Seventeenth Census of Seabird Populations in the Sanctuaries of the North Shore of the Gulf of St. Lawrence, 2010

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Seabirds in the 10 migratory bird sanctuaries of the North Shore of the Gulf of St. Lawrence, Quebec, Canada, which were created in 1925, have been censused regularly for the last 85 years. The sanctuaries support 16 seabird species, many of which are found in significant numbers. From 2005 to 2010, some notable population changes were observed: large increases in Common Murres (*Uria aalge*), Razorbills (*Alca torda*), and two species of cormorants and continuing declines in Black-legged Kittiwakes (*Rissa tridactyla*) and Atlantic Puffins (*Fratercula arctica*). The status of Leach's Storm-Petrel (*Oceanodroma leucorhoa*) and Caspian Tern (*Hydroprogne caspia*) is extremely precarious because of their small breeding populations. Between 2005 and 2010, seabird numbers in the sanctuaries increased 19% overall and were stable in most sanctuaries (≤ 15% change); however, notable increases were observed at Îles Sainte-Marie (60%), Baie des Loups (47%), and Île à la Brume (44%). Nonetheless, considering historical records, increased surveillance and raising of awareness of seabird conservation in local communities near the sanctuaries of Île à la Brume, Baie des Loups, and Saint-Augustin would be most beneficial.

Key Words: Seabirds; populations; North Shore; bird sanctuaries; Gulf of St. Lawrence; larids; alcids

Introduction

The migratory bird sanctuaries on the North Shore of the Gulf of St. Lawrence were created in 1925, following large and widespread seabird population declines. The declines were mainly the result of egging and hunting, practised initially primarily for subsistence and sport (Comeau 1909), but carried out more intensely for commercial purposes from the middle of the 18th century to the beginning of the 20th (Frazar 1887; De Puyjalon 1893; Blanchard 1984). The protection afforded by the sanctuaries preserved the remaining seabird populations and allowed some species to recover somewhat.

Currently, 10 migratory bird sanctuaries on the North Shore (Figure 1) are spread over 700 km of a coastline that comprises thousands of remote islands that can host seabird colonies. Thus, the sanctuaries protect only a small fraction of these islands. Nonetheless, seabirds are concentrated in these protected areas, which seem to act as reservoirs from which new colonies can establish elsewhere on the North Shore. In fact, the sanctuaries are home to 16 breeding seabird species (Table 1), and in many cases breeding numbers are significant at the regional or provincial scale, if not at the national or even continental scale. For example, according to Chapdelaine *et al.* (2001), they support two thirds of the Razorbills (*Alca torda*) breeding in the Gulf of St. Lawrence and 28% of the North American population; close to 95% of the Atlantic Puffins (*Fratercula arctica*) breeding in Quebec are found in these sanctuaries.

Seabird breeding populations have been censused nearly every five years in North Shore sanctuaries since they were created, i.e., for the last 85 years. The results of the previous 16 quinquennial surveys have been published by Lewis (1925, 1931, 1937, 1942), Hewitt (1950), Tener (1951), Lemieux (1956), Moisan (1962), Moisan and Fyfe (1967), Nettleship and Lock (1973), Chapdelaine (1980, 1995), Chapdelaine and Brousseau (1984, 1991), Rail and Chapdelaine (2004), and Rail and Cotter (2007). This is the only monitoring program in Quebec old enough to allow insight into seabird population trends from before the 1970s. The resulting database is certainly one of the very few in North America with such a long time series and such a wealth of historic data, and it is a valuable tool for the management and conservation of seabird populations in Quebec.

In this article, we aim to update population estimates and trends of seabird populations found in the sanctuaries of the North Shore of the Gulf of St. Lawrence. We also examine the status of each species and identify specific conservation issues that should be a priority.

