the productivity of several species of seabirds (Vader *et al*. 1990; Monaghan *et al*. 1989; Barrett *et al*. 1987). In this context, there is a need to develop theoretical and practical tools to evaluate the interaction between seabirds and the fishing industry (see research needs) and this industry's impact on seabird communities.

- **Impact of oil and other pollutants spills**

A literature review of 22 oil spills which occurred in different areas of the world since 1995 has shown that seabirds like the Common Murre, the Razorbill and the Black Guillemot represent 97 % of the birds affected by spills (Lehoux and Bélanger 1995). Hence, BCR 14, in Québec, is composed of a portion of the Gulf of St. Lawrence and the entire estuary where these species are abundant, especially during breeding season at Bonaventure Island, Rochers aux Oiseaux and on the islands of the St. Lawrence Estuary

Oil spill at Ile du Cheval,
Jean-Luc DesGranges

(Chapdelaine 1995b). The importance of marine traffic and the large quantities of dangerous material transported increase the risks of a spill in the Gulf of St. Lawrence and Estuary. Major spills occurred in BCR 14, such as the Arrow and the Irving Whale in 1970, and were responsible for the deaths of thousands of alcids and eiders (Lehoux and Bélanger 1995). In addition, a PCB contamination of the Gulf of St. Lawrence waters occurred from the Irving Whale which was only refloated in 1996.

- **Contamination (pesticides, heavy metals)**

Seabirds are exposed to a variety of chemical products and other forms of pollution because they spend the majority of their time on water and are exposed to pollutants through direct contact or by inhalation, especially when feeding. The large groups of pollutants having a potential impact are the organo-chlorines, the toxic metals (e.g. mercury, lead and cadmium), petroleum derived products, plastic particles and other artefacts (Burger et Gochfeld 2001). The impact of DDT and its derivatives on the productivity of the Northern Gannet on Bonaventure Island between 1967 and 1984 is an example of the long term consequences on a species having a low reproductive potential and a high longevity (~25 years). Even if the seabird colonies of BCR 14 do not appear to be close to large industries and agricultural areas, the movement of pollutants from freshwater to marine environments is a reality. The hydrographical networks of the St. Lawrence River and the Baie des Chaleurs, where several rivers converge, have undoubtedly contributed to the transportation of DDT and its derivatives, largely used in the fight against spruce budworm in the Gaspé and New-Brunswick forests (Elliot *et al*. 1988). Even if the organo-chlorine impacts on waterbirds of BCR 14 are now part of the past, we must remain careful because other contaminants can suddenly appear in the environment. This is the reason why we must maintain Environment Canada's long term contaminant monitoring programs on seabirds of BCR 14 and other aquatic species such as the Great Blue Heron and the Common Loon.

- **Encroachment and wetland modification**

Bécancour River's mouth,
Jean-Luc DesGranges

BCR 14's salt water marshes offer good feeding and staging habitats for several species of waterbirds (e.g. Great Blue Heron and Black-crowned Night-Heron). The Groupe Dryade (1981) mentioned that an improvement in agricultural lands in the Kamouraska Bay, the construction of a dock near Cacouna and bog modifications to improve residential construction and service infrastructures near Rimouski, have caused the loss of 238 hectares of shoreline vegetation and the modifications of over 110 hectares. Such an encroachment is certainly damageable to waterbird species closely associated with wetlands.

Approximately fourteen barachois are dispersed in Baie des Chaleurs between Gaspé and Restigouche. These particular habitats, unique in Québec, are located in the lower sections of the Gaspé coast. For this reason they have been established as favoured sectors for industrial and urban development in

the past. These habitats sometimes end up being greatly altered by landfill, erosion of sandy outreaches and modification of hydraulic conditions.

- **Long term climate changes**

Climate changes constitute another environmental problem likely to have important fallouts on waterbirds. Enumerate all the long term consequences of climate changes in BCR 14 would require a team working full time to elaborate all the scenarios and specific impacts for each species. In such circumstances, we can only generalize a few examples.

Seabird reproduction is synchronized with periods of maximum fish abundance. Needs of fish species adapted to a precise oceanographic regime could no longer be satisfied as the water temperature of the Gulf of St. Lawrence increases and they would tend to leave the gulf for colder waters. This change in the distribution of traditional seabird prey would disrupt the optimum required for a maximum reproductive success (Bryant *et al*. 1999). A decrease in productivity over several years would necessarily lead to a population decline.

Furthermore, changes in the amount of precipitation can affect reproductive success. For example, an increase in the frequency of sudden and abundant precipitation during juvenile rearing can increase the mortality rate (Rail and Chapdelaine 2002).

Obviously, waterbirds will have to deal with a variety of incidents due to climatic changes during their life cycle. For the moment, no studies have attempted to model these processes with enough precision to make predictions concerning the probable effects of climatic changes on waterbirds.

2.2 BCR 13

2.2.1 Waterbird populations and species in BCR 13

In Québec, a total of 19 species breed in BCR 13 (Table 3). This region is characterized by a very important freshwater body, the St. Lawrence River. Close to 75% of the St. Lawrence system's wetlands are situated in the fluvial section where 400 islands are distributed among 10 archipelagos (Lehoux *et al*. 1995). The variety of wetlands which characterize BCR 13 partially explains the diversity of waterbirds associated with freshwater habitats.

Ring-billed Gull,
Pierre Brousseau

Within BCR 13, we find a particularly abundant species, the Ring-billed Gull whose population numbers largely surpass those of other species. BCR 13 is the most urbanized BCR in Québec, which partially explains the pervasive presence of the Ring-billed Gull in this region. Other species such as the Herring Gull, the Great Blue Heron, the Black-crowned Night-Heron, the Common Tern and the Double-crested Cormorant are particularly important from a demographic point of view. The Great Blue Heron colony of Grande Île situated in the Berthier Archipelago, west of Lake Saint-Pierre, is the largest colony in North America, which confers an extremely high responsibility to the Québec region toward the conservation of this species. It is important to note that using species priority according to population number criteria is far from being objective in this BCR since there is a lack of information concerning the Pied-billed Grebe, the American Bittern, the Virginia Rail, the Sora, the Common Moorhen and the American Coot.

As far as population trends for species in BCR 13 are concerned, the available information is very sketchy and irregular. The Black-crowned Night-Heron, the Yellow Rail, the Sora and the Black Tern appear to be decreasing, both on a regional and continental level. However, as in the case of population numbers, we lack data to objectively stipulate on the trends for several species. This is why we insist on the provisional and fragmentary character of this list of species at risk.

Table 3: Populations, population trends and representativeness of waterbirds of BCR 13 in Québec

Species	Breeding population (individuals)			Proportion of the population			Trend(s)[2]		References[3]
	BCR 13 (Qc)[1]	North Am.	BCR 13	BCR 13 (Qc) vs BCR 13	BCR 13 (Qc) vs North Am.	BCR 13 vs North Am.	BCR 13 (Qc)	North Am.	
Pied-billed Grebe	?	?	?	14%[4]	0,08%[4,5]	0,57%[5]	= ?	= -	1,2,4,15
Common Loon	360 (2)	600000	2520[5]	14,3%[5]	0,06%	0,42%[5]	- ?	- ?	1,4,9,10,15
Double-crested Cormorant	944 (3)	740000	99330	1,0%	0,13%	13,4%	+ +	+ +	1,4,5,6,16,17
American Bittern	?	?	?	14%[4]	0,41%[4,5]	2,90%[5]	- ?	- ?	1,4,15
Least Bittern	100 (2)	77640[4,5]	714[4]	14%[4]	0,13%[4,5]	0,92%[5]	- ?	- ?	1,3,4,15
Great Blue Heron	3490 (4)	83000	6230	56,0%	4,20%	7,5%	+ =	= -	1,4,5,16,17
Great Egret	56 (4)	18000+	410	13,7%	traces	2,28%	+ +	? ?	1,5,16,17
Green-backed Heron	?	?	?	14%[4]	0,33%[4,5]	2,33%[5]	? ?	+ ?	1,4,15
Black-crowned Night-Heron	1292 (3)	50000	5750	22,5%	2,58%	11,5%	+ +	- -	1,4,5,16,17
Yellow Rail	120 (3)	9350	150[6]	80%[6]	1,28%	1,6%[6]	- ?	- -	1,4,7,8,9,11,12
Virginia Rail	?	?	?	14%[4]	0,33%[4,5]	2,34%[5]	?	- ?	1,4,15
Sora	?	?	?	14%[4]	traces[4,5]	0,03%[5]	- ?	- -	1,4,15
Common Moorhen	?	?	?	14%[4]	0,04%[4,5]	0,31%[5]	- ?	- ?	1,9,15
American Coot	?	1300000	?	14%[4]	traces[4,5]	0,01%[5]	- ?	- +	1,9,15
Ring-billed Gull	178340 (4)	1700000	970604	18,9%	10,80%	57,1%	+ -	+ +	1,4,5,13,16,17
Herring Gull	3604 (4)	246000	36932	9,8%	1,47%	15,0%	+ +	+ -	1,4,5,16,17
Great Black-backed Gull	204 (4)	121430	294	69,4%	0,17%	0,2%	+ +	+ +	1,4,5,16,17
Common Tern	1674 (2)	300000	10724	15,6%	0,56%	3,6%	- =	- =	1,5,9,16,17
Black Tern	320 (1)	300000	1090	29,4%	0,11%	0,4%	- ?	- -	1,4,5,14,16,17

[1]The number in parenthesis indicates the confidence level of the estimation: (1)=very low; (2)=low; (3)=average; (4)=good; (5)=very good

[2]The first sign= long term tendency (50 years); 2nd sign= short term tend. (10 years). "+": increase; "=": stable; "-": decline; "?": unknown.

[3]1=Atlas of the Breeding Birds of Québec; 2=data from BBS (Breeding Bird Survey); 3=F.Shaffer (pers. comm.); 4=The Birds of North America species account; 5=BIOMQ; 6=Nettleship and Duffy (eds) 1995; 7=David 1996; 8=Robert *et al*. 1995; 9=Anonymous 2000b; 10=D.Bordage (pers. comm.); 11=M.Robert (pers. comm.); 12=Alvo and Robert 1999; 13=P.Brousseau (pers. comm.); 14=Austen *et al*. 1991; 15=database of Rocky Mountain Bird Observatory; 16=C.Weseloh (pres. comm.); 17=Anonymous 2001

[4]From the percentage of the area of BCR 13 situated in Québec

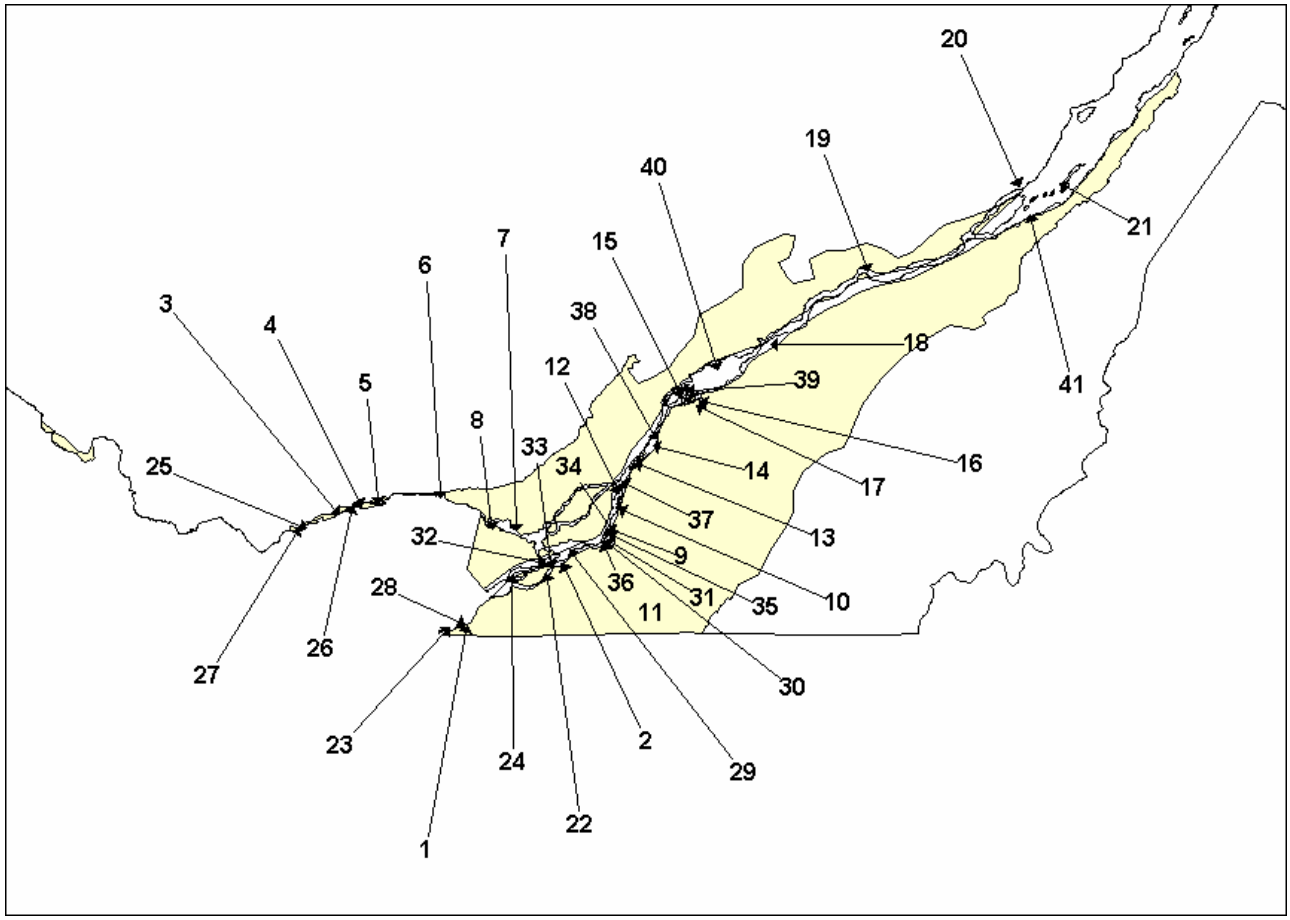
[5]From the percentage of the North Am. population situated in BCR 13, according to the Rocky Mountain Bird Observatory database

[6]From the percentage of the area occupied by the species in Québec vs in BCR 13

2.2.2 Important areas and nesting sites for waterbirds in BCR 13

We have identified a series of potential sites (Figure 3) for birds belonging to the podicipedidae, non-colonial ardeids (Green-backed Heron, Least Bittern, American Bittern) and rails: (1) Lac St-François National Wildlife Area (NWA), (2) Îles de la Paix NWA, (3) Lochaber Bay, (4) Baie Noire, (5) La Pentecôte Bay, (6) Grenville-Pointe-aux-Chênes, (7) Oka / Pointe-aux-Anglais, (8) Rigaud Bay / Pointe Raquette (9) Laprairie Nord Basin, (10) Boucherville Islands, (11) Rivière du Sud (Richelieu Valley), (12) Varennes Islands, (13) Verchères Islands, (14) Contrecoeur Islands, (15) Sorel Islands, (16) St-François Bay, (17) Baie Lavallière, (18) Lake St-Paul, (19) Donnacona-Portneuf sector, (20) Cap Tourmente NWA, (21) Montmagny Archipelago including Île aux Grues, Île à Durand, Brothers Islands, Patience Island et Île à l'Oignon, (22) Beauharnois Marsh.

Figure 3: Important nesting sites for waterbirds in BCR 14 in Québec



Other sites are also very important for the nesting of colonial species (Great Blue Heron, Great Egret, Black-crowned Night-Heron, Ring-billed Gull, Herring Gull, Great Black-backed Gull, Common Tern and Black Tern): (23) Dickerson Island, (24) Bienville Island, (25) Marais aux Grenouillettes, (26) Perras Bay, (27) McLaurin Bay, (28) Christatie Island, (29) Chateauguay Islets, (30) Îles aux Sternes (Lachine Rapids), (31) Mud Pie Islands (Lachine

Rapids), (32) Pointe des Cascades, (33) Beauharnois Dam and Canal, (34) Île de la Couvée, (35) Champlain Bridge North Island, (36) Île aux Hérons, (37) Deslauriers Island, (38) St-Ours Island's West Islet, (39) Grand Île (Lake St-Pierre), (40) Lake St-Pierre Islets, (41) Île de Bellechasse..

