



Environment
Canada

Environnement
Canada

www.ec.gc.ca



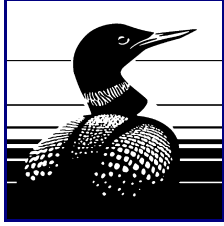
Seabirds and Colonial Waterbirds of the Magdalen Islands: Statuses and Population Trends

Jean-François Rail

Quebec Region

Canadian Wildlife Service
Technical Report Series Number 502
2009

Canada 



CANADIAN WILDLIFE SERVICE TECHNICAL REPORT SERIES

This series of reports, introduced in 1986, contains technical and scientific information on Canadian Wildlife Service projects. The reports are intended to make available material that is either of interest to a limited audience or is too extensive to be accommodated in scientific journals or in existing CWS series.

Demand for the Technical Reports is usually limited to specialists in the fields concerned. Consequently, they are produced regionally and in small quantities. They are numbered according to a national system but can be obtained only from the address given on the back of the title page. The recommended citation appears on the title page.

Technical Reports are available in CWS libraries and are listed in the catalogue of Library and Archives Canada, which is available in science libraries across the country. They are printed in the official language chosen by the author to meet the language preference of the likely audience, with an abstract in the second official language. **To determine whether there is sufficient demand to make the Reports available in the second official language, CWS invites users to specify their official language preference. Requests for Technical Reports in the second official language should be sent to the address on the back of the title page.**

SÉRIE DE RAPPORTS TECHNIQUES DU SERVICE CANADIEN DE LA FAUNE

Cette série de rapports, créée en 1986, donne des informations scientifiques et techniques sur les projets du Service canadien de la faune (SCF). Elle vise à diffuser des études qui s'adressent à un public restreint ou sont trop volumineuses pour paraître dans une revue scientifique ou une autre série du SCF.

Ces rapports techniques ne sont habituellement demandés que par les spécialistes des sujets traités. C'est pourquoi ils sont produits à l'échelle régionale et en quantités limitées. Ils sont toutefois numérotés à l'échelle nationale. On ne peut les obtenir qu'à l'adresse indiquée au dos de la page titre. La référence recommandée figure à la page titre.

Les rapports techniques sont conservés dans les bibliothèques du SCF et figurent dans le catalogue de Bibliothèque et Archives Canada, que l'on retrouve dans les principales bibliothèques scientifiques du Canada. Ils sont publiés dans la langue officielle choisie par l'auteur, en fonction du public visé, accompagnés d'un résumé dans la deuxième langue officielle. **En vue de déterminer si la demande est suffisante pour publier ces rapports dans la deuxième langue officielle, le SCF invite les usagers à lui indiquer leur langue officielle préférée. Les demandes de rapports techniques dans la deuxième langue officielle doivent être envoyées à l'adresse indiquée au dos de la page titre.**



SEABIRDS AND COLONIAL WATERBIRDS OF THE MAGDALEN ISLANDS: STATUSES AND POPULATION TRENDS

Jean-François Rail¹

**Technical Report Series No. 502
2009
Canadian Wildlife Service
Quebec Region**

¹Environment Canada
Canadian Wildlife Service
1141 Route de l'Église
P.O. Box 10100
Québec, Quebec
G1V 4H5

Library and Archives Canada Cataloguing in Publication

Rail, Jean-François

Colonial and sea birds of the Magdalen Islands [electronic resource] :
statuses and population trends / Jean-François Rail.

(Technical report series ; no. 502)

Electronic monograph in PDF format.

Issued also in French under title: Les oiseaux marins et coloniaux des
Îles-de-la-Madeleine, statuts et tendances des populations.

Issued by: Québec Region.

Issued also in printed form.

Includes bibliographical references.

ISBN 978-1-100-12929-7

Cat. no.: CW69-5/502E-PDF

1. Sea birds--Québec (Province)--Îles-de-la-Madeleine--Geographical
distribution. 2. Bird surveys--Québec (Province)--Îles-de-la-Madeleine.

3. Bird populations--Québec (Province)--Îles-de-la-Madeleine.

I. Canadian Wildlife Service II. Canadian Wildlife Service. Quebec Region

III. Title. IV. Series: Technical report series (Canadian Wildlife Service :

Online) no. 502

QL685.5 Q4 R34 2009

598.177

C2009-980144-2

©Her Majesty the Queen in Right of Canada, represented by the Minister of Environment, 2009

Catalogue No. CW69-5/502E-PDF

ISBN 978-1-100-12929-7

Recommended citation:

Rail, J.-F. 2009. Seabirds and Colonial Waterbirds of the Magdalen Islands: Status and Population Trends. Technical Report Series No. 502. Canadian Wildlife Service, Quebec Region, Environment Canada, Sainte-Foy, vi + 65 pp.