Methods

Survey methods have been fairly constant from one census to the next and have been described in detail by Rail and Chapdelaine (2002) for the 1998–1999 census and more concisely by Rail and Cotter (2007) for the 2005 census. In the 2010 census, the method for loons, storm-petrels, cormorants, gulls, and terns remained unchanged; however, for Common Eiders (*Somateria mollissima*) and alcids, changes are described below. Unless otherwise indicated, if the method used resulted in an estimate of the number of breeding pairs or nests, these estimates were multiplied by two to obtain the total number of breeding birds (Table 1).

For Common Eider in the Île à la Brume sanctuary, a complete nest survey was conducted on six of the seven islands visited in previous censuses. These six

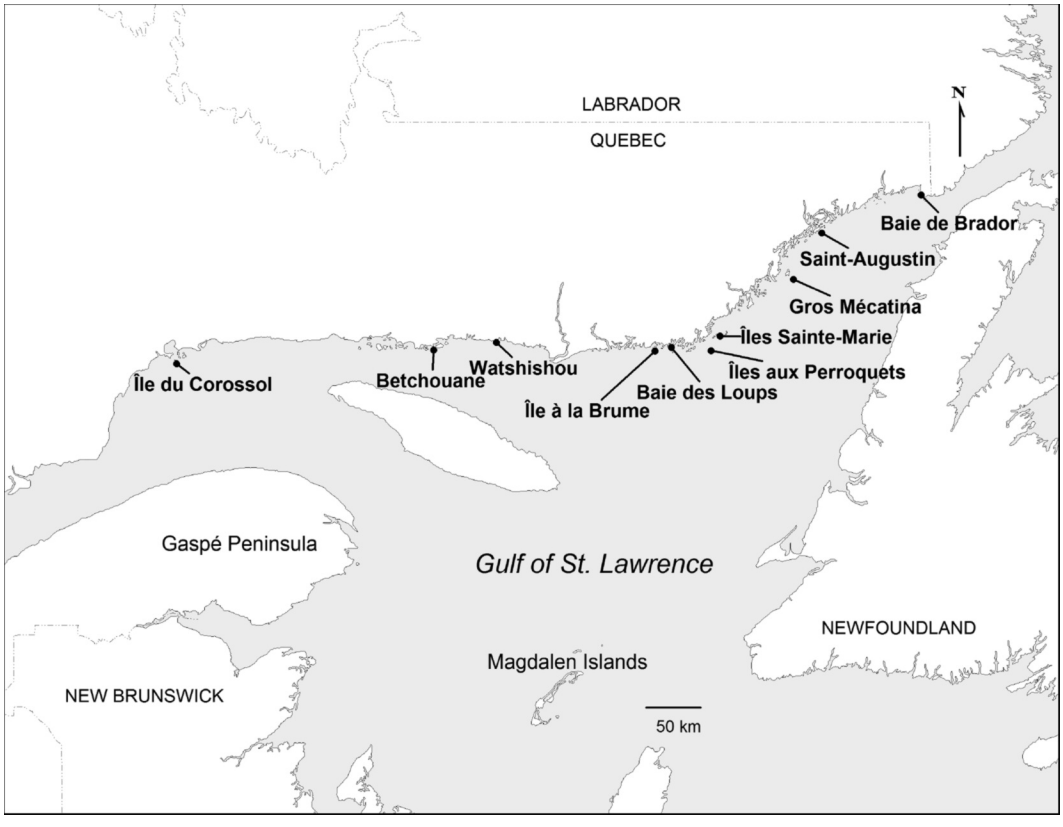

FIGURE 1. Location of the migratory bird sanctuaries on the North Shore of the Gulf of St. Lawrence, Quebec, Canada.

islands cover 21% of the sanctuary and the observed nest density was multiplied by the total land area of the sanctuary to estimate the total number of nests in the sanctuary. At Baie des Loups sanctuary, a complete nest survey was conducted on every island with the following exceptions: for Les Blacklands, nest density was calculated and extrapolated separately from 9% of open habitat and 9% of closed habitat (i.e., spruce thickets); for the Îles Factory archipelago, nest density was calculated for two islands, representing 25% of the total land area of the archipelago, and then extrapolated; and, finally, the nest density for Île no. 4 was applied to the adjacent Île no. 5. Approximately 40% of the Baie des Loups sanctuary total land area was censused.