2.2.3 Conflicts and threats for waterbirds during breeding season in BCR 13

- **Encroachment and wetland modification**

The shores and wetlands of BCR 13 have undergone multiple disturbances. In urban and peri-urban areas, shore artificialization is a generalized phenomenon. Marshes and bogs, long considered as useless if not dirty and unhealthy were, for the most part, drained for agriculture, road infrastructure or residential construction purposes (Desponts 1995). An important portion of BCR 13's wetlands, especially along the fluvial section of the St. Lawrence and the Richelieu and Outaouais Valleys, have been drained for agricultural and industrial purposes. The loss of these wetlands, because of their rarity and biological importance, causes many species, which depend on these habitats to feed and breed, to be confined to marginal sites which cannot offer adequate conditions to ensure reproductive success.

- **Water levels**

Black Tern nest,
Jean-Luc DesGranges

Wetland habitats of the fluvial section of the St. Lawrence undergo multiple seasonal water level fluctuations. The Black Tern is very vulnerable to these variations since its nest is constructed on semi-stable and half-submerged surfaces, such as a stump, a tree trunk or a floating vegetation carpet. Sudden floods cause egg loss and juvenile drowning. Other species such as rails and grebes can also be affected by water level fluctuations during the nesting period.

- **Contamination**

Since BCR 13 is situated where agriculture is most developed, there is reason to consider the potential impact of chemical treatments, such as several pesticides used in certain agricultural sectors, which could influence waterbird reproduction. Herbicides can also modify the vegetation, and consequently, alter wetland plant communities.

- **Impact of oil and other pollutants spills**

The ecological importance of wetlands along the St. Lawrence has been a cause of growing concern about the consequences of a significant oil spill on plant and animal life. The seaway constitutes a major transportation route for oil tankers and other ships carring potentially dangerous material. There are approximately 140 accidental oil spills per year in the St. Lawrence (Environment Canada 2002). Until now, they have been fairly small or distant and interveners have been able to prevent them from reaching wetland habitats of significant importance for waterbirds. Nonetheless, a potential oil spill impact does exist in BCR 13 and it could have consequences on

waterbird communities.

- **Long term climate change**

If the global warming hypotheses were true, the wetlands which characterize BCR 13 could also undergo transformations in the long term. In addition to a water level problem, which partly comes from manipulations in water flow due to dams, the climatic changes could contributed to a decrease in the water level of the St. Lawrence. A change in the river's hydraulic characteristics would obviously have repercussions on wetlands and eventually on their dependant waterbirds. Warmer temperatures can bring about favourable conditions for the development of green algae which reduce water quality and cause health problems for waterbirds. Generally speaking, it is well known that climate changes present a threat to the composition of species and the function of aquatic ecosystems (LeRoy Poff *et al*. 2002).

2.3 BCR 12

2.3.1 Waterbird populations and species in BCR 12

Herring Gull,
Jean-François Rail

Sixteen species breed within BCR 12 (Table 4). This BCR is characterized by many lakes and peat bogs of the Laurentians. Because of its close association with lakes, the Common Loon is the most abundant species. Other colonial and ubiquist species such as the Ring-billed Gull, the Herring Gull, the Common Tern and the Double-crested Cormorant, do not find habitats within this BCR that are favourable for the development of large colonies such as those observed on the shores of vast freshwater bodies, like the Great Lakes and St. Lawrence water basins. We lack information concerning species associated with wetlands: the American Bittern, the Green-backed Heron, the Virginia Rail, the Sora, the Common Moorhen and the American Coot. However, we believe these species to be less abundant than farther South, especially compared to BCR 13, where there appears to be more wetland habitats favourable to these species.

The available information on the trends for each species in BCR 12 does not enable us to determine if the Québec populations are increasing or declining. The consulted literature leads us to believe that the Pied-billed Grebe, the Great Blue Heron, the Black-crowned Night-Heron and the Sora might have suffered recent declines on a North American continental scale. This information is not conclusive because there is no survey update system which could allow us to adequately monitor the species populations.

Table 4: Populations, population trends and waterbird representativeness of BCR 12 in Québec

Species	Breeding population (individuals)			Proportion of the population			Trend(s)[2]		References[3]
	BCR 12 (Qc)[1]	North Am.	BCR 12	BCR 12 (Qc) vs BCR 12	BCR 12 (Qc) vs North Am.	BCR 12 vs North Am.	BCR 12 (Qc)	North Am.	
Pied-billed Grebe	?	?	?	28%[4]	0,6%[4,5]	2,19%[5]	? ?	= -	1,2,3,10
Common Loon	17774 (3)	600000	44820[5]	40%[5]	3,0%	7,47%[5]	- +	- ?	1,3,7,8,10
Double-crested Cormorant	110 (4)	740000	4366[5]	2,5%[5]	0,0%	0,59%[5]	+ +	+ +	1,3,4,6,9,10
American Bittern	?	?	?	28%[4]	3,0%[4,5]	10,60%[5]	? ?	- ?	1,3,10
Great Blue Heron	?	83000	5204[5]	28 %[4]	1,8%[4,5]	6,27%[5]	= -	= -	1,2,3,7,9,10
Green-backed Heron	?	?	?	12,5%[6]	0,02%[5,6]	1,92%[5]	? ?	+ ?	1,3,10
Black-crowned Night-Heron	114+	50000	80[5]	?	traces	0,16%[5]	? ?	- -	1,3,5,9,10
Virginia Rail	?	?	?	28%[4]	3,8%[4,5]	13,70%[5]	? ?	- ?	1,3,10
Sora	?	?	?	28%[4]	1,2%[4,5]	0,44%[5]	? ?	- -	1,3,10
Common Moorhen	?	?	?	28%[4]	0,5%[4,5]	0,17%[5]	? ?	- ?	1,7,10
American Coot	?	1300000	1950[5]	28%[4]	0,4%[4,5]	0,15%[5]	? ?	- +	1,7,10
Bonaparte's Gull	traces (3)	175000	?	?	traces	-	? ?	= ?	1,7,10
Ring-billed Gull	1666 (2)	1700000	176800[5]	0,9%[5]	0,1%	10,40%[5]	? ?	+ +	1,3,5,9,10
Herring Gull	816 (1)	246000	4256[5]	?	0,3%	1,73%[5]	? ?	+ -	1,3,5,9,10
Common Tern	390 (1)	300000	1140[5]	34,2%[5]	0,1%	0,38%[5]	? ?	- =	1,5,7,9,10
Black Tern	?	300000	2250[5]	?	traces	0,75%[5]	? ?	- -	1,3,9,10

[1]The number in parenthesis indicates the estimation confidence level: (1)=very low; (2)=low; (3)=average; (4)=good; (5)=very good

[2]The first sign= long term tendency (50 years); 2nd sign= short term tend. (10 years). "+": increase; "=": stable; "-": decline; "?": unknown.

[3]1=Atlas of the Breeding Birds of Québec; 2= BBS data (Breeding Bird Survey); 3=The Birds of North America species account; 4=L.Champoux (pers.comm.); 5=BIOMQ; 6=Nettleship and Duffy (eds) 1995; 7=Anonymous 2000b; 8= D.Bordage (pers.comm.); 9=Anonymous 2001; 10=Rocky Mountain Bird Observatory database

[4]From the percentage of the area of BCR 12 situated in Québec

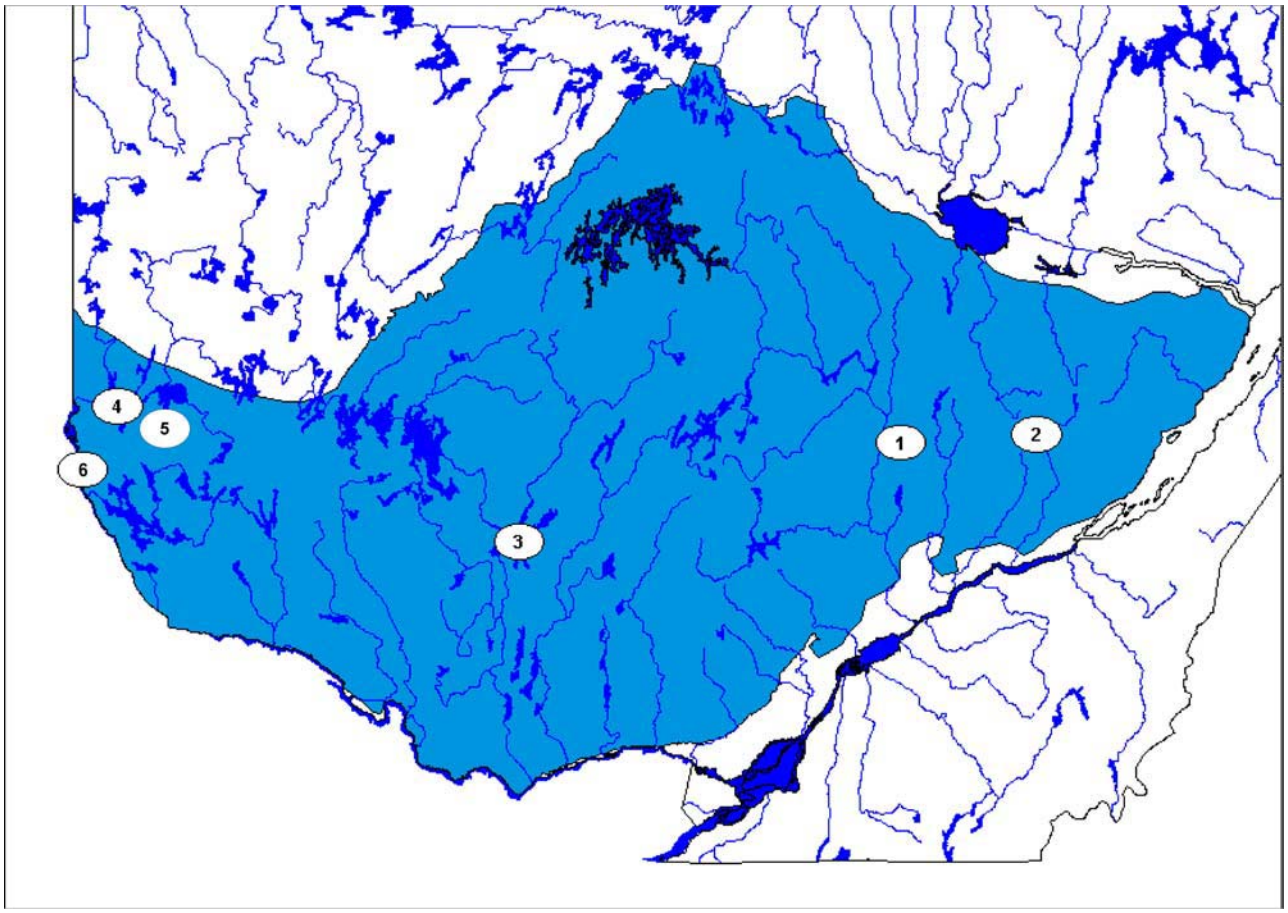
[5]From the percentage of the North Am. population situated in BCR 12, according to the Rocky Mountain Bird Observatory database

[6]From the proportion of the area occupied by the species in Québec vs in BCR 12

2.3.2 Important areas and nesting sites for waterbirds in BCR 12

Most of the potential sites of BCR 12 (Figure 4) are characterized by the presence of islands in large inland lakes where the Great Blue Heron, the Black-crowned Night-Heron, the Ring-billed Gull and the Common Tern nest: (1) Steamboat Island, (2) Petit lac Jacques Cartier, (3) Baskatong Reservoir, (4) Pointe du Pin Rouge Islet, (5) Lac des Castors des Quinze, (6) Lake Témiscamingue Islands. In this BCR, there are wildlife reserves, provincial parks and one federal park (La Mauricie National Park of Canada) where several lakes offer favourable nesting habitats for the Common Loon. Marshes and peat bogs characterize the edges and the discharges of these numerous lakes where other species of waterbirds such as rails and grebes may nest.

Figure 4: Important nesting sites for waterbirds in BCR 12 in Québec



2.3.3 Conflicts and threats for waterbirds during breeding season in BCR 12

- **Encroachment and wetland modification**

Several large rivers of BCR 12 whose waters flow toward the St. Lawrence and Ottawa River basins, have been modified, like throughout much of the province. These modifications were made to avoid large water level fluctuations (floods or low-water levels) and to improve wood transportation and production of hydro-electric power (Desponts 1995). Before 1990, 70% of the reservoirs were constructed in the Ottawa and Gatineau, the Saint-Maurice, the Saguenay and Lake Saint-Jean water basins. These constructions resulted in the modification of the landscape by enlarging certain water bodies and by reducing flood lowlands in other parts of rivers. As a result, little bogs disappeared, having been either flooded or dried up. This effect is especially noticeable in reservoirs constructed for hydro-electric power production, when the high and low-water level variation is important and the water level fluctuation cycle is disrupted. We observe a depletion of riverside plant communities which influence the nesting habitat of resident wildlife (Sarrazin *et al*. 1983). Species such as the American Bittern, the Virginia Rail and the Sora may have been affected by these modifications.

- **Contamination (heavy metals)**

Contamination problems in waterbirds of this BCR have been identified by the presence of mercury (Scheuhammer 2001) and lead in the Common Loon. Mercury, for example, may be the cause of behavioural and reproductive problems, while lead weakens the physiological system and leads to death. Mercury may come from natural processes (volcanic eruptions, forest fires), but also from human activities (combustion of fossil fuels, garbage incineration, industrial activities). Once it penetrates the atmosphere, it can be carried over thousands of kilometres and deposited very far from its source. Eastern Canada's lakes receive the highest level of acid rain while being the most vulnerable to mercury contamination problems at the same time (Environment Canada 2002). Concerning lead, one of the most serious problems for the Common Loon remains the ingestion of tiny lead weights found in lakes where sport fishing is intense.

- **Long term climate change**

The same remarks as for BCR 13 apply here.

2.4 BCR 8

2.4.1 Waterbird populations and species in BCR 8

Arctic Tern,
Yves Aubry

28 species breed within BCR 8 (Table 5). If we include the Red-throated Loon with seabirds, seabirds present the greatest diversity, with 19 species. The presence of thousands of rocky and bare islands dispersed on the North Shore coast which are the preferred nesting habitats for seabirds may explain this predominance. The steep cliffs on the North side of Anticosti Island also offer adequate habitat. The Double-crested Cormorant, the Great Cormorant, the Black-legged Kittiwake, the Black Guillemot and the Razorbill are among the species whose numbers are important on a regional and even national context. Almost half of the North American Razorbill population nests on the North Shore islands. The Common Murre and the Atlantic Puffin, once much more numerous on this coast, add to the diversity of the seabird community. The Mingan Archipelago harbours important Common and Arctic tern colonies representing almost half of the terns which nest along the North Shore. The Caspian Tern is a very rare species in Eastern North America since it is only found in six small colonies: three in Newfoundland, two in Labrador and one on the North Shore in the Île à la Brume MBS. Unfortunately, the species has only been observed sporadically in the Îke à la Brume MBS since 1995 (Shaffer *et al.* 2004).

For North Shore seabirds, we noted a general increasing trend toward the end of the 80s and the beginning of the 90s (Chapdelaine 1995). However, several species have shown signs of stabilisation and some declining trends since 1995. Among the cases of the most important declines, there are the almost disappearance of the Caspian Tern from the Île à la Brume MBS in 1999, a 40% population decline of the Atlantic Puffin on every sanctuaries and an important decline of the Black-legged Kittiwake at Corossol Island (Rail and Chapdelaine 2002).

The inland of BCR 8 is characterized by numerous lakes and peat bogs of the Saguenay-Lake Saint-Jean and Abitibi regions. Several waterbird species of this BCR are at the limit of their continental distribution. This is particularly true for the Pied-billed Grebe, the Green-backed Heron, the Virginia Rail, the Common Moorhen and the American Coot. Even if we have little information on these species, we believe that their numbers are relatively low. On the other hand, the Common Loon should be abundant within this region because of the numerous lakes of various dimensions that are found throughout this territory. A species that deserves special attention in this BCR is the Red-necked Grebe. A small population scattered across Abitibi seems to have established itself since the early the 80s.

We cannot discuss the trends of waterbird populations other than seabirds due to the lack of information on the subject. As for continental trend indexes (Table 5), they must be considered as non conclusive because of the lack of data on the population dynamics for these species.