Copies available from the author at the following address:

Canadian Wildlife Service
1141 Route de l'Église, 8th Floor
P.O. Box 10100
Québec, Quebec G1V 4H5

Or by e-mailing the author at: jean-francois.rail@ec.gc.ca

Aussi disponible en français

Cover photos (left to right):

Black-legged Kittiwakes (at Île d'Entrée), 2008, ©J.-F. Rail

Tern nest (on an islet at Étang de la Martinique, in Havre-aux-Basques Lagoon), 2008, ©Richard Cotter

Aerial view of Rocher aux Oiseaux, Magdalen Islands (the Northern Gannet colony that has invaded the plateau is visible), 2004, ©J.-F. Rail

ABSTRACT

Located in the middle of the Gulf of St. Lawrence, the Magdalen Islands are home to a rich community of seabirds that can be found nesting in the numerous and characteristic red sandstone cliffs, as well as on sandy islands in lagoons and rocky offshore islands.

This survey of breeding seabirds in 2007 updates the work done by Mousseau et al. (1976), Bourque and Richard (1992), and by the Canadian Wildlife Service (CWS) in 2000-2002, and was a collaborative effort between the CWS and Parks Canada. During an aerial survey that took place on June 9, photographs were taken of breeding colonies that were inaccessible or difficult to census by boat. The remainder of the colonies were visited either by boat or by foot, between June 8 and 22. The size of all colonies of breeding seabirds, plus the Great Blue Heron, were estimated, with the exception of the Northern Gannet which is censused during a specific survey every five years (next due in 2009). Census methods that were used are provided in detail for each site and species. For each species, the current status of the breeding population is discussed and comparisons are made with previous surveys, as well as with historical data, to determine local population trends.

Overall, our results highlight the fact that the seabird breeding community is as diverse and abundant as ever in the Magdalen Islands, being represented by nearly 100,000 birds from 17 different species. However, several species have a precarious status here: Roseate Tern, Common Eider, Great Blue Heron, and Black-headed Gull breed in very small numbers; all the breeding sites of gulls, terns, and Leach's Storm-Petrel are easily accessible to mammalian predators; important and unexplained declines were noted in the numbers of Herring Gulls, Atlantic Puffins, and Thick-billed Murres. Actually, the greatest threat to the seabird populations of the Magdalen Islands has to be the Red Fox. Its impact on seabirds was conspicuous, as we observed many cases of predation of nests and adult birds, but also the desertion of several sites previously occupied by well-established seabird colonies. We also attributed one case of predation to a newcomer, the Coyote.

Fortunately, many other important seabird breeding sites are protected against terrestrial predators, as well as from disturbance by humans, by being located on offshore islands or in

cliffs. The best example of this has to be Rochers aux Oiseaux (Bird Rocks), which harbours about two thirds of all the seabirds that breed in the Magdalen Islands.

TABLE OF CONTENTS

ABSTRACT	iii
LIST OF TABLES	v
LIST OF FIGURES	vi
1. INTRODUCTION	1
2. METHODOLOGY AND RESULTS	2
Calculation Methods for the Population Estimates	2
Aerial Census	4
Census by Land and by Boat.....	6
3. DISCUSSION	24
4. CONCLUSION.....	42
5. ACKNOWLEDGMENTS	44
6. LITERATURE CITED	45
7. APPENDICES	49

LIST OF TABLES

Table 1. Estimates of the number of breeding individuals in the colonial and seabird colonies of the Magdalen Islands, 2007.....	22
--	----

LIST OF FIGURES

Figure 1. Location of seabird nesting sites in the Magdalen Islands.....	23
Figure 2. Northern Gannet population trend on Rochers aux Oiseaux, from 1830 to 2004.....	25
Figure 3. Population trend of the Great Cormorant in the Magdalen Islands, 1976-2007.	27
Figure 4. Population trend of the Double-crested Cormorant in the Magdalen Islands, 1972-2007	29
Figure 5. Population estimates of Herring Gulls and Great Black-backed Gulls in the Magdalen Islands, 1976-2007.....	31
Figure 6. Nesting sites of the Black-headed Gull at Pointe de l'Est, from 2000 to 2007.....	34
Figure 7. Tern population estimates in the Magdalen Islands, 1972-2007.....	36
Figure 8. Number of Roseate Terns observed in the Magdalen Islands, from 1972 to 2006	37