For the four species of alcids at all colonies, adult bird counts were used to estimate the number of breeding individuals, except for the following colonies that were either small or easily accessible and, therefore, could be censused with minimal disturbance. In the Betchouane sanctuary, eggs of Common Murres (*Uria aalge*) and Razorbills and active burrows of Atlantic Puffins were counted to estimate the number of breeding pairs. Egg counts were also used at a few Razorbills colonies in the Île à la Brume, Baie des Loups, Îles aux Perroquets, and Îles Sainte-Marie sanctuaries, but these accounted for less than 2% of the total estimates of these four sanctuaries. In the Baie des Loups sanctuary, the number of Atlantic Puffins observed was multiplied by two to estimate the number of breeding pairs. This was done to allow better comparison with the 2005 results, when we had put considerable effort into calculating a correction factor at several subcolonies and had used a factor of 1.99 (number of active burrows per individual observed) to estimate the size of the puffin population there.

Results and Discussion

With confirmation of Leach's Storm-Petrels (*Oceanodroma leucorhoa*) nesting on Île du Corossol, a total of 16 seabird species were recorded breeding in North Shore migratory bird sanctuaries in 2010. The total seabird population increased nearly 20%, from 109 885 in 2005 to 130 407 in 2010, but individual species trends were extremely variable (Table 1 and Figure 2). Taking into account population trends and changes in distribution in North Shore sanctuaries since 1925, we present the situation for each species, in order of concern (least to most), followed by a summary and discussion of notable results for each sanctuary.

TABLE 1. Census of seabirds (number of individuals) in the migratory bird sanctuaries of the North Shore of the Gulf of St. Lawrence, Quebec, Canada, in 2005 and 2010.

	Île du Corossol		Betchouane		Watshishou		Île à la Brume		Baie des Loups		Îles aux Perroquets		Îles Sainte-Marie		Gros Mécatina		Saint-Augustin		Baie de Brador		All sanctuaries*		
Species	2005	2010	2005	2010	2005	2010	2005	2010	2005	2010	2005	2010	2005	2010	2005	2010	2005	2010	2005	2010	1998–99	2005†	2010
Common Eider *Somateria mollissima*	1960	1504	5596	6006	11024‡	12958‡	1004	1610	3898	3436	866	986	1218	1152	4	4	146	94	–	–	13072	25716	27750
Red-throated Loon *Gavia stellata*	–	–	–	–	–	–	2	4	6	12	28	30	54	52	2	4	–	–	–	–	82	92	102
Leach's Storm-Petrel *Oceanodroma leucorhoa*	–	72	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	718	0	72
Double-crested Cormorant *Phalacrocorax auritus*	312	316	–	–	1688	1888	–	–	–	40	–	–	1300	3245	46	–	–	–	–	–	2830	3346	5489
Great Cormorant *Phalacrocorax carbo*	–	–	–	–	–	–	–	–	–	–	2	–	46	156	–	78	–	–	–	–	342	48	234
Ring-billed Gull *Larus delawarensis*	–	–	–	–	54	414	48	174	–	128	1242	–	–	2	–	–	549	216	–	–	484	1893	934
Herring Gull *Larus argentatus*	1278	1040	1004	828	833	598	454	422	527	379	169	204	206	154	166	93	1102	1793	175	558	4988	5914	6069
Great Black-backed Gull *Larus marinus*	658	420	156	74	176	168	52	82	239	96	106	71	169	182	35	81	86	123	279	348	2427	1956	1645
Black-legged Kittiwake *Rissa tridactyla*	3318	1342	146	58	–	–	–	–	–	–	14	–	516	820	–	–	–	–	–	–	3856	3994	2220
Caspian Tern *Hydroprogne caspia*	–	–	–	–	–	–	3	3	–	–	–	–	–	–	–	–	–	–	–	–	0	3	3
Common and Arctic Terns *Sterna hirundo* and *S. paradisaea*	–	–	–	–	331	220	55	35	15	12	81	91	49	12	1789	8	987	645	4	–	394	3311	1023
Common Murre *Uria aalge*	522	1662	128	116	–	–	–	–	187	256	1598	2811	12131	20078	67	12	–	–	244	1402	30124	14877	26337
Razorbill *Alca torda*	2197	2799	328	346	–	–	–	10	1062	2984	5555	6864	8964	16547	192	280	–	–	4174	6283	14341	22472	36113
Black Guillemot *Cepphus grylle*	321	401	–	–	21	1	25	20	16	15	76	90	223	103	240	192	4	6	2	3	788	928	831
Atlantic Puffin§ *Fratercula arctica*	6	3	524	540	–	–	–	–	1774	4028	620	400	2208	837	123	59	–	–	20080	15718	29133	25335	21585
Total for sanctuary	10527	9559	7882	7968	14127	16247	1643	2360	7724	11386	10357	11547	27084	43340	2664	811	2874	2877	24958	24312	103579	109885	130407