Table 5: Populations, population trends, and waterbird representativeness of BCR 8 in Québec

Species	Breeding population (individuals)			Proportion of the population			Trend(s)[2]		References[3]
	BCR 8 (Qc)[1]	North Am.	BCR 8	BCR 8 (Qc) vs BCR 8	BCR 8 (Qc) vs North Am.	BCR 8 vs North Am.	BCR 8 (Qc)	North Am.	
Red-necked Grebe	?	45000	?	?	?	?	+ ?	= =	1,2,4
Red-throated Loon	198 (3)	?	?	?	?	?	+ =	? ?	1,2,3
Common Loon	?	600000	?	?	?	?	+ =	+ ?	1,2,4,6
Leach's Storm-Petrel	718 (3)	15275000	9013978	0,01%	0,00%	59,01%	+ -	? =	1,2,3,7,9
Double-crested Cormorant	11216 (4)	740000	11560	97,02%	1,52%	1,56%	+ -	+ +	1,2,3,7,8
Great Cormorant	1284 (4)	11600	1546	83,05%	11,07%	13,33%	- +	+ =	1,2,3,7,9
Northern Gannet	406 (5)	155050	47410	0,86%	0,26%	30,58%	= =	++	3,8
American Bittern	?	?	?	?	?	?	? ?	- ?	1,2
Great Blue Heron	102? (1)	83000	?	?	?	?	? ?	= -	1,2,3,7
Black-crowned Night-Heron	?	50000	?	?	?	?	? ?	- -	1,2,3,7
Yellow Rail	?	9350	?	?	?	?	? ?	- -	1,2,4
Virginia Rail	?	?	?	?	?	?	? ?	- ?	1,2
Sora	?	?	?	?	?	?	? ?	- -	1,2
American Coot	?	1300000	?	?	?	?	? ?	= +	1,4
Sandhill Crane	?	683900	?	?	?	?	? ?	+ +	1,2,4
Black-headed Gull	1 (5)	40	15	6,67%	2,50%	37,50%	= =	+ =	1,3,7,9
Bonaparte's Gull	?	175000	?	?	?	?	? ?	?	1,4
Ring-billed Gull	19187 (3)	1700000	?	?	1,13%	?	? ?	+ +	1,2,3,7
Herring Gull	46283 (2)	246000	190896[4]	24,25%[4]	18,81%	77,60%[4]	+ -	+ -	1,2,3,7,14
Great Black-backed Gull	7419 (2)	121430	?	?	6,11%	?	+ +	+ +	1,2,3,7
Black-legged Kittiwake	59032 (4)	3126000	140677	41,96%	1,89%	4,50%	+ -	+ -	1,2,3,7,9
Caspian Tern	0 (4)	68000	30	0,00%	0,00%	0,04%	- -	+ +	1,2,3,7,9
Common Tern	18574 (2)	300000	?	?	6,19%		+ ?	- =	1,3,7
Arctic Tern	1310 (1)	500000	21310	6,15%	0,26%	4,26%	? ?	? -	1,3,7,11
Black Tern	19 (2)	300000	?	?	0,01%		? ?	- -	1,2,3,7
Common Murre	42532 (2)	4250000	1166142	3,65%	1,00%	27,44%	+ =	+ =	1,2,3,7,13
Razorbill	27350 (4)	76238	57770	47,34%	35,87%	75,78%	- +	- +	1,3,5
Black Guillemot	5230 (2)	150000	8500	61,53%	3,49%	5,67%	- +	? ?	1,3,7,12,13
Atlantic Puffin	33786 (3)	755000	747964	4,52%	4,47%	99,07%	- -	+ =	1,3,7,12,13

[1]The number in parenthesis indicates the estimation's confidence level: (1)=very low; (2)=low; (3)=average; (4)=good; (5)=very good

[2]The first sign= long term tendency (50 years); 2nd sign= short term tend. (10 years). "+": increase; "=": stable; "-": decline; "?": unknown.

[3]1=Atlas of the Breeding Birds of Québec (1995); 2=The Birds of North America species account; 3=BIOMQ; 4=Anonymous 2000b; 5=Chapdelaine *et al*. 2001; 6= D.Bordage (pers. comm.); 7=Anonymous 2001; 8=CWS Unpubl. data; 9= Lock *et al*. 1994; 10=Wires *et al*. 2001; 11=G.Robertson (pers. comm.); 12= Cairns *et al*. 1986; 13=Nettleship et Glenn 1992; 14=Rocky Mountain Bird Observatory database

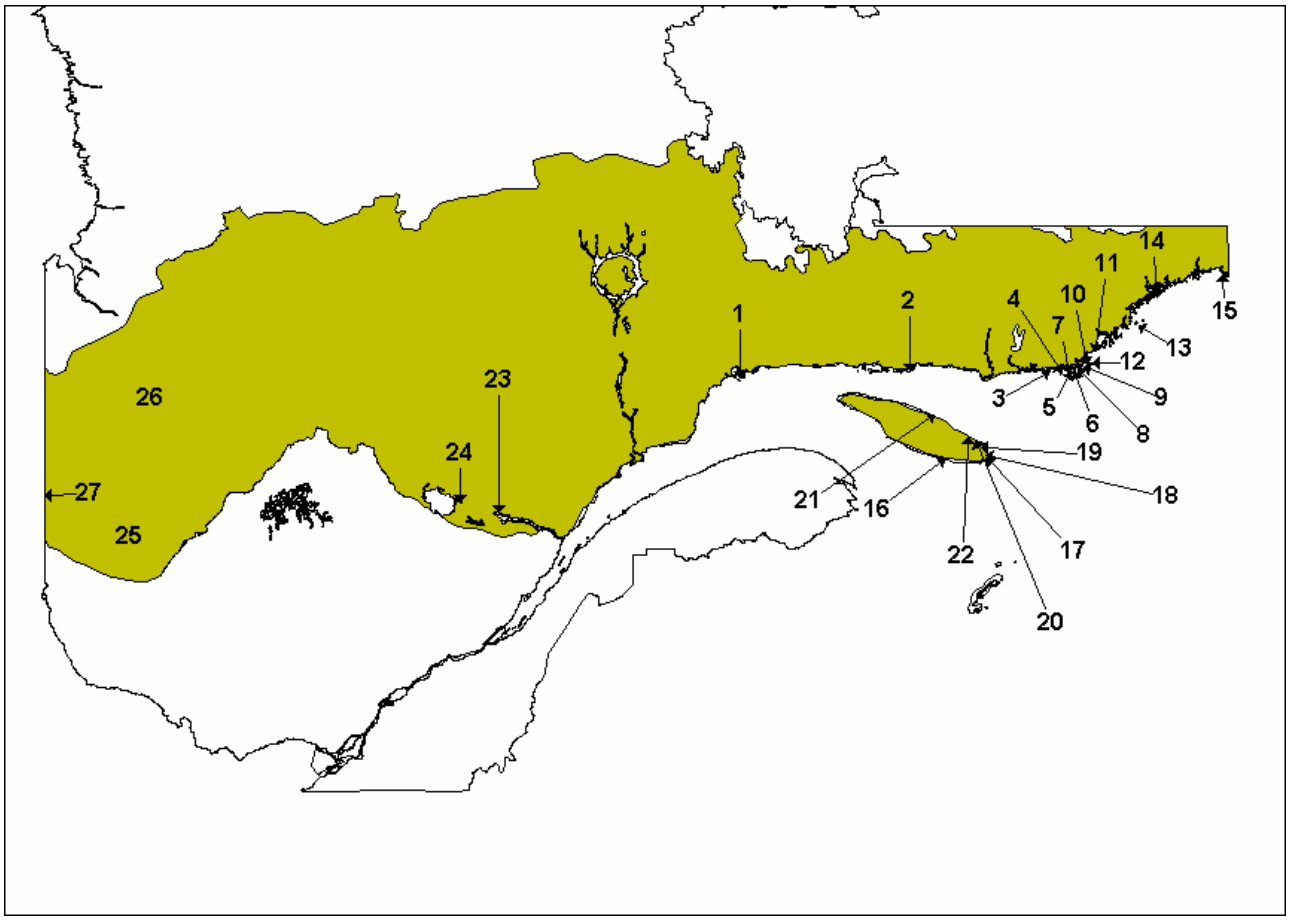
[4]From the percentage of the North Am. population situated in BCR 8, according to the Rocky Mountain Bird Observatory database

2.4.2 Important areas and nesting sites for waterbirds in BCR 8

Most of the identified sites for BCR 8 (Figure 5) are recognized as favourable for seabird nesting: (1) Sept-Îles Archipelago including the Île du Corossol MBS, (2) Mingan Archipelago National Park Reserve of Canada including Perroquets Island, Île de la Maison, Wreck Island, Betchouane MBS, and Watshishou MBS, (3) Île à la Brume MBS, (4) Baie des Loups MBS, (5) Île du Lac, (6) Île de Ouapitagone, (7) Whale Islands, (8) Mistassini Islands (9) Mariannes Islands, (10) Galibois Islands, (11) Îlots de Chevery, (12) Îles Sainte-Marie MBS including Perroquets Island, (13) Gros Mécatina MBS, (14) Saint-Augustin MBS, (15) Baie de Brador MBS, (16) Pointe Dauphiné (Anticosti Island), (17) Pointe de l'Est (Anticosti Island), (18) Falaise aux Goélands (Anticosti Island), (19) Baie Innommée (Anticosti Island), (20) Cap de la Table (Anticosti Island), (21) Cape Observation (Anticosti Island), (22) Cape Tunnel (Anticosti Island).

Sites for waterbirds other than seabirds are not well known because of the territory's vastness and the scattered aspect of wetlands. Nonetheless, a few sites such as (23) Saint-Fulgence Marsh, (24) Saint-Gédéon Marsh (25) Montigny Islets, (26) Lake Matagami, (27) Lake Abitibi Marsh deserve special attention.

Figure 5: Important nesting sites for waterbirds in BCR 8 in Québec



2.4.3 Conflicts and threats for waterbirds during breeding season in BCR 8

- **Human disturbances and predation on seabird colonies**

Common Murre,
Claude Nadeau

Seabird colonies of the North Shore have been exploited without restriction during the colonization period. Birds and their eggs were gathered as a food source and to supplement provisions on boats. Causing even more damage was the haversting of eggs, birds and feathers to provide the markets of Eastern Canada and United States centres which were in full bloom. Following the signature of the Migratory Bird Convention in 1916, a series of sanctuaries were created to ensure the protection of seabird communities. Despite this conservation effort, the well anchored habit of North Shore residents for the harvesting of eggs and seabirds is still apparent today. Past events such as the drastic decline of the single colony of Caspian Terns in Québec at the Île à la Brume MBS and the decline of other species which chronologically correspond to a slacking in the surveillance period since 1995, remind us to be careful (Rail and Chapdelaine 2002). The North Shore sanctuaries must be watched closely since their access is easy as opposed to sites where seabirds nest on high cliffs (e.g. Bonaventure Island).

As discussed for BCR 14, predation has a significant impact on waterbirds in BRC 8. Important declines in seabirds have been noted in the sanctuaries of Baie des Loups, Sainte-Marie Islands and Brador Bay due to predation by the Red Fox and the Arctic Fox (*Alopex lagopus*). As in the St. Lawrence Estuary (BCR 14), control measures for these predators should be undertaken when needed. Such measures would permit the recovery of Common Eider colonies (*Somateria mollissima*), a species which is not covered by the present conservation plan, but is found in the same sanctuaries as the seabirds.

- **Accidental seabird captures in fishing nets**

Fishing nets installed near colonies are a constant threat during the nesting season. Sanctuaries at Corossol Island, Baie des Loups, Sainte-Marie Islands and especially Brador Bay are the most vulnerable. There are no statistics on the number of birds caught, but the phenomenon of accidental captures by the fishing industry is well known (Circumpolar Seabird Working Group 1998) and has already been the object of discussion between CWS and DFO. A re-opening of bottom-sea fishing on the North Shore is anticipated and could increase the mortality rate, especially for alcids.

- **Competition for the resource with fisheries and direct and indirect effects**

Remarks on this subject, as discussed for BCR 14, also apply here. The cold waters of the North Shore as opposed to the warmer waters of the southern area of the Gulf of St. Lawrence, are filled with stocks of Capelin (*Mallotus villosus*), a species associated with cold water which could interest the fishing industry. This forage fish as well as the lance (*Ammodytes sp.*) are at the base of the food chain of several predator species such as Cod (*Gadus*

morhua), marine mammals and seabirds in general. Experimental fishing has already been carried out in 1988 in the sector situated between Harrington Harbour and La Tabatière with the intention of eventually exploiting Capelin (Chapdelaine 1990). Studies in other countries (United States, England and Norway) have demonstrated that depletion of forage fish following intensive exploitation for commercial purposes could decrease reproductive success in seabirds and could lead to a population decline (Vader *et al*. 1990; Barrett *et al*. 1987; Anderson *et al*. 1980).

- **Hydrocarbon spills**

Even if marine traffic is less intensive in this BCR compared to BCRs 13 and 14, the risk of an oil spill does exist and even occurred recently during winter in the Mingan Archipelago (Roberge and Chapdelaine 2000). Waterbirds who move freely on the water surface according to currents, winds and tides are more seriously affected by oil slicks. Alcids (Common Murre, Razorbill, Black Guillemot and Atlantic Puffin) are the most vulnerable. Most of the North Shore sanctuaries shelter these species.

- **Contamination**

Remarks concerning the presence of toxic metals (mercury and lead) in the Common Loon of BCR 12 also apply here. The problem may actually get worse as you move toward areas farther north. In fact, it appears that the northern regions act as a sort of trap for pollutants from industrial regions because of complex air mass movement. We note abnormally high levels of mercury in seabird eggs of BCR 8 and their concentrations tend to increase (N. Burgess [CWS, Atlantic Region], pers. comm.).

- **Long term climate change**

The remarks presented for BCR 13 and 14 also apply to BCR 8. It is important to point out the influence of increased precipitation on certain species of seabirds whose nesting sites are poorly drained. For example, during studies on the Razorbill between 1990 and 1997, especially on the Sainte-Marie Islands, biologists noted the destruction and flooding of several nest sites of the Atlantic Puffin, which nests in burrows, following thunderstorms and unusually heavy rainfall. Depending on the circumstances and the nest sites, the Razorbill and the Common Murre can also be affected by torrential rainfalls.

2.5 BCR 7

2.5.1 Waterbird populations and species in BCR 7

Black Guillemot,
Jean-François Rail

Farther north, 16 waterbird species nest in BCR 7 (Table 6). The populations of each species are poorly known. Among seabirds, the populations of the Red-throated Loon, the Arctic Tern and the Black Guillemot appear to be important, as well as the populations of the Common Loon. The presence of the Yellow Rail, a species at risk, south of James Bay (Robert 1995; Todd 1963) must also be reported. We do not have enough detailed information to determine the trends for these species in BCR 7.

2.5.2 Important areas and nesting sites for waterbirds in BCR 7

Even if BCR 7 occupies a very large area of Québec's territory, it is poorly known. We have made a list of sites (Figure 6) which is probably incomplete, but which corresponds to known potential habitats found in the consulted literature: (1) McNab Rock, (2) Way Rock, (3) Many Islands Bay, (4) Cabbage Willows Bay (5) Boatswain Bay, (6) Long Island. The coastal marshes situated in James Bay appear to be a favourable nesting habitat for the Yellow Rail. The Long Island sector is characterized by the presence of the Arctic Tern, the Herring Gull and the Black Guillemot throughout the numerous islands and islets dispersed across the coastal area.

Table 6: Populations, population trends and representativeness of waterbirds of BCR 7 in Québec

Species	Breeding population (individuals)			Proportion of the population			Trend(s)[2]		References[3]
	BCR 7 (Qc)[1]	North Am.	BCR 7	BCR 7 (Qc) vs BCR 7	BCR 7 (Qc) vs North Am.	BCR 7 vs North Am.	BCR 7 (Qc)	North Am.	
Red-throated Loon	?	?	?	?	traces	?	?	? ?	1,3
Common Loon	?	600000	?	?	?	?	?	+ ?	1,2,3,6
Double-crested Cormorant	790+ (1)	740000	?	100%	traces	?	?	+ +	1,3,4,11
American Bittern	?	?	?	?	?	?	?	- ?	1,2,3
Great Blue Heron	154	83000	?	?	?	?	?	= -	1,2,3,4,13
Yellow Rail	?	9350	?	?	?	?	?	- -	1,3,5,6,9,10
Sora	?	?	?	?	?	?	?	- -	1,3
Sandhill Crane	?	683900	?	tr.	traces	?	?	+ +	1,3,6
Bonaparte's Gull	?	175000	?	tr.	traces	?	?	?	1,6
Ring-billed Gull	78+ (1)	1700000	?	tr.	traces	?	?	+ +	1,3,4,11
Great Black-backed Gull	?	121430	?	100%	traces	?	?	+ +	1,3,4,11
Herring Gull	?	246000	?	?	?	6,44%[4]	?	+ -	1,3,4,6,11,12
Common Tern	?	300000	?	?	traces	?	?	- =	1,4,6,11
Arctic Tern	?	500000	?	?	?	?	?	? -	1,4,6,7
Black Tern	?	300000	?	?	traces	?	?	- -	1,3,11
Black Guillemot	?	150000	?	?	?	?	?	? ?	1,3,4,8,11

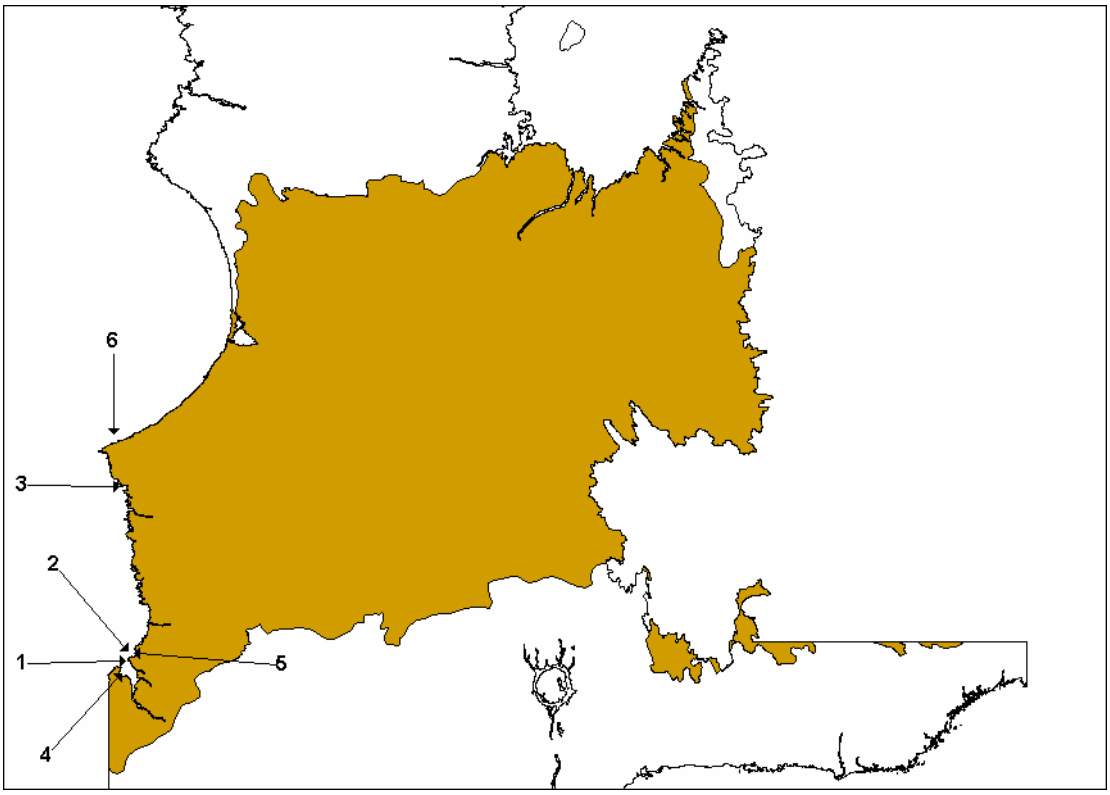
[1]The number in parenthesis indicates the estimation's confidence level: (1)=very low; (2)=low; (3)=average; (4)=good; (5)=very good

[2]The first sign= long term tendency (50 years); 2nd sign= short term tend. (10 years). "+": increase; "=": stable; "-": decline; "?": unknown.

[3]1=Atlas of the Breeding Birds of Québec; 2=BBS data (Breeding Bird Survey); 3=The Birds of North America species account; 4=BIOMQ; 5=Robert *et al.* 1995; 6=Anonymous 2000b; 7=del Hoyo *et al.* (eds) 1996; 8=Nettleship and Birkhead 1985; 9=M.Robert (pers. comm.); 10=Alvo and Robert 1999; 11=Anonymous 2001; 12=Rocky Mountain Bird Observatory database; 13=Consortium Gauthier et Guillemette-GRÈBE 1992

[4]From the percentage of the North Am. population situated in BCR 7, according to the Rocky Mountain Bird Observatory database

Figure 6: Important nesting sites for waterbirds in BCR 7 in Québec



2.5.3 Conflicts and threats for waterbirds during breeding season in BCR 7

- **Hydro-electric development**

Hydro-electric development efforts of the James Bay basin have contributed to changes in landscape, function of water regimes, sediment and salinity close to the coast where freshwater rivers mix with salt water. Such changes may have modified the food chain (invertebrates and fish) and have repercussions on waterbird populations (Reed *et al*. 1996), but since there is no accurate study on the subject, it is impossible for us to measure its importance.

- **Wildlife exploitation**

In Northern Québec, the balance between the native communities and their natural surroundings is achieved foremost through wildlife. The present diet of the Inuit and Cree still partially relies on harvesting waterbirds and their eggs. Applying the principle of "exploitation priority by the natives" such as defined by the James Bay and Northern Québec Convention, implies that, in conformity to the wildlife conservation principle and when wildlife populations permit it, natives will enjoy exploitation levels guaranteed to equal those which prevailed at the time the convention was signed. Since our knowledge on the status of several species of waterbirds in BCR 7 and on harvest by natives is limited, it is difficult to know whether it has a negative

impact on population levels. Considering the lack of information on the subject, a potential threat lingers.

- **Contamination**

Remarks presented for BCR 8 on this subject also apply for BCR 7.

- **Long term climate change**

The arctic and boreal regions are considered the most likely to be affected by climate changes. Consequently, the waterbird species of these regions will undoubtedly be affected. Species adapted to northern habitats and to a very precise climatic regime might find their needs no longer satisfied as the landscape is modified. A very important isostatic increase at James Bay and Hudson Bay could contribute to habitat modifications (P. Lamothe, pers. comm.).

2.6 BCR 3

2.6.1 Waterbird populations and species in BCR 3

There are 14 species of waterbirds in BCR 3, most of which are seabirds (Table 7). The Thick-billed Murre is certainly the most abundant, but distributed in only 4 colonies; two of which are at Akpatok Island, one at Digges Island and one at Cape Wolstenholme situated on the cliffs of the Ungava Peninsula. Even if there is an abundant literature on the biology of this species, especially from the work carried out on Digges Island (Gaston *et al*. 1985; Gaston *et al.* 1993) and on Akpatok Island (Chapdelaine *et al*. 1986), it is actually impossible to determine the trends for these populations. For the other species, the information is much more fragmentary, thus making it risky to estimate their respective populations. Concerning population trends, the information is even rarer if not absent for most species.

Parasitic Jaeger,
Yves Aubry

Table 7: Populations, population trends and representativeness of waterbirds of BCR 3 in Québec

Species	Breeding population (individuals)			Proportion of the population			Trend(s)[2]		References[3]
	BCR 3 (Qc)[1]	North Am.	BCR 3	BCR 3 (Qc) vs BCR 3	BCR 3 (Qc) vs North Am.	BCR 3 vs North Am.	BCR 3 (Qc)	North Am.	
Red-throated Loon	?	?	?	?	tr.	?	?	? ?	1,3
Pacific Loon	?	?	?	?	tr.	?	?	? ?	1
Common Loon	?	600000	?	?	?	?	?	+ ?	1,2,3,5
Pomarine Jaeger	?	30000	?	?	?	?	?	? ?	1,3,9
Parasitic Jaeger	?	?	?	tr.	tr.	?	?	? ?	1,3
Long-tailed Jaeger	?	150000+	?	tr.	tr.	?	?	? ?	1,3,9
Great Black-backed Gull	?	121430	?	100%	tr.	?	?	+ +	1,3,4,9
Herring Gull	?	246000	?	?	?	6,44%[4]	?	+ -	1,3,4,5,9,10
Iceland Gull	?	100000+	?	?	?	?	?	? ?	1,9
Glaucous Gull	?	120000+	?	?	?	?	?	? ?	1,9
Arctic Tern	?	500000	?	?	?	?	?	? -	1,4,5,9
Thick-billed Murre	1640000 (3)	8000000	2924000	56,09%	20,50%	?	?	- =	1,3,4,9
Razorbill	6 (2)	76238	56	10,71%	0,01%	?	?	- +	1,4,7
Black Guillemot	?	150000	?	?	?	?	?	? ?	1,3,4,8,9

[1]The number in parenthesis indicates the estimation's confidence level: (1)=very low; (2)=low; (3)=average; (4)=good; (5)=very good

[2]The first sign=long term tendency (50 years); 2nd sign=short term tend. (10 years). "+": increase; "=": stable; "-": decline; "?": unknown.

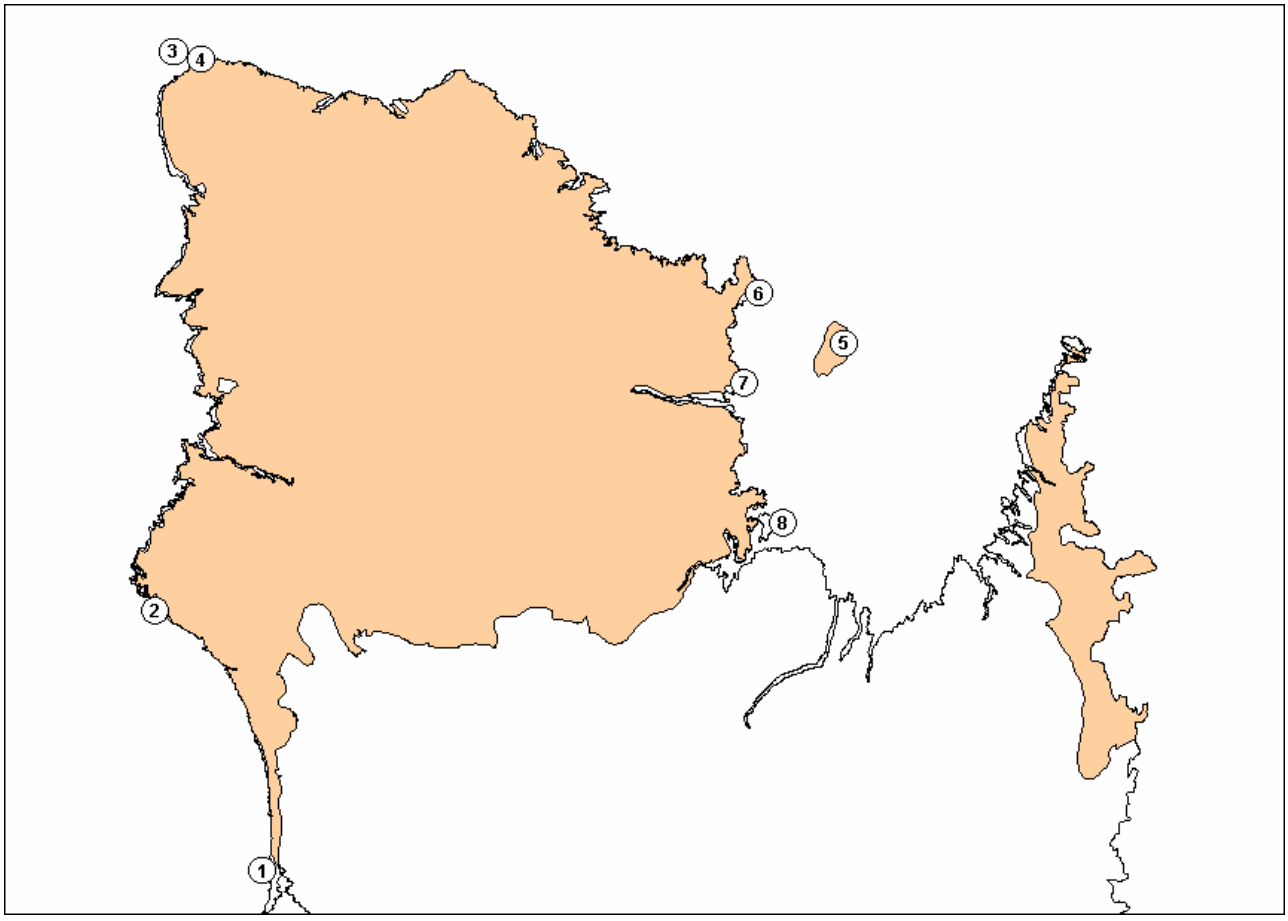
[3]1=Atlas of the Breeding Birds of Québec; 2=BBS data (Breeding Bird Survey); 3=The Birds of North America species account; 4=BIOMQ; 5=Anonymous 2000b; 6=del Hoyo *et al*. (eds) 1996; 7=Chapdelaine *et al*. 2001; 8=Nettleship and Birkhead 1985; 9=Anonymous 2001; 10=Rocky Mountain Bird Observatory database

[4]From the percentage of the North Am. population situated in BCR 3, according to the Rocky Mountain Bird Observatory database

2.6.2 Important areas and nesting sites for waterbirds in BCR 3

The sites that we have been able to identify for BCR 3 (Figure 7) strictly concern seabirds: (1) Nastapoka Island, (2) Hopewell Island, (3) Digges Island, (4) Cape Wolstenholme, (5) Akpatok Island, (6) Eiders Islands Archipelago, (7) Payne and Plover Islands Archipelago, (8) Gyrfalcon Islands Archipelago.

Figure 7: Important nesting sites for waterbirds in BCR 3 in Québec



2.6.3 Conflicts and threats for waterbirds during breeding season in BCR 3

- **Wildlife exploitation**

Remarks presented for BCR 7 on this subject also apply to BCR 3.

- **Contamination**

Remarks presented for BCR 8 on this subject also apply to BCR 3.

- **Long term climate change**

Remarks presented for BCR 8 on this subject also apply to BCR 3. The species associated with the marine habitat would probably be most affected. For example, the large colonies of Thick-billed Murres of the Hudson Strait and of Ungava Bay are unique. They are an expression of the evolutionary process which has adjusted to arctic conditions. Ecosystem disturbances, particularly to the food chain, might affect the reproduction of this species.

Palsa,
Jean-Luc DesGranges

3.0 Waterbirds migrating in Québec

There is very little information to identify every sites and migration corridors used by the waterbirds of the different BCRs encountered in Québec. For seabirds, such a characterization would be very difficult to make since they move over large water bodies such as the Gulf of St. Lawrence and Estuary as well as along the coasts of Hudson Bay and Ungava Bay. It is important to note that the Québec territory acts as a "terminal station" for several seabirds and other waterbird species breeding inland. Therefore, there are no well defined staging areas like those existing for shorebirds and waterfowl (e.g. Snow Geese) who intensively use several sectors of the St. Lawrence to rest or as migratory stopovers before continuing their route toward arctic regions. Nonetheless, a few sites can be identified from existing literature and observations from amateur ornithologists.

- **BCR 14**

A part of the upper estuary and the lower estuary including the sector of the future Saguenay - St. Lawrence Marine Park represents an important migratory stopover for several species of seabirds. In spring and fall, important groups of Common and Arctic Terns, Parasitic and Pomarine Jaegers (Bélisle and Giroux 1995), Black-legged Kittiwakes , Bonaparte's Gulls (particularly in the Escoumins sector), Double-crested Cormorants and gulls are found in this region where they can feed and stock the energy required to continue their migration. The presence of the Northern Gannet in spring and in late summer is also remarkable since this species nests only in the Gulf of St. Lawrence. We assume that it is attracted by the flow of herring in specific sectors such as the Île aux Lièvres pass (Bédard *et al*. 1997; Falardeau *et al*. 2000). Also noteworthy, are the upwelling zones in the Malbaie sector which attract the Ring-billed Gull, the Herring Gull, the Great Black-backed Gull and the Iceland and Glaucous Gulls, although the latter are more numerous in the wintering period.

- **BCR 13**

The large hydrographic basins of this BCR (Lake Saint-Francois, Lake Saint-Louis, Lake des Deux Montagnes, Lake Saint-Pierre, the Outaouais Valley, the St. Lawrence River corridor) are very important migratory stops for waterfowl (Lehoux *et al*. 1985). Since the ecological niche of several species (e.g. rails, grebes and moorhens) is closely related to that of waterfowl, we assume that these sites are used by both groups. However, we cannot estimate the population of waterbirds that transit through these sectors. The migration routes of waterbirds other than waterfowl are poorly known due to the discreet nature of several species of rails, grebes and ardeids (Davis 1993; Melvin and Gibbs 1996).