*Totals for 1998–1999 are included for comparison; see also Figure 2 for compound growth rate by period (1999–2005 and 2005–2010).

†Totals for 2005 may differ slightly from those previously published (in Rail and Cotter 2007), as they include data from the Saint-Augustin sanctuary for better comparison with the 2010 totals.

‡The method used to estimate the Common Eider population in Watshishou likely resulted in a significant overestimate (possibly as much as two to fourfold; but see Rail and Chapdelaine 2002). We used this method for population trends analysis, e.g., to allow better historical comparisons (results were obtained with the same method in previous censuses).

§In 2005, the use of a burrow probe at a few sites at Baie des Loups, Îles aux Perroquets, and Baie de Brador verified that apparently occupied burrows were actually used at a fairly constant rate (71–76%). Therefore, the Atlantic Puffin population estimates for these sanctuaries, and for the Betchouane and Îles Sainte-Marie sanctuaries as well, are in reality overestimates because apparently occupied burrow counts were used. We did not apply a correction factor to these estimates as we wanted to be able to compare them with data from previous censuses.

Species' status

Razorbill

Increased by 61% between 2005 and 2010, and 2010 was the sixth consecutive census reporting an increase in this species. Razorbills are thriving, not only on the North Shore but also everywhere they breed in eastern North America (Chapdelaine *et al.* 2001; Cotter and Rail 2007; Rail 2009).

Common Eider

Increased marginally between 2005 and 2010, reaching a record level. The species is now more than three times as numerous as in any census between 1925 and 1988 and is currently second in abundance to the Razorbill.

Double-crested Cormorant

Increased by 64%, with numbers in 2010 the highest on record. Before 1988, the population never exceeded 700 pairs, but since then every census has recorded more than 1400 pairs. Since 1988, the drastic decline of the large colony at Île du Corossol has been offset by large increases in the Watshishou and Îles Sainte-Marie sanctuaries.

Common Murre

Increased 77% between 2005 and 2010. The population is now almost back to its 1998–1999 level, after an unexpected 51% decrease recorded in the 2005 census.

Red-throated Loon

Appears in good shape, even though the record number of 51 pairs in 2010 may not seem high. Although this species no longer breeds at Saint-Augustin and, historically, numbers have been much higher at Île à la Brume, the numbers of loons breeding at Baie des Loups, Îles aux Perroquets and Îles Sainte-Marie sanctuaries in 2010 were all at or near the highest ever recorded.

Black Guillemot

Although trends vary among sanctuaries, the total numbers of this species have been relatively stable in the last three censuses and near the highest levels ever observed.

Great Cormorant

Numbers have rebounded from only 23 nests in 2005, the lowest estimate since 1935, to 117 nests in 2010. However, this is still a third of the numbers seen in 1950–1960, and the Île Cliff colony (Îles Sainte-Marie sanctuary) appears to be the only well-established colony of the species in North Shore sanctuaries.

Herring Gull

The 2010 population was considerably lower than levels observed from the 1960s through the 1980s, before the collapse of the Atlantic Cod (*Gadus morhua*) fishery and the ensuing fishery moratorium in 1994, which eliminated fish offal and discards discharged at

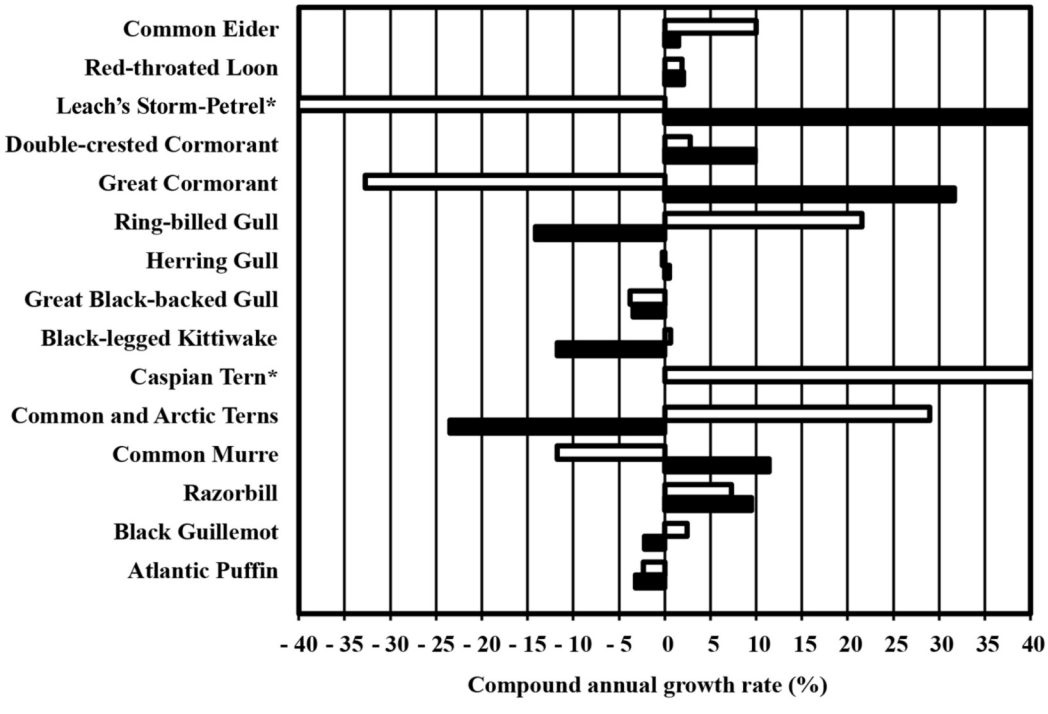

FIGURE 2. Compound annual growth rates of breeding seabird populations in the sanctuaries of the North Shore of the Gulf of St. Lawrence, Quebec, Canada, from 1999 to 2005 (white bars) and from 2005 to 2010 (black bars). Species marked with an asterisk have a compound growth rate greater than 40%, either positive or negative, because they either appeared or disappeared in the censuses.

sea by cod fishermen (see Chapdelaine and Rail 1997). Nevertheless, since 1993, the population has been fairly stable and numbers are now similar to or higher than they were before 1960.

Arctic Tern, Common Tern, and Ring-billed Gull

Tern populations decreased by 69% and numbers of Ring-Billed Gulls fell by half between 2005 and 2010. These declines resulted primarily from the disappearance of a large tern colony at Gros Mécatina and a large gull colony at Îles aux Perroquets. Population trends for these species are highly variable, as colonies tend to move in and out of sanctuaries and, consequently, our results may not be representative of trends for the whole North Shore. However, the 2010 population levels for these species were near the long-term average for 1925–2010.