- **BCR 12**

Missing information

- **BCR 8**

In BCR 8, Belle Isle Strait is well known as an important site for the observation of pelagic birds from the southern hemisphere. The meeting point of cold waters of the Labrador Current with the warmer waters of the Gulf of St. Lawrence and a marked upwelling phenomenon in this narrow passage probably explain the numerous observations of species like the Sooty Shearwater and the Greater Shearwater during the summer season (Brown *et al*. 1975).

- **BCR 7**

Missing information

- **BCR 3**

Missing information

Great Shearwater,
Yves Aubry

4. Waterbirds wintering in Québec

Wintering sites for waterbirds are pretty rare since the majority of species migrate South. A few openings in the ice, caused by current dynamics, offer open water areas for species coming from northern regions.

- **BCR 14**

Two sites in this BCR hold our attention: (1) the St. Lawrence Estuary at the mouth of the Saguenay River and (2) the southern portion of the Gaspé Peninsula from the Baie des Chaleurs to the Forillon Peninsula.

In the estuary, by the mouth of the Saguenay River, we find a few species of larids typical of arctic areas like the Iceland and Glaucous Gulls. Other larids such as the Herring Gull and the Great Black-backed Gull winter in this region of the estuary. We also find a large concentration of Black Guillemot, especially in the area in front of Pointe-au-Pic. Even if this species is highly representative of arctic regions, we do not know if these birds come from northern regions or from a local population nesting on islands of the St. Lawrence Estuary.

Concerning the Baie des Chaleurs area, we find the same species as reported for the estuary although the presence of a wintering population of Great Cormorant gives this sector a particular nature (Chapdelaine 1977c).

- **BCR 13**

Two areas attract several species of larids in winter in this BCR: (1) the Beauharnois Dam, (2) the Lachine Rapids. The waterbird species observed in these areas are the Herring Gull, the Ring-billed Gull, the Great Black-backed Gull, the Glaucous Gull and the Iceland Gull. However, their numbers appear less important than those of the St. Lawrence Estuary.

5. Monitoring and research needs for waterbird conservation in Québec

In this section, we elaborate the needs concerning monitoring and research to ensure that the correct decisions are made to maintain and increase the waterbird populations of Québec. The needs expressed will enable us to have a better idea of the resources which should be allocated to implement NABCI on a regional level.

5.1 POPULATION MONITORING

The objective of a bird population monitoring program, no matter which bird group it addresses, is to gather detailed information on distribution, population abundance and trends as well as data on reproduction (hatching success, flight success, net productivity) which will enable the prediction of long term population levels or population goals. Only with long term monitoring and the use of efficient methodologies within a reasonable time frame, will we be able to know if a species is increasing or declining. We have noticed that for certain species, particularly the grebes and the rails, no reliable data exists to determine their population trends on a regional or continental scale because the monitoring systems addressing these species do not exist in Québec.

5.1.1 Seabird population monitoring

The survey results for seabirds nesting in Québec are compiled in the seabird data bank (BIOMQ) which essentially contains data on distribution according to a geographic information system (GIS), abundance, survey methods, survey chronology and other references. A CWS biologist has the responsibility to maintain the BIOMQ as well as its diffusion to biologists, university researchers and the public. The BIOMQ also helps in responding to specific demands for impact assessment in marine habitats and for academic or practical research projects. Part of this bank is also available on the internet.

The population monitoring that presently exist are under-financed and do not respect the pre-established time intervals. It is equally impossible to implement other studies which would be necessary to fully understand the problematics related to seabirds especially in northern regions.

- **Seabird monitoring in Migratory Bird Sanctuaries of the North Shore of the Gulf of St. Lawrence since 1925 (BCR 8)**

This monitoring program is unique in North America and lead to the measurement of the efficiency of the network of Migratory Bird Sanctuaries of BCR 8. This study is also part of the National Seabird Program of CWS established in 1971 (Nettleship 1993; 1997). It has reported on the population dynamics of 16 seabird species. It is also used to measure the health status of the St. Lawrence marine ecosystem when research projects are specific to certain species and can be conducted jointly. Seabirds play a central role at different levels of the food chain and they are sensitive to natural and anthropogenic modifications of the marine

ecosystems. In this context, this seabird monitoring study has also been integrated to the monitoring section of SLAP-III to help judge the health of the St. Lawrence. The actual program must be solidified because a chronic lack of resources in 1998-99 forced the responsible biologist to split the survey over a two year period instead of carrying it out yearly as it had always been done since 1925, and to abandon long term research projects which would allow survey results to be interpreted through an ecosystemic approach. Such modifications decrease our capacity to objectively and scientifically interpret what goes on in the marine environment. In addition, survey techniques for certain species, especially in the more populated sanctuaries, need to be revised and developed to improve our capacity to detect statistically significant changes. To this survey, it would be equally appropriate to incorporate the survey on seabird colonies on the North East of Anticosti Island where there are Black-legged Kittiwake, Black Guillemot and Great Cormorant colonies of national importance but have never been the object of regular monitoring. These colonies are part of BCR 8 just as are the North Shore MBS (last survey: 1998-99; expected: 2005).

- **Seabird monitoring in the Mingan Archipelago National Park Reserve of Canada and the Forillon National Park of Canada (BCR 8 and 14)**

These monitoring programs are carried out by teams of technicians and biologists from Parks Canada in order to better understand the seabird trends within the parks' limits. The time span varies according to the species, but is usually three years. The results from these surveys are recorded in the BIOMQ and consolidate our knowledge on seabirds of BCR 8 and 14.

- **Seabird monitoring in the St. Lawrence Estuary, the Gaspé Peninsula and the Magdalen Islands (BCR 14)**

These large geographic entities are part of BCR 14. The seabird colonies of BCR 14 have been surveyed according to a more or less regular time interval due to a lack of resources. We need to establish a 5-year survey interval for each of these geographic regions and survey seabird nesting in the most important colonies of this BCR (see the important sites of BCR 14 in section 2.0) (last partial survey, St. Lawrence Estuary: 2001, expected: 2006; last survey, Gaspé Peninsula: 2002, expected: 2008; last partial survey, Magdalen Islands: 2000; expected 2007).

- **Monitoring of the Northern Gannet population in the Gulf of St. Lawrence (BCR 14)**

This survey is part of CWS National Seabird Program established in 1971 (Nettleship 1993; 1997) and recurs every 5 years. Since there are only 6 colonies across Canada, three of which are in Québec, all colonies are surveyed during the same season jointly by the Québec and Atlantic regions. This species is also used as an indicator species of the St. Lawrence marine ecosystem's health status in the monitoring phase of the

SLAP-III. Data on productivity and contamination of the Northern Gannet of Bonaventure Island area also recorded. Until now, this monitoring program has respected the five year time span since 1967. The research division, on the other hand, would need to be supported by additional resources (see research section) (last survey: 1999, expected: 2004).

Northern Gannet,
Jean-François Rail

- **Monitoring of Thick-billed Murre colonies (BCR 3)**

Even if certain Thick-billed Murre colonies are geo-politically situated in Nunavut, seabird populations biologists from the Québec region have had, in the past, the monitoring responsibility of two Thick-billed Murre colonies of Akpatok Island (Chapdelaine and Brousseau 1982; Chapdelaine *et al*. 1986) and still have that responsibility within the framework of the National Seabird Program of CWS (Nettleship 1993). All the islands along the coasts of Ungava Bay and Hudson Strait (included in the Nouveau-Québec) are visited by Inuits from Nunavik who harvest wildlife. The Makivik Corporation is their spokesperson on wildlife matters and it is with this corporation that CWS, Québec region, collaborates to conduct surveys in this BCR (e.g. Common Eider survey in Ungava Bay in 1980 and 2000). In 1981, 1982 and 1987, a series of control colonies were established at the North and South colonies of Akpatok Island to detect population trends, but have not been re-examined since. These two colonies represent one of the largest, if not the largest, Thick-billed Murre concentration in the world. Update surveys are needed at Akpatok Island as well as at Digges Island and Cape Wolstenholme colonies situated on the continent at the northern point of the Ungava Peninsula. This last colony has never been surveyed according to the unified method of type I or II (see Birkhead and Nettleship 1980) whereas on Digges Island, CWS operated a research station for several years and established a monitoring protocol according to the unified method (Gaston *et al*. 1993) (last survey at Akpatok Island, South colony: 1982; North colony: 1983; expected: to be determined).

- **Monitoring seabird populations of the coastal zones of James Bay and Hudson Bay (BCR 7 and 3)**

This portion of the Québec territory includes the coastal zones of BCR 7

and 3. In 1985, the Makivik Corporation, in collaboration with CWS, Québec region, set the basis of a colonial bird population monitoring program (Nakashima and Murray 1988) within the framework of the Common Eider population monitoring of Northern Québec, for the following species: Herring Gull, Great Black-backed Gull, Glaucous Gull and the Arctic Tern. Several other waterbird species were not surveyed, but should be included in future monitoring. For example, it would be important to know the population status of the Arctic Tern (inland colonies), the Black Guillemot and the unidentified Jaegers of BCR 7 and 3 (last survey: 1985, expected: to be determined).

- **Population monitoring of the Ring-billed Gull**

This survey is carried out every three years within the framework of the monitoring of overabundant species. Due to the numerous complaints concerning the invasion of gulls in urban areas, CWS, Québec region, follows the evolution of Ring-billed Gull populations in BCRs 13 and 14 because of their close links to urban environments. This survey is very important to support and justify gull control when necessary (last survey: 2003, expected: 2006).

- **Population monitoring of the Double-crested Cormorant**

This species is protected under provincial government legislation. In the last couple of years, an increase in the North American Double-crested Cormorant population has raised questions among Lake Saint-Pierre commercial and sport fishermen concerning a possible competition for resources. An increase in the Double-crested Cormorant population in the St. Lawrence Estuary has also affected the nesting habitat of other colonial bird species which justified population control for this species in the late 80s and early 90s. To support and justify these controls, FAPAQ wants to maintain a survey for this species in BCR 13 and 14.

5.1.2 Monitoring of waterbirds other than seabirds

There are currently few monitoring programs covering waterbird species other than seabirds. As opposed to seabirds, which usually nest in colonies, several waterbird species are found in isolated pairs. Very low densities require survey techniques which are adapted to scattered distributions. We must therefore plan on several years of development and practice to implement monitoring systems for these species. Even if certain monitoring programs already exist for particular species, resources to maintain them and improve their contents are deficient.

- **Monitoring Great Blue Heron colonies in Québec (BCR 12, 13, 14)**

In connection with the Conservation Law of the Québec government and its regulation on wildlife habitats, FAPAQ conducts surveys for all heron colonies on the entire Québec territory every five years. This survey is also a monitoring element within the framework of SLAP (Monitoring program of SLAP-III) and is carried out jointly with contaminant monitoring

directed by CWS (Champoux *et al*. 2002).

- **Canadian Lake Loon Survey**

The Canadian Lake Loon Survey is supervised by Bird Studies Canada. The Québec province is only partially covered in time and space due to the absence of a regional coordinator for Bird Studies Canada. This monitoring program is carried out by volunteers who send their observations to Bird Studies Canada. The autorities of La Mauricie National Park of Canada also have a monitoring program on the Common Loon which began in 1987.

- **Monitoring waterbirds associated with wetlands**

There are currently no monitoring programs for species associated with wetlands for the entire Québec region. In Ontario, the Marsh Monitoring Program (MMP) aims to survey bird species of the Great Lakes wetlands. It is a bi-national program (Canada and United States) for which the Canadian portion is supervised by Bird Studies Canada (Weeber and Vallianatos 2000). It would be appropriate to link a future survey program on waterbirds associated with Québec wetlands with the MMP via a Bird Studies Canada coordinator. The sites to be surveyed could consist of the existing National Wildlife Reserves in BCR 13 and 14 as well as certain provincial and federal parks in the BCRs situated farther north. Exceptional environments should also be surveyed, such as Rupert Bay for example, where we find an important population of Yellow Rail which is a species at risk.

Yellow Rail,
Michel Robert

5.2 RESEARCH ON WATERBIRDS

Fundamental studies on several aspects of waterbird ecology are required to explain and interpret population trends. Data collection of demographic parameters such as productivity and juvenile and adult survival rate is essential to understand population dynamics. Knowledge based on scientific research must be part of our arsenal to make decisions and take action for waterbird population management. Research is intimately linked to population surveys in such a way that it is more accurate and appropriate to talk about «integrated research».

5.2.1 Research on seabirds and other waterbird species

- **Population demography**

Demographic parameters such as reproductive success and adult and juvenile survival rate are essential information to understand population dynamics. Seabird populations are sensitive to variations in adult survival rates. Obtaining reliable data on survival rates is difficult because it requires the use of banding recapture techniques over several years (10 to 15 years). In Québec, estimations exist only for the Razorbill of the Sainte-Marie Islands (adult survival rate = 0.90; Chapdelaine 1997). An empirical method based on reproductive success and the evolution of the Northern Gannet population of Bonaventure Island has also permitted the estimation of an adult survival rate for this species (0.92; Chapdelaine and Rail, unpubl. data). Due to the Razorbill's importance in BCRs 8 and 14 in Québec, we insist on the importance of continuing the Razorbill project in the Sainte-Marie Islands (this project was abandoned in 1997 for financial reasons) and the establishment of control colonies on the islands in the St. Lawrence Estuary to carry out the same type of research. The Northern Gannet of Bonaventure Island should also be the object of long term research on adult and juvenile survival rates. Because of a 40% decline in the Atlantic Puffin population in several sanctuaries of the North Shore (Rail and Chapdelaine 2002), this species should also be the object of a similar study in the Sainte-Marie Islands and Brador Bay sanctuaries. From a logistic point of view, studies on Razorbill and Atlantic Puffin demography can be carried out jointly since these two species use the same nesting sites.

- **Seabirds as bio-indicators of the St. Lawrence marine ecosystem**

Seabird population fluctuations can be correlated to natural stresses (climate change, large scale oceanographic disruptions [e.g. North Atlantic Oscillation; NAO]) and anthropogenic stresses (e.g. oil or chemical spills, contaminants, interaction with fisheries) in the St. Lawrence marine ecosystem (Rail *et al*. 1996; Chapdelaine and Rail 1997). A series of quantifiable parameters such as activity budget, productivity (hatching success, flight success, net productivity), juvenile growth and diet (composition, quality and quantity) can be correlated together and interpreted on the basis of abundance or rarity and quality of food

Black-legged Kittiwake,
Jean-François Rail

resources. Seven species of seabirds (Northern Gannet, Double-crested Cormorant, Herring Gull, Black-legged Kittiwake, Common Tern, Common Murre and Razorbill) have already been selected in BCRs 8 and 14 to establish an environmental monitoring network. Several scientific publications have been written within this monitoring framework (Rail and Chapdelaine 2000; Rail and Chapdelaine 1998; Chapdelaine and Rail 1997; Brousseau *et al*. 1996; Rail *et al.* 1996; Chapdelaine and Brousseau 1996; Chapdelaine *et al*. 1987; Chapdelaine *et al*. 1983). The objective of these research projects was to obtain basic data to start and maintain a St. Lawrence marine environment monitoring program using an ecosystemic approach. University participation in these projects is essential and a financial participation is expected through SLAP-IV.

- **Development of energetic models and Multispecies Virtual Population Analysis (MSVPA)**

In the context of seabird interactions with the fishing industry, we must maintain and encourage the development of energetic models and MSVPA to establish an enlightened form of management of sea resources by Fisheries and Oceans Canada and CWS, responsible for seabird conservation. This collaboration presently exists at a regional level, thanks to the participation of a senior waterbird population biologist in meetings of the Working Group on Seabird Ecology, a committee of experts who meet each year at the International Council for the Exploration of the Sea (ICES). This research division must also be encouraged through university collaboration.

- **Development of survey techniques for alcids in the sanctuaries of the North Shore, Bonaventure Island, and the islands of the St. Lawrence Estuary**

There is an urgent need to establish study polts to improve our survey network in order to obtain more precisions on population estimates particularly for alcids (Common Murre, Razorbill, Atlantic Puffin and Black Guillemot). Due to the lack of resources, surveys have been conducted within a short time frame and with very approximate methods, therefore reducing the precision of the results significantly.

- **Recovery of Common Tern colonies in the Gaspé Peninsula and Magdalen Islands**

The Common Tern populations of the Gaspé region have declined considerably over the past ten years. Gull control techniques are being experimented to restore the Common Tern colony of Sandy Beach in the Gaspé region as well as in the Magdalen Islands, where Red Fox predation and gull invasion in areas favourable for the Common, Arctic and Roseate Tern (an endangered species) are factors which prevent their respective populations from increasing. Parallel to these measures taken to restore these populations, there should be long term research on tern reproductive success and survival rates. These studies would enable us to measure the

effectiveness of the interactions carried out in the colonies.

- **Impacts of water level on the reproductive success of the Black Tern in the fluvial section of the St. Lawrence and extension of this research project to grebes and rails**

The Black Tern reproduces in wetlands and was once proposed as a species at risk in Canada (Gerson 1988). A drastic population decline has been noted in Ontario (Weseloh *et al*. 1997) and we think the same is true in Québec. Spring and summer water level conditions appear to be a determining factor in the nesting success of Black Terns along the St. Lawrence (BCR 13). The water level range that represents the optimum conditions for reproductive success of this species should be determined. It would also be appropriate to examine water level impacts on other groups of species (grebes and rails) with similar nesting habits.

6. Conservation actions

- **Recovery of Common Tern colonies of the Gaspé Peninsula and the Magdalen Islands**

In BCR 14, we find several favourable habitats for the establishment of large tern colonies. In the Gaspé region, there is presently a project to restore the Common Tern at Sandy Beach (Gaspé Bay) which requires varied management techniques such as predator elimination either by trapping or electric fence installation (Red Fox) or the installation of enclosures made of monofilament treillis which prevents gulls from establishing in habitats favourable for tern nesting. There are other sites in the Gaspé region which should be managed to restore Common Tern colonies which were once thriving such as the Carleton Beach Ridge and the Saint-Omer MBS.

At the Magdalen Islands, the colonies of Paquet Island, Îlot du Chenal, Baie du Portage Island (Havre-aux-Basques) and the 2nd islet of Point-aux-Loups should also be the object of management for tern colony recovery. Let us mention that three species nest at the Magdalen Islands: the Common Tern, the Artic Tern and the Roseate Tern, a species at risk.

- **Predator control on the islands of the St. Lawrence Estuary, and in the sanctuaries of the North Shore and Brion Island (Magdalen Islands)**

Predation by the Red Fox is a recurrent problem on islands of the St. Lawrence Estuary (BCR 14) like the Long Pèlerin, the Petit Pèlerin, the Gros Pèlerin, the Gros Pot and the Pot du Phare where the majority of Razorbills of the St. Lawrence Estuary are found. The Société Duvetvor Ltée has made efforts to eliminate them until now, but without substantial and sustained help, we cannot guarantee control efficiency.

On the North Shore (BCR 8), the predation problem is particularly important in the following three sanctuaries: Baie des Loups, Sainte-Marie Islands and Brador Bay. Efforts are currently under way to control the Red Fox at the Sainte-Marie Islands, which is not the case for the other two sanctuaries.

At Brion Island, a Provincial Ecological Reserve, Red Fox control would allow the recovery of the Leach's Storm-Petrel colony and would most certainly be favourable for the Atlantic Puffin.

- **Increase the surveillance in the Migratory Bird Sanctuaries on the North Shore**

Waterbird poaching is particularly important in remote regions. This is especially true on the North Shore (BCR 8). In several locations, harvesting seabird eggs and increased motorboat use close to Migratory Bird

Sanctuaries left without surveillance, are still common activities. From the late 80s until 1997, a substantial increase in surveillance had positive results on reproductive success and on seabird population increases in this region. Unfortunately, a slack in surveillance since 1997 seems to correspond to a recent population decline observed inside and outside the Migratory Bird Sanctuaries. We will have to increase and maintain the surveillance efforts of the North Shore sanctuaries if we want to maintain and increase seabird populations in BCR 8.

Group of Alcids,
Jean-François Rail

- **Development of an observation network to assess the impact of accidental seabird captures by the fishing industry**

A commercial fishing impact on seabirds is felt especially in the Gulf of St. Lawrence (BCR 14 and 8). Unfortunately, there are no specific statistics for the gulf that would corroborate what many biologists suspect as a significant seabird mortality factor. Fisheries and Oceans Canada already has a network of observers who collect information on accidental captures in fishing nets. This program exists for deep-sea fishing activities which do not seem to be a problem, at least not in the Gulf of St. Lawrence, but we do not have its counterpart for commercial fishing operating in the coastal environment. In a coastal environment, the problem could be particularly important especially where there are important bird concentrations during breeding season. We believe that a network of observers should be implanted for coastal sea fishing in order to shed light on the subject. The coastal areas of interest are the sectors of Bonaventure Island, Magdalen Islands, Corossol Island, Baie des Loups, Sainte-Marie Islands, Gros Mécatina and the Brador Bay.

- **Update the recovery plan for the Caspian Tern**

Since the Île à la Brume MBS (BCR 8) is the only place where the Caspian Tern nests in Québec, we feel the urgency to prepare a recovery plan for this species which clearly shows signs of decline. A revision of the Caspian Tern situation in Québec has already been made in 1997 (F. Shaffer, M. Robert and P. Laporte, unpubl. manuscript), but didn't follow through since it was not retained by the COSEPAC as a species at risk. In our opinion, this decision was based on an arbitrary reason since scientific data clearly shows the precarious status of the Caspian Tern on the North Shore. Not to mention that this species' distribution in Eastern Canada is very restricted and could constitute a distinct population from the Caspian Tern of Western Canada which shows no sign of decline.

7. Partnership

7.1 POTENTIAL PARTNERS

This section presents a list of the principal governmental and non governmental organizations who could collaborate in the implementation of the different steps of this waterbird conservation plan:

Association des amis et des amies du Cap Tourmente (AACT)
Association des membres et amis pour la protection de la Réserve nationale de
faune du lac Saint-Francois (AMAPRE)
Association québécoise des groupes d'ornithologues (AQGO)
Attention Frag'Îles
Bird Studies Canada (BSC)
Canadian Nature Federation (CNF)
Corporation P.A.R.C. Bas-Saint-Laurent
Department of Canadian Heritage / Parks Canada (PC)
Department of Fisheries and Oceans Canada (DFO)
Ducks Unlimited (DU)
Environment Canada (EC) / Canadian Wildlife Service (CWS)
Fondation de la faune du Québec (FFQ)
Hydro-Québec (HQ)
Makivik Corporation
Ministère de l'Environnement du Québec (MENVIQ)
Montréal Biodôme
Québec-Labrador Foundation (QLF)
Société de la faune et des parcs du Québec (FAPAQ)
Société des établissements de plein air du Québec (SEPAQ)
Société Duvetnor Ltée
Trappers Association (Premières Nations)
Union québécoise pour la conservation de la nature (UQCN)
Université de Montréal
Université du Québec à Montréal
Université du Québec à Rimouski
Université Laval
Wildlife Habitat Canada (WHC)

All these interveners can eventually collaborate according to their respective expertise in various fields such as research, population monitoring, habitat protection and management, communications, education, waterbird promotion, and funding of conservation related projects. Several contacts and collaborations already exist between these partners especially at the level of information exchange and logistic support. However, integration of these collaborations for waterbird conservation under NABCI requires the development of initiatives and conservation plans which must offer financial strategies for concrete actions to be taken.

7.1.1 Initiatives, joint ventures and collaborations

- **Eastern Habitat Joint Venture (EHJV)**

The objective of the Eastern Habitat Joint Venture is to «protect and maintain the integrity of Eastern Canada wetlands in order to maintain and increase waterfowl species and other migratory bird species associated with wetlands». Until now CWS, FAPAQ, DU, WHC, and numerous local conservation groups, municipalities, landowners and interested persons have contributed to wetland conservation projects. Since the present waterbird conservation plan, written in the framework of NABCI, deals with several species associated with wetlands, there is reason to maintain, increase and initiate concrete conservation actions for waterbirds under the EHJV.

- **Important Bird Areas (IBA)**

American Bittern,
Jean-Luc DesGranges

The objective of the IBA program is to identify and protect an array of nesting sites, migratory stopovers and winter ranges considered crucial for a large range of North American birds. It is a worldwide initiative of Bird Life International conducted in association with its national partners. In Québec, a total of 89 IBAs (a 1999 list) have been identified and proposed as important sites for waterbirds (see Appendix 2).

- **Marine Protected Areas (MPA)**

Many seabirds depend on coastal and extra-coastal habitats to reproduce, feed, molt and use as stopovers during migration and for wintering. The extra-coastal habitats include the polynia, cold water rise areas and the waters around nesting sites. Coastal habitats include notably jagged coasts, salt water, brackish and soft water marshes, and river estuaries. Environment Canada works for the protection of important marine zones in collaboration with two other federal ministries: Parks Canada (Department of Canadian Heritage) and Fisheries and Oceans Canada. Even if each ministry plays a distinct but complementary role in coastal and extra-coastal ecosystems, each one's effort can contribute to waterbird conservation and at the same time support NABCI objectives.

- **Northern Ecosystem Initiative**

The goal of this initiative is to get a better scientific understanding of northern ecosystems to favour sustainable development in the North. It also

encourages partnership development with northern communities. It is clear that the North is in transformation and that waterbird populations are threatened by a variety of problems such as long distance transportation of toxic substances and climate change. Our knowledge on waterbirds of BCRs 7 and 3 is insufficient. It would thus be beneficial to take advantage of this initiative and develop monitoring and research projects with the Makivik Corporation and the participating communities, to ensure waterbird conservation. Such projects, especially on the Common Eider, have been conducted in the past with local community participation, the Makivik Corporation and CWS.

- **St. Lawrence Action Plan (SLAP)**

One of the objectives of this agreement is to gain and diffuse knowledge on the St. Lawrence to managers, riverside communities and the population.

The implementation of this plan is possible thanks to the collaboration between the Ministère de l'Environnement du Québec, FAPAQ, Environment Canada, Department of Canadian Heritage and Fisheries and Oceans Canada. Several monitoring programs, such as those on seabirds of the North Shore sanctuaries, the Northern Gannet population of the Gulf of St. Lawrence and the Great Blue Heron population of the St. Lawrence in general, are used as indicators of the health status of the St. Lawrence ecosystem. In the perspective of a SLAP-IV, it would be appropriate to match these waterbird monitoring elements with NABCI conservation principles.

7.1.2 Conservation and education initiatives on waterbirds by non-governmental organizations (NGO)

Certain non-governmental organizations play an important role in habitat conservation as well as in the broadcast of educational information on waterbirds. This is the case of the Société Duvetnor who works on the islands of the St. Lawrence Estuary and protects habitats of national importance for several seabird and other waterbird species. This organization also collaborates with CWS to conduct surveys on the estuary's islands and is also implicated with FAPAQ in the Double-crested Cormorant population control program.

Québec-Labrador Foundation (QLF) plays an important role in outreach with North Shore communities. Their educational program places an emphasis on seabird conservation and ecology in this region and contributes in reducing certain secular practices of seabird exploitation. They have also initiated a Red-throated Loon survey outside North Shore sanctuaries, which is complementary to seabird monitoring conducted by CWS in this region.

The group Attention Frag'Îles's objective is to promote the heritage of Magdalen Islands. It is through information outreach and education that Attention Frag'Îles contributes to the protection of species at risk and of

fragile habitats of the archipelago. It regularly participates in Magdalen Islands waterbird surveys conducted by CWS.

The Société des établissement de plein air du Québec (SEPAQ) is responsible for the interpretation program of the Île Bonaventure and Rocher Percé Conservation Park. This organization broadcasts information on seabirds to park visitors and maintains a close collaboration with CWS on this matter.

Information on waterbirds is also distributed by the *Association des membres et amis de la Réserve nationale de faune du lac St-François* (AMAPRE), the *Association des amis et des amies du Cap Tourmente* (AACT) and the *Corporation P.A.R.C. Bas St-Laurent* at Isle-Verte. These three groups maintain interpretation activities in National Wildlife Areas managed by CWS.

The Montreal Biodôme has recreated the St. Lawrence ecosystems in a closed environment and maintains several waterbird species associated with these ecosystems in captivity. Frequently visited by schools and tourists, the Biodôme is an educational and broadcasting tool that is accessible year round. A close collaboration with CWS allows the maintenance of the stocks of captive birds. Furthermore, physiology and ethology research can be conducted by universities and wildlife-related governmental agencies.

8. Proposed budget to carry out the Waterbird Conservation Plan for the Québec region

The budget proposed here (Table 8) is a realistic projection on one hand in as much as it would meet the needs expressed earlier, and is idealistic on the other hand if we take into account the decrease in resources injected over the past years for waterbird monitoring and research.

Table 8: Proposed annual budget for waterbird conservation (seabirds and other waterbirds) in the Québec region

Monitoring and research	AP	Annual wages ($) + marginal benefits	Annual operation costs ($)
Surveys on seabirds	4.0 (1)	400 000	50 000
Research on seabirds	* (2)		60 000
Surveys on aquatic birds other than seabirds	2.0 (3)	200 000	30 000
Research on aquatic birds other than seabirds	* (4)		30 000
Conservation actions	**AP**	**Annual wages ($) + marginal benefits**	**Annual operation costs ($)**
Law enforcement and surveillance	2.0 (5)	70 000	40 000
Fox control (estuary islands, North Shore Sanctuaries, Brion Island and Magdalen Islands)	(6)		100 000
Surveys and control measures for over abundant species (Gulls and cormorants)	(6)		50 000
Recovery of tern colonies in Gaspésie and Magdalen Islands	(6)		20 000
Total	**8.0**	**670 000**	**380 000**

(1) This amount includes both persons presently working for the seabird program of CWS, Québec region.
(2) The research involves CWS personnel, but master and doctorate level students are also involved, in which case their wages and expenses are included in the operation costs.
(3) Presently, no one is employed full time to elaborate and coordinate a survey program on waterbirds other than seabirds.
(4) The research is coordinated by CWS employees, but master and doctorate level students are involved, such that their wages are included in operation costs.
(5) Two guards are already employed for a few North Shore MBS on a 6 month period = 1.0 AP.
(6) The wages for persons on contract are part of the operation costs.

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Great Egret,
Jean-Luc DesGranges

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Appendix 1.

Waterbird prioritization according to the Rocky Mountain Bird Observatory database

Red-throated Loon,
Yves Aubry

Appendix 1a. Attributed classification for the different prioritization criteria for the waterbirds of BCR 3, during nesting*
(refer to data dictionary in appendix for field definitions)

Species	G_RA	G_BD	G_ND	AI_B	TN_L	TB_L	XPOP	PT_B	TRENDINT	B_TOTALSCO
Pacific Loon	4	2	3	4	3	2		3	Abs. data	21
Red-throated Loon	4	1	1	4	3	2		3	Abs. data	18
Common Loon	4	1	2	3	3	2		3	Abs. data	18
Pomarine Jaeger	3	2	1	5	2	2		3	Abs. data	18
Parasitic Jaeger	4	1	1	5	2	2		3	Abs. data	18
Arctic Tern	3	1	2	5	2	2		3	Abs. data	18
Black Guillemot	3	2	1	5	2	2		3	Abs. data	18
Long-tailed Jaeger	3	1	1	5	2	2		3	Abs. data	17
Thick-billed Murre	2	3	1	4	2	2		3	Abs. data	17
Glaucous Gull	3	2	1	5	1	1		3	Abs. data	16
Herring Gull	2	1	1	3	1	1		3	Abs. data	12

*From the Rocky Mountain Bird Observatory database. The species included here are those included in this database and are present in BCR 3 in Québec during nesting (exceptional and unusual species are excluded).

Appendix 1b. Attributed classification for the different prioritization criteria for the waterbirds of BCR 7, during nesting*
(refer to data dictionary in appendix for field definitions)

Species	G_RA	G_BD	G_ND	AI_B	TN_L	TB_L	XPOP	PT_B	TRENDINT	B_TOTALSCO
Bonaparte's Gull	3	2	3	4	2	2		3	Abs. data	19
Red-throated Loon	4	1	1	3	3	2		3	Abs. data	17
Arctic Tern	3	1	2	3	2	2		3	Abs. data	16
Herring Gull	2	1	1	3	1	1	6,44	3	Abs. data	12
Common Loon	4	1	2							
Double-crested Cormorant	3	2	1							
Great Black-backed Gull	2	3	1							

*From the Rocky Mountain Bird Observatory database. The species included here are those included in this database and are present in BCR 7 in Québec during nesting (exceptional and unusual species are excluded).