Great Black-backed Gull

The census in 2010 was the second consecutive census to record a decline in numbers and there are now one-third fewer birds than there were in 1998–1999. However, this decline was mainly driven by a 64% decrease at Île du Corossol since 1998.

Atlantic Puffin

The last three censuses show a population decrease, to the second lowest population estimate since 1925. Nonetheless, in 2010, this was the fourth most abundant seabird in North Shore sanctuaries and was found breeding in seven. The colony at Baie des Loups had more than doubled in size in 2010, after a catastrophic decline (87%) noted at this sanctuary between 1993 and 2005.

Black-legged Kittiwake

Decreased by 44% between 2005 and 2010. Except for apparent stabilization between 1998–1999 and 2005, the number of Black-legged Kittiwakes has decreased in each census since 1988, and, as a result, there are now nearly 75% fewer birds. Most are found at Île du Corossol and kittiwakes are now also well established in the Îles Sainte-Marie sanctuary.

Leach's Storm-Petrel

The reappearance of 36 active burrows on Île du Corossol in 2010 was significant for the province, considering there are only two other known colonies (each with fewer than 20 pairs): Île Bonaventure on the Gaspé Peninsula and Île Brion in the Magdalen Islands (Rail 2009). However, a single small colony in all North Shore sanctuaries is a significant decline from 1988 when 872 nests were discovered on seven islands in four sanctuaries (Brousseau and Chapdelaine 1990).

Caspian Tern

In 2010, only three birds were observed, breeding was not confirmed, and there are no other known colonies in the Gulf of St. Lawrence. The 2010 census could have been conducted too early in the breeding season for this species, but a more likely explanation for so few observations is the finding on Île à la Brume of 87 empty and unattended Ring-billed Gull nests, among which Caspian Terns usually nest. Most clutches of Herring and Great Black-backed Gulls were still incomplete, which strongly suggests that eggs had been harvested.

Recent population trends by sanctuary

Some of the most recent local population trends in the migratory bird sanctuaries are noteworthy. Beginning from the west, between 2005 and 2010 the Île du Corossol sanctuary (surveyed 26–28 May) saw a threefold increase in Common Murres, whereas its large kittiwake colony decreased by 60% (continuing a decline first noted in 1993). In the Betchouane sanctuary (visited on 30 May), the colony of Black-legged Kittiwakes, rather small compared with the one on Île du Corossol, also declined by 60%. Furthermore, the number of Great Black-backed Gulls was reduced roughly by half. In the Watshishou sanctuary (censused from 31 May to 4 June), the population of Ring-billed Gulls increased four-fold between 2005 and 2010. Razorbills were absent for the second census in a row, and the Black Guillemot may be the next species to disappear, as only a single individual was observed in 2010.

Razorbills, absent in 2005, reappeared at the Île à la Brume sanctuary (surveyed on 13 June). Until 2005, this alcid was present in every census since 1925. Common Eiders increased 60% and Ring-billed Gull numbers more than tripled between 2005 and 2010. In the past, alcids were much more abundant at this sanctuary and included several thousand Common Murres, which disappeared 50 years ago. This decline among alcids, as well as the fact that the Caspian Tern is on the verge of vanishing from its only know breeding site on the North Shore and the evidence of egg collection there, suggests that this sanctuary would benefit from better protection, despite the 44% increase in the total number of breeding seabirds between 2005 and 2010 (mostly attributable to the increase in eider numbers).

When we visited the Baie des Loups sanctuary (10 and 17 June), we found that the number of Razorbills had almost tripled since the last census, while the number of Atlantic Puffins had more than doubled (127% increase). Once a regular breeder, the Double-crested Cormorant was seen breeding at Baie des Loups for the first time in over 30 years. Combining all species, the number of seabirds grew by 47% from 2005 to 2010, and only the Great Black-backed Gull exhibited a large decline (60%). Despite encouraging trends for Razorbills and Common Murres, this sanctuary has a severely impoverished alcid community compared to historical levels (Rail and Chapdelaine 2002; Rail and Cotter 2007).