Appendix 1c. Attributed classification for the different prioritization criteria for the waterbirds of BCR 8, during nesting*
(refer to data dictionary in appendix for field definitions)

Species	G_RA	G_BD	G_ND	AI_B	TN_L	TB_L	XPOP	PT_B	TRENDINT	B_TOTALSCO
Bonaparte's Gull	3	2	3	4	2	2		3	Abs. data	19
Black Guillemot	3	2	1	5	2	2		3	Abs. data	18
Red-throated Loon	4	1	1	2	3	2		3	Abs. data	16
Herring Gull	2	1	1	3	1	1	77,60	5	Sign. decl.	14
Black-headed Gull	3	1	1							
Great Black-backed Gull	2	3	1							

*From the Rocky Mountain Bird Observatory database. The species included here are those included in this database and are present in BCR 8 in Québec during nesting (exceptional and unusual species are excluded).

Appendix 1d. Attributed classification for the different prioritization criteria for the waterbirds of BCR 12, during nesting*
(refer to data dictionary in appendix for field definitions)

Species	G_RA	G_BD	G_ND	AI_B	TN_L	TB_L	XPOP	PT_B	TRENDINT	B_TOTALSCO
American Bittern	4	1	2	5	3	3	10,60	4	Mod. decl.	22
Virginia Rail	4	1	2	5	2	3	13,70	3	Uncertain	20
Black Tern	3	1	2	2	3	4	0,75	4	Poss. decl.	19
Common Loon	4	1	2	4	3	2	7,47	1	Sign. incr.	17
Green-backed Heron	4	1	2	2	2	2	1,92	3	Uncertain	16
Sora	3	1	1	2	2	2	0,44	5	Sign. decl.	16
Double-crested Cormorant	3	2	1	2	1	2	0,59	3	Uncertain	14
Great Blue Heron	4	1	1	3	2	2	6,27	1	Sign. incr.	14
Black-crowned Night-Heron	4	1	1	1	2	2	0,16	3	Abs. données	14
Common Tern	3	1	1	2	2	2	0,38	3	Uncertain	14
Pied-billed Grebe	4	1	1	2	2	2	2,19	1	Sign. incr.	13
Common Moorhen	3	1	1	1	2	2	0,17	3	Abs. données	13
American Coot	3	1	1	1	1	2	0,15	4	Poss. decl.	13
Ring-billed Gull	1	3	1	4	1	1	10,40	1	Sign. incr.	12
Herring Gull	2	1	1	2	1	1	1,73	3	Uncertain	11
Bonaparte's Gull	3	2	3							

*From the Rocky Mountain Bird Observatory database. The species included here are those included in this database and are present in BCR 12 in Québec during nesting (exceptional and unusual species are excluded).

Appendix 1e. Attributed classification for the different prioritization criteria for the waterbirds of BCR 13, during nesting*
(refer to data dictionary in appendix for field definitions)

Species	G_RA	G_BD	G_ND	AI_B	TN_L	TB_L	XPOP	PT_B	TRENDINT	B_TOTALSCO
American Bittern	4	1	2	5	3	3	2,09	2	Poss. incr.	20
Black Tern	3	1	2	2	3	4	0,22	4	Poss. decl.	19
Least Bittern	4	2	1	2	3	3	0,92	3	Uncertain	18
Virginia Rail	4	1	2	4	2	3	2,34	2	Poss. incr.	18
Common Loon	4	1	2	2	3	3	0,42	1	Sign. incr.	16
Great Blue Heron	4	1	1	4	2	3	4,15	1	Sign. incr.	16
Green-backed Heron	4	1	2	2	2	3	2,33	2	Stable	16
Black-crowned Night-Heron	4	1	1	2	2	3	0,28	3	Uncertain	16
Common Tern	3	1	1	3	2	3	0,96	3	Uncertain	16
Pied-billed Grebe	4	1	1	2	2	3	0,57	2	Mod. incr.	15
Sora	3	1	1	2	2	3	0,03	3	Uncertain	15
Double-crested Cormorant	3	2	1	3	1	2	0,63	2	Poss. incr.	14
Common Moorhen	3	1	1	2	2	3	0,31	2	Stable	14
American Coot	3	1	1	2	1	3	0,01	3	Uncertain	14
Ring-billed Gull	1	3	1	5	1	1	12,80	2	Poss. incr.	14
Herring Gull	2	1	1	2	1	1	0,68	4	Poss. decl.	12
Great Black-backed Gull	2	3	1	1	1	1	0,03	3	Abs. data	12

*From the Rocky Mountain Bird Observatory database. The species included here are those included in this database and are present in BCR 13 in Québec during nesting (exceptional and unusual species are excluded).

Appendix 1f. Attributed classification for the different prioritization criteria for the waterbirds of BCR 14, during nesting*
(refer to data dictionary in appendix for field definitions)

Species	G_RA	G_BD	G_ND	AI_B	TN_L	TB_L	XPOP	PT_B	TRENDINT	B_TOTALSCO
American Bittern	4	1	2	5	3	3	4,09	3	Uncertain	21
Common Tern	3	1	1	5	2	3	7,49	5	Sign. decl.	20
Leach's Storm-Petrel	3	3	1	4	2	3	0,00	3	Abs. data	19
Green-backed Heron	4	1	2	2	2	3	0,35	5	Sign. decl.	19
Roseate Tern	5	2	2	2	2	3	0,00	3	Abs. data	19
Black Guillemot	3	2	1	5	2	3	0,00	3	Abs. data	19
Least Bittern	4	2	1	2	3	3	0,00	3	Abs. data	18
Common Loon	4	1	2	3	3	3	2,45	1	Sign. incr.	17
Great Blue Heron	4	1	1	3	2	3	2,90	3	Uncertain	17
Black-crowned Night-Heron	4	1	1	2	2	3	0,54	4	Poss. decl.	17
Virginia Rail	4	1	2	2	2	3	0,46	3	Uncertain	17
Great Black-backed Gull	2	3	1	4	1	1	8,27	5	Sign. decl.	17
Black-legged Kittiwake	1	2	2	5	2	2	0,00	3	Abs. data	17
Common Murre	2	3	2	2	2	3	0,00	3	Abs. data	17
Arctic Tern	3	1	2	2	2	3	0,00	3	Abs. data	16
Razorbill	2	3	1	2	2	3	0,00	3	Abs. data	16
Atlantic Puffin	3	2	1	2	2	3	0,00	3	Abs. data	16
Pied-billed Grebe	4	1	1	2	2	3	0,71	2	Poss. incr.	15
Double-crested Cormorant	3	2	1	5	1	1	8,03	1	Sign. incr.	14
Sora	3	1	1	2	2	3	0,08	2	Poss. incr.	14
Common Moorhen	3	1	1	1	2	3	0,02	3	Abs. data	14
Herring Gull	2	1	1	3	1	1	4,56	5	Sign. decl.	14
Great Cormorant	1	2	1	2	2	2	0,00	3	Abs. data	13
American Coot	3	1	1	1	1	3	0,00	3	Abs. data	13
Ring-billed Gull	1	3	1	2	1	1	0,59	1	Sign. incr.	10
Horned Grebe	4	1	2							
Black-headed Gull	3	1	1							

*From the Rocky Mountain Bird Observatory database. The species included here are those included in this database and are present in BCR 14 in Québec during nesting (exceptional and unusual species are excluded).

Appendix 1g. Attributed classification for the different prioritization criteria for the waterbirds of BCR 3, during wintering period*
(refer to data dictionary in appendix for field definitions)

Species	G_RA	G_BD	G_ND	AI_W	TN_W	G_TB	XPOP	G_PT	TRENDINT	W_TOTALSCO
Glaucous Gull	3	2	1	5	1	1		2	Abs. data	15
Herring Gull	2	1	1	2	1	1		3	Abs. data	11
Black Guillemot	3	2	1			2		2	Abs. data	

*From the Rocky Mountain Bird Observatory database. The species included here are those included in this database and are present in BCR 3 in Québec during wintering period (exceptional and unusual species are excluded).

Appendix 1h. Attributed classification for the different prioritization criteria for the waterbirds of BCR 7, during wintering period*
(refer to data dictionary in appendix for field definitions)

Species	G_RA	G_BD	G_ND	AI_W	TN_W	G_TB	XPOP	G_PT	TRENDINT	W_TOTALSCO
Iceland Gull	4	4	3	2	2	2		1		18
Glaucous Gull	3	2	1	5	1	1		2		15
Great Black-backed Gull	2	3	1	4	1	1		1		13
Herring Gull	2	1	1	2	1	1	6,44	3	Abs. data	11

*From the Rocky Mountain Bird Observatory database. The species included here are those included in this database and are present in BCR 7 in Québec during wintering period (exceptional and unusual species are excluded).

Appendix 1i. Attributed classification for the different prioritization criteria for the waterbirds of BCR 8, during wintering period*
(refer to data dictionary in appendix for field definitions)

Species	G_RA	G_BD	G_ND	AI_W	TN_W	G_TB	XPOP	G_PT	TRENDINT	W_TOTALSCO
Iceland Gull	4	4	3	4	2	2		1		20
Glaucous Gull	3	2	1	5	1	1		2		15
Great Black-backed Gull	2	3	1	4	1	1		1		13
Black Guillemot	3	2	1			2		2	Abs. data	
Herring Gull	2	1	1			1	77,60	3	Sign. decl.	

*From the Rocky Mountain Bird Observatory database. The species included here are those included in this database and are present in BCR 8 in Québec during wintering period (exceptional and unusual species are excluded).

Appendix 1j. Attributed classification for the different prioritization criteria for the waterbirds of BCR 12, during wintering period* (refer to data dictionary in appendix for field definitions)

Species	G_RA	G_BD	G_ND	AI_W	TN_W	G_TB	XPOP	G_PT	TRENDINT	W_TOTALSCO
Great Black-backed Gull	2	3	1	5	1	1		1		14
Herring Gull	2	1	1	4	1	1	1,73	3	Uncertain	13

*From the Rocky Mountain Bird Observatory database. The species included here are those included in this database and are present in BCR 12 in Québec during wintering period (exceptional and unusual species are excluded).

Appendix 1k. Attributed classification for the different prioritization criteria for the waterbirds of BCR 13, during wintering period* (refer to data dictionary in appendix for field definitions)

Species	G_RA	G_BD	G_ND	AI_W	TN_W	G_TB	XPOP	G_PT	TRENDINT	W_TOTALSCO
Iceland Gull	4	4	3	3	2	2		1		19
Glaucous Gull	3	2	1	3	1	1		2		13
Herring Gull	2	1	1	3	1	1	0,68	3	Poss. decl.	12
Great Black-backed Gull	2	3	1	3	1	1	0,03	1	Abs. data	12
Ring-billed Gull	1	3	1	3	1	1	12,80	1	Poss. incr.	11

*From the Rocky Mountain Bird Observatory database. The species included here are those included in this database and are present in BCR 13 in Québec during wintering period (exceptional and unusual species are excluded).

Appendix 1l. Attributed classification for the different prioritization criteria for the waterbirds of BCR 14, during wintering period* (refer to data dictionary in appendix for field definitions)

Species	G_RA	G_BD	G_ND	AI_W	TN_W	G_TB	XPOP	G_PT	TRENDINT	W_TOTALSCO
Iceland Gull	4	4	3	5	2	2		1		21
Great Black-backed Gull	2	3	1	5	1	1	8,27	1	Sign. decl.	14
Herring Gull	2	1	1	4	1	1	4,56	3	Sign. decl.	13
Glaucous Gull	3	2	1	3	1	1		2		13
Great Cormorant	1	2	1			2	0,00	3	Abs. data	
Black-legged Kittiwake	1	2	2			2	0,00	5	Abs. data	
Black Guillemot	3	2	1			2	0,00	2	Abs. data	

*From the Rocky Mountain Bird Observatory database. The species included here are those included in this database and are present in BCR 14 in Québec during wintering period (exceptional and unusual species are excluded).

DATABASE DICTIONARY

Field title definition in the Partners in Flight prioritization database
for the Bird Conservation Regions (BCRs)

Here is a brief description of the column titles in the prioritization database. It must not be forgotten that the global scores are those which remain constant for a species throughout its distribution range; the local scores are specific for each Bird Conservation Region (see Carter et al. 2000 for a more detailed explanation of the classes and the way in which they were attributed).

SPECIES: Common name according to the nomenclature of the Commission internationale des noms français d'oiseaux (1993)
G_RA: Relative abundance (global class)
G-BD: Distribution during nesting period (global class)
G-ND: Distribution outside of nesting period (global class)
AI_B: Distribution importance during the nesting period (local class)
AI_W: Importance of wintering grounds (local class)
TB_L: Risks during nesting period (local class)
G-TB: Risks during nesting period (global class)
TN_L: Risks outside of nesting period (global class for migrating populations; local class for resident populations)
TN_W: Risks in winter for non-breeders (local class)
XPOP: Percentage of the population of a species in the BCR
G-PT: Population trend (global class)
PT_B: Nesting population trend (local class; based on the Relevé des Oiseaux Nicheurs (RON))
TrendInt: Trend interpretation (of PT_B)
B_totalscore: Total priority score during nesting period (G-RA+G-BD+G-ND+AI_B+TN_L+TB_L+ PT_B)
W_totalscore: Total priority score during wintering period (G-RA+G-BD+G-ND+AI_W+TN_W+G-TB+G-PT)

The database offers other information, such as the source of the information which is not presented here due to a concern for conciseness.

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Appendix 2.

List of designated and proposed Important Bird Areas (IBA) in Québec specifically for the waterbirds presented in this conservation plan.

Corossol Island,
Jean-François Rail

Appendix 2: list of designated and proposed Important Bird Areas (IBA) in Québec[1], specifically for the waterbirds which are the object of this conservation plan

Name of the IBA	BCR	Aimed species[2] and proposed criteria[3]
Akpatok Island[4]	3	**TBMU**, TOUTES
Cape Wolstenholme (Digges Sound)[4]	3	**BLGU, ICGU, TBMU**, TOUTES
North-Easthern Cost of James Bay[4]	7	**BLGU**
Baie des Loups	8	**ATPU, RAZO, GRCO, ALL**
Brador Bay	8	**RAZO,ATPU**
Corossol Island	8	BLKI, **GBBG, HERG, RAZO**, DCCO, ALL
Falaise aux Goélands/Pointe de l'Est (Anticosti)	8	BLKI, **GRCO**
Île à Calculot	8	**COTE, BHGU**
Île du Lac	8	**GRCO**
Île Nue de Mingan	8	**HERG, BHGU**
La Grosse Boule	8	**HERG**, DCCO
Perroquets Island (Mingan)	8	**COTE**
Saint-Augustin MBS	8	**HERG**
Saint-Fulgence marsh	8	**HERG**
Sainte-Marie Islands	8	**COMU**, COMU, **RAZO, HERG, GBBG, GRCO, ALL**[5]
Beaudet Reservoir (Victoriaville)	13	*RBGU*
Beauharnois Dam	13	*BLTE* , RBGU, **HERG**
Cap Tourmente	13	**HERG**
Deslauriers Island	13	**RBGU**, *BCNH*
Île aux Hérons MBS	13	*BLTE, BCNH, GBHE, GREG,* **HERG**
Îles de Contrecoeur NWA	13	**RBGU**
Île de la Couvée	13	**RBGU**
Lac Saint-François NWAand surrounding waters	13	*BLTE*
Lake Saint-Pierre Archipelago	13	*BCNH, BLTE, GBHE*
Nicolet/Baie-du-Febvre	13	*BLTE*
Plaisance Wildlife Reserve	13	*BLTE, LEBI*
Saint-Barthélémy floodplains	13	*BLTE*
Alouettes Flats/ Saguenay's Mouth	14	DCCO
Baie Comeau	14	**BOGU, GLGU**
Baie de l'Île-Verte marsh	14	**NOGA**
Barachois de Malbaie	14	BLKI, **HERG**
Battures aux Loups Marins	14	*BCNH*
Bicquette Island	14	*HERG*
Bonaventure Island	14	**NOGA**, BLKI, **GBBG**, **HERG, COMU, RAZO, ALL**
Brion Island	14	BLKI, **GBBG, GRCO, NOGA**
Cap d'Espoir	14	BLKI, **NOGA, RAZO**
Cap Noir (Madgalen Islands)	14	**GRCO**
Carleton Beach Ridge	14	**COTE, HERG**
Dune du Sud (Madgalen Islands)	14	**GRCO, NOGA**
Escoumins Bay and Grandes-Bergeronnes	14	**ICGU**, BLKI, **GBBG, HERG**
Forillon peninsula	14	BLKI, **BLGU**
Gaspé Bay	14	BCNH, **COTE, GBBG**
Havre aux Basques Lagoon and plage de l'Ouest	14	**BHGU, COTE**, *ROTE*
Île aux Basques and the Razades	14	**BLGU**, BLKI, DCCO, **HERG, RTLO**
Île aux Fraises	14	**HERG, GBBG**

[1]Source: Canadian IBA program site

[2]Alphabetical codes for the species names used for North American Bird Banding

[3]Significant waterbird ou colonial seabird concentration: on a **worldwide**, continental or *national* level

[4]Included areas (at least partially) in Nunavut territory, but included in the present conservation plan

[5]Waterbird or colonial seabird concentration, all species included

[6]Source: Québec IBA program site (http://ecoroute.uqcn.qc.ca/zico/accueil.htm)

Appendix 2 (continued): list of designated and proposed Important Bird Areas (IBA) in Québec[1], specifically for the waterbirds which are the object of this conservation plan

Name of the IBA	BCR	Aimed species[2] and proposed criteria[3]
Île aux Goélands	14	**GRCO**
Île aux Loups Marins (Madgalen Islands)	14	DCCO
Île aux Pommes	14	DCCO, **HERG, GBBG**
Île Blanche	14	**BLGU**, *BCNH*, DCCO
Île d'Entrée cliffs (Madgalen Islands)	14	**GRCO**, BLKI
Îles du Pot à l'Eau-de-vie	14	**RAZO**, **BLGU**, DCCO, *BCNH*
Îles Les Boules (Bas St-Laurent)	14	**HERG, NOGA**
Îles Pèlerins	14	**RAZO, HERG**, DCCO, *BCNH*
Ilot C (Madgalen Islands)	14	**COTE, GBBC, NOGA**, *ROTE*
La Malbaie-Pointe-au-Pic	14	**BLGU**
Le Pilier de Bois	14	DCCO, *BCNH*
Le Pilier de Pierre	14	**RBGU**
Le Rochers aux Oiseaux	14	**NOGA**, BLKI
Paquet Island (Madgalen Islands)	14	**COTE**, *ROTE*
Montmagny	14	**HERG**, *BCNH*
Pointe-au-Père marsh	14	**NOGA**
Pointe de l'Est (Madgalen Islands)	14	**NOGA,** HOGR
Pointe Saint-Pierre et Île Plate	14	**RAZO**
Rocher Le Corps Mort (Madgalen Islands)	14	**GRCO**
Shag Island (Madgalen Islands)	14	**GRCO**
Shigawake/Newport	14	**GBBG, HERG, NOGA**
Tadoussac	14	BLKI, **HERG, ICGU**
Complementary areas (under study; non-specified or confirmed criteria) in Québec[6]		
Boatswain Bay[4]	7	YERA restricted to one biome (other IBA criteria)
Cabbage Willows Bay	7	YERA restricted to one biome (other IBA criteria)
Cayes à Meck	8	COTE
Belle-Isle Strait	8	groups of puffins and other seabirds
Lake Abitibi Marsh	8	BLTE
Petite Île Sainte-Geneviève	8	DCCO
Beauport - Île d'Orléans canal	13	RBGU (15000-22000 breeding pairs)
Boivin Lake	13	LEBI
Dickerson Island	13	GBHE, GREG
Île aux Grues and Île aux Oies	13	YERA
Philipsburg	13	LEBI
Saint-Ours Island	13	RBGU
Saint-Timothée Marsh et Saint-Étienne	13	LEBI, BLTE, GREG
Cacouna	14	YERA, BCNH
Île aux Coudres	14	YERA
Kamouraska Islands	14	BCNH
Laval Island	14	DCCO
Les Trois Soeurs, Caps Blanc and Barré (Percé)	14	BLKI
Magdalen Island Archipelago	14	ROTE, HOGR
Portneuf sandbank	14	gull roosting area
Ragueneau Archipelago	14	gulls
Rocher Percé	14	BLKI, GRCO

[1]Source: Canadian IBA program site

[2]Alphabetical codes for the species names used for North American Bird Banding

[3]Significant waterbird ou colonial seabird concentration: on a **worldwide**, continental or *national* level

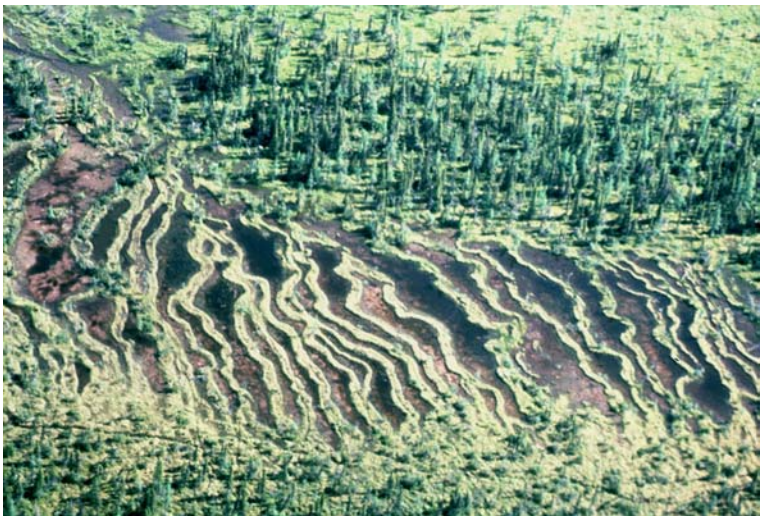
[4]Included areas (at least partially) in Nunavut territory, but included in the present conservation plan

[5]Waterbird or colonial seabird concentration, all species included

[6]Source: Québec IBA program site (http://ecoroute.uqcn.qc.ca/zico/accueil.htm)

Appendix 3.

List of the important waterbird areas which are the object of this conservation plan in Québec and their actual protection status



Reticulated peat bog,
André Nadeau

Appendix 3a. BCR 14: list of the important waterbird areas which are the object of this conservation plan in Québec and their actual protection status[1]

#site	Area name	Federal status			Provincial status					Other status		
		MBS	NWA	NP	PP	ER	NHA	WRF	WRS	FFQ	ZICO	RAMSAR
1	**Parc de l'île-Bonaventure-et-du-Rocher-Percé**	X			X						x[2], p[3]	
2	**Les Trois Soeurs**										P	
3	**Parc national de Forillon**			X							X	
4	**Les Rochers aux Oiseaux (IDLM)**	X									X	
5	**Île Brion (IDLM)**					X					X	
6	**Île d'Entrée (IDLM)**										x, P	
7	**Île Paquet (IDLM)**										X	
8	**Île aux Goélands (IDLM)**										X	
9	**Îlots de la lagune de Grande Entrée (IDLM)**										x, P	
10	**Îlets des Étroits (IDLM)**										P	
11	**Île Shag (IDLM)**										X	
12	**Pointe Reddish (IDLM)**										P	
13	**Île aux Loups Marins (IDLM)**										P	
14	**Lagune et banc de Carleton**							X		X	X	
15	**Île Taylor**											
16	**Secteur Paspébiac-Shigawake**											
17	**Saint-Godefroi**											
18	**Falaises côtières de Shigawake-Newport**										X	
19	**Îlots Mahy**											
20	**Cap d'Espoir**										X	
21	**Île Plate**										X	
22	**Sandy Beach (baie de Gaspé)**										X	
23	**Falaises côtières de Cloridorme-Marsoui**											
24	**ROM de Saint-Omer**	X										
25	**Falaises côtières de Pointe Saint-Pierre-Douglastown**										X	
26	**La Vieille**											
27	**Île Bicquette**		X								X	
28	**Île aux Pommes**										X	
29	**Île aux Basques et Les Razades**	X									X	
30	**Île Rouge**											
31	**Batture aux Alouettes**							X			X	
32	**Île Blanche**		X								X	
33	**Îles du Pot à l'Eau-de-Vie**		x								X	

[1]MBS=Migratory Bird Sanctuary; NWA=National Wildlife Area; NP=National Park: PP=Provincial Park; ER=Ecological Reserve; NHA=No-Hunting Areas; WRF=Wildlife Refuge; WRS=Wildlife Reserve; FFQ=Site protected by the Fondation de la Faune du Québec; IBA=Important Bird Areas in Canada (http://www.ibacanada.com/); RAMSAR=site designated for the RAMSAR Convention list (in relation to wetlands of international importance)

[2]The small letter signifies that the site is only partially covered by this protection status

[3]P=Site susceptible of being designated in Québec (non-specified criteria). Source: Québec IBA program site (http://ecoroute.uqcn.qc.ca/zico/accueil.htm)

Appendix 3a (continued). BCR 14: list of the important waterbird areas which are the object of this conservation plan in Québec and their actual protection status[1]

#site	Area name	Federal status			Provincial status					Other status		
		MBS	NWA	NP	PP	ER	NHA	WRF	WRS	FFQ	ZICO	RAMSAR
34	**Îles Pèlerins**		x[2]								X	
35	**Kamouraska Islands**		X								P[3]	
36	**Le Pilier de Bois**										X	
37	**Le Pilier de Pierre**										X	
38	**Battures aux Loups Marins**										X	
39	**Ragueneau Archipelago**										P	
40	**Laval Island**										P	
41	**Île aux Oeufs**											
42	**Îles de Mai**											
43	**Brunelle Bay**											
44	**Pointe de l'Est (Madgalen Islands)**		x					X			X	
45	**Havre aux Basques Lagoon and Plage de l'Ouest**						x				X	
46	**Barachois de Malbaie**										X	
47	**Barachois de Bonaventure**											
48	**Barachois de Chandler**											
49	**Barachois de New Richmond**											
50	**Pointe-à-la-Croix Marsh**											
51	**Saint-André-de-Kamouraska Marsh**											
52	**Baie de l'Isle Verte NWA**	x	X								x	X
53	**l'Isle-Verte MBS**	X	X								X	
54	**Cacouna Marsh**										X	
55	**Rivière-du-Loup Marsh**											
56	**Îlets Boisés**											

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Appendix 3b. BCR 13: list of the important waterbird areas which are the object of this conservation plan in Québec and their actual protection status[1]

#site	Area name	Federal status			Provincial status					Other status		
		MBS	NWA	NP	PP	ER	NHA	WRF	WRS	FFQ	ZICO	RAMSAR
1	**Lac Saint-François NWA**		X								X	
2	**Îles de la Paix NWA**	X	X									
3	**Lochaber Bay**											
4	**Baie Noire**								X		X	
5	**La Pentecôte Bay**								X		X	
6	**Grenville-Pointe-aux-Chênes**											
7	**Oka-Pointe-aux-Anglais**											
8	**Rigaud Bay-Pointe Raquette**											
9	**Laprairie Nord Basin**											
10	**Boucherville Islands**				X							
11	**Rivière du Sud (vallée du Richelieu)**											
12	**Varennes Islands**											
13	**Verchères Islands**											
14	**Contrecoeur Islands**		X								X	
15	**Sorel Islands**									x[2]	X	X
16	**Saint-François Bay**									x		X
17	**Baie Lavallière**									X		X
18	**Lake Saint-Paul**											
19	**Donnacona-Portneuf Sector**											
20	**Cap Tourmente**		X				x				X	X
21	**Montmagny Archipelago**										p[3]	
22	**Beauharnois Marsh**						X				P	
23	**Dickerson Island**										P	
24	**Bienville Island**					x						
25	**Marais aux Grenouillettes**											

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[2]The small letter signifies that the site is only partially covered by this protection status

[3]P=Site susceptible of being designated in Québec (non-specified criteria). Source: Québec IBA program site (http://ecoroute.uqcn.qc.ca/zico/accueil.htm)

Appendix 3b (continued). BCR 13: list of the important waterbird areas which are the object of this conservation plan in Québec and their actual protection status[1]

#site	Area name	Federal status			Provincial status					Other status		
		MBS	NWA	NP	PP	ER	NHA	WRF	WRS	FFQ	ZICO	RAMSAR
26	**Perras Bay**											
27	**McLaurin Bay**									X		
28	**Christatie Island**											
29	**Chateauguay Islets**											
30	**Îles aux Sternes (Lachine Rapids)**											
31	**Mud Pie Islands (Lachine Rapids)**											
32	**Pointe des Cascades**											
33	**Beauharnois Dam**										X	
34	**Île de la Couvée**	X									X	
35	**Champlain Bridge North Island**											
36	**Île aux Hérons MBS**	X									X	
37	**Deslauriers Islands**										X	
38	**Saint-Ours Island's West Islet**											
39	**Grande Île (Lake Saint-Pierre)**							X			X	X
40	**Lake Saint-Pierre Islets**											X
41	**Île de Bellechasse**											

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[2]The small letter signifies that the site is only partially covered by this protection status

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Appendix 3c. BCR 12: list of the important waterbird areas which are the object of this conservation plan in Québec and their actual protection status[1]

#site	Area name	Federal status			Provincial status					Other status		
		MBS	NWA	NP	PP	ER	NHA	WRF	WRS	FFQ	ZICO	RAMSAR
1	**Steamboat Island**											
2	**Petit lac Jacques-Cartier**								X			
3	**Baskatong Reservoir**											
4	**Pointe du Pin Rouge**											
5	**Lac des Castors des Quinze Islands**											

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Appendix 3d. BCR 8: list of the important waterbird areas which are the object of this conservation plan in Québec and their actual protection status[1]

#site	Area name	Federal status			Provincial status					Other status		
		MBS	NWA	NP	PP	ER	NHA	WRF	WRS	FFQ	ZICO	RAMSAR
1	**Sept-Îles Archipelago**	x[2]									x, p[3]	
2	**Mingan Archipelago National Park Reserve of Canada**	x		X							x, p	
3	**Île à la Brume MBS**	X										
4	**Baie des Loups MBS**	X									X	
5	**Île du Lac**										X	
6	**Îles de Ouapitagone**											
7	**Whale Islands**											
8	**Mistassini Islands**											
9	**Mariannes Islands**											
10	**Galibois Islands**											
11	**Îlots de Chevery**											
12	**Îles Sainte-Marie MBS (and Perroquets Island)**	X									X	
13	**Gros Mécatina MBS**	X										
14	**Saint-Augustin MBS**	X									X	
15	**Baie de Brador MBS**	X									X	
16	**Pointe Dauphiné (Anticosti Island)**											
17	**Pointe de l'Est (Anticosti Island)**					X					X	
18	**Falaise aux Goélands (Anticosti Island)**					X					X	
19	**Baie Innomée (Anticosti Island)**											
20	**Cap de la Table (Anticosti Island)**											
21	**Cape Observation (Anticosti Island)**				X							
22	**Cape Tunnel (Anticosti Island)**											
23	**Saint-Fulgence Marsh**									X	X	
24	**Saint-Gédéon Marsh**									X		
25	**Lake De Montigny Islets**											
26	**Lake Matagami**											
27	**Lake Abitibi Marsh**										P	

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[2]The small letter signifies that the site is only partially covered by this protection status

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Appendix 3e. BCR 7: list of the important waterbird areas which are the object of this conservation plan in Québec and their actual protection status[1]

#site	Area name	Federal status			Provincial status					Other status		
		MBS	NWA	NP	PP	ER	NHA	WRF	WRS	FFQ	ZICO	RAMSAR
1	**McNab Rock**											
2	**Way Rock**											
3	**Many Islands Bay**											
4	**Cabbage Willows Bay**										P[3]	
5	**Boatswain Bay[2]**	X									P	
6	**Long Island**											

[1]MBS=Migratory Bird Sanctuary; NWA=National Wildlife Area; NP=National Park: PP=Provincial Park; ER=Ecological Reserve; NHA=No-Hunting Areas; WRF=Wildlife Refuge; WRS=Wildlife Reserve; FFQ=Site protected by the Fondation de la Faune du Québec; IBA=Important Bird Areas in Canada (http://www.ibacanada.com/); RAMSAR=site designated for the RAMSAR Convention list (in relation to wetlands of international importance)

[2]The small letter signifies that the site is only partially covered by this protection status

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Appendix 3f. BCR 3: list of the important waterbird areas which are the object of this conservation plan in Québec and their actual protection status[1]

#site	Area name	Federal status			Provincial status					Other status		
		MBS	NWA	NP	PP	ER	NHA	WRF	WRS	FFQ	ZICO	RAMSAR
1	**Nastapoka Islands**											
2	**Hopewell Islands**											
3	**Digges Islands[2]**										X	
4	**Cape Wolstenholme[2]**										X	
5	**Akpatok Island[2]**										X	
6	**Eiders Islands Archipelago**											
7	**Plover Islands Archipelago**											
8	**Gyrfalcon Islands Archipelago**											

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[2]The small letter signifies that the site is only partially covered by this protection status