At Îles aux Perroquets (surveyed 15–16 June), Great Cormorant, Black-legged Kittiwake, and Ring-billed Gull were not seen; however, these species have never bred regularly or in large numbers in this sanctuary (first censused in 1982). Other notable trends at this sanctuary included an increase in the number of

Razorbills (24%) and Common Murres (77%), but a 35% decrease in Atlantic Puffins.

At Îles Sainte-Marie (on 8, 9, 11, 12, 16, and 18 June), we found large increases in the number of Great (239%) and Double-crested (150%) Cormorants since 2005. With 1290 nests, the colony at Île de l'Est is the largest cormorant colony ever recorded in North Shore sanctuaries. Razorbills (85%), Common Murres (66%), and Black-legged Kittiwakes (59%) also experienced large increases in the sanctuary, whereas Black Guillemots and Atlantic Puffins suffered declines of 54% and 62%, respectively. Overall there was a 60% increase in the total seabird population between 2005 and 2010, and this sanctuary is now home to a third of all seabirds breeding in North Shore sanctuaries (and to 76% of all Common Murres and 46% of all Razorbills).

At Gros Mécatina sanctuary (19 June), only six tern nests were found on Île Plate, compared to 887 nests in 2005. However, excluding terns, the number of seabirds varied little over the three previous censuses. The 23 Double-crested Cormorant nests found in 2005 on Île aux Trois Collines were replaced by 39 Great Cormorant nests in 2010. Among North Shore sanctuaries, Gros Mécatina has the second smallest land area and, in 2010, only 0.6% of the total seabird population.

In contrast, Saint-Augustin is the largest sanctuary, but, on 21 June 2010, it had the third smallest seabird population, with only 2877 breeding individuals of six species. Nearly the entire seabird breeding community is represented by larids (terns and gulls, 97%). Herring and Great Black-backed Gulls increased from 2005 by 63% and 43%, respectively, but the smaller Ring-billed Gull experienced a 61% decline. Only 47 Common Eider nests were found, compared to 73 nests in 2005. The Common Eider population is only 7-10% of what is was between 1925 and 1960. The islands in this sanctuary are used extensively by nearby communities, and direct exploitation, by egg harvesting and hunting of young and adult seabirds of many species, is a tradition still practised in most local villages on the North Shore, by both Innu and non-native peoples (Blanchard 1984; Agence Mamu Innu Kaikusseht 2014*).

The Baie de Brador sanctuary (Île Verte surveyed on 23 June and Île aux Perroquets on 24 and 27 June) has the highest density of breeding seabirds of all North Shore sanctuaries. Nevertheless, its most abundant seabird, the Atlantic Puffin, decreased by 22% between 2005 and 2010. This decline was partly counterbalanced by the spectacular growth of the Common Murre (475% increase) and Razorbill (51% increase) populations. Common Murre was confirmed breeding here for the first time fairly recently (seven pairs in 1999), while Razorbills have been increasing in numbers since 1982. Herring and Great Black-backed Gulls are much less abundant, but they too have been growing at a fast rate since 1988, when only two individuals of each species were noted.

In conclusion, Île à la Brume, Baie des Loups, and Saint-Augustin sanctuaries are facing the greatest conservation challenges, as current seabird populations are far below historical levels; therefore, they would benefit most from conservation efforts. These are the same sanctuaries that were highlighted after the 2005 census, and the recommendations we made then (Rail and Cotter 2007) regarding the need for better law enforcement and educational programs still hold. Moreover, we suggest that a population study of Atlantic Puffins would be useful if we want to understand why they are decreasing. A restoration project on Île à la Brume could be very beneficial to the Caspian Tern while there are still a few individuals breeding there, albeit sporadically.

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