1. INTRODUCTION

Within the context of the survey of Quebec breeding seabird populations begun by the Canadian Wildlife Service (CWS) in 1976, the Magdalen Islands are an unavoidable location. Located right in the middle of the Gulf of St. Lawrence, with red cliffs and characteristic lagoons, they also offer exceptional sites, such as Rochers aux Oiseaux and Île Brion, sheltering a rich community of seabirds benefiting from varied and numerous nesting habitats.

The seabird populations of the Islands were censused fairly exhaustively in 1976 by Mousseau et al. (1976) and in 1990 by Fradette (Bourque and Richard 1992). More recently, in 2000, the CWS conducted a census by land and by boat, which was completed by an aerial census at some sites in 2002. In its Quebec seabird monitoring program, the CWS is seeking to institute a cycle of regular censuses (ideally every five years) in the different regions of the St. Lawrence Estuary and Gulf. This is what led to the planning of a new census in 2007. Parallel to this, within the context of the Magdalen Islands national marine conservation area project, Parks Canada (PC) expressed interest in participating in data acquisition to update the picture (among others) of the seabird populations of the Islands, and to report on their status.

This report is thus the result of a fruitful collaboration between the CWS and Parks Canada. The population trend analysis is produced not only from the above-mentioned censuses, but with all the data available from a multitude of sources that will be cited as this report progresses.

2. METHODOLOGY AND RESULTS

CALCULATION METHODS FOR POPULATION ESTIMATES

The breeding population of a species in the Magdalen Islands is represented by all the pairs who have built a nest or attempted to breed in a given year. Unfortunately, this datum is almost impossible to obtain, given that not all pairs breed simultaneously, and that some pairs who lose their nest prematurely abandon the site and disappear, or move and build one or more new nests, etc. Also, in the case of several species, searching for nests is not feasible, as in the case of the Black Guillemot, which shelters its eggs in an often invisible and inaccessible crack in the cliffs. During multi-species censuses, as in the case of the present census, all species generally are censused during the same visit to a site; the methods used thus must be very quick and efficient to cover a large number of sites throughout the subject territory.

In cases where the population is estimated by directly counting the number of nests, which is the preferred method for gulls, terns and cormorants, the time chosen for the census is important. Indeed, the result will be all the more representative if it were obtained during the nesting peak, i.e., the period when the maximum number of active nests will be found (a certain proportion of the nests may appear before or after this time; see Barbraud and Gélinaud 2005). What makes the census even more difficult is that different species do not have the same nesting chronology; a visit cannot take place during the simultaneous nesting peak of all species. For example, Great Black-backed Gulls often start breeding much sooner than terns. This having been said, since seabirds have fairly prolonged nesting periods, we think that a June census in the Magdalen Islands allows a fairly precise assessment of the populations of the various species present, although our estimates are possibly conservative. Generally, the contents of the nests are noted and the clutch size estimate makes it possible to verify the nesting progress (see Appendix 1) to ensure that the census is not too early or too late (if this is the case, the data must be interpreted cautiously).

When using nest counts is unfeasible, as is the case for the alcids (whose nests are often inaccessible, very well hidden, or very vulnerable to disturbance), the method used is the adult count. In the nesting period, at the approaches to alcid colonies, there are always individuals waiting on the water or resting on the rocks, and the passage of a boat nearby invariably

provokes the flight of a number of individuals leaving their nest. Even though some non-breeding or immature birds may frequent the colony, the alcids observed near a colony are generally breeders associated with this site. But not all breeders are visible during the census: individuals may remain hidden in the nest, or have left to feed far offshore. In short, it is very difficult to know how many nests correspond to the number of birds observed at a site. Moreover, the colony attendance patterns (i.e., the number of birds observed near the colony) vary according to the species, the time of day, the season, the weather conditions, etc. (Cairns 1979; Ewins 1985; Rail and Chapdelaine 2002). Thus, the alcid counts certainly provide less precise population estimates, but no real alternative exists when conducting a simultaneous census of all species at sites that are often difficult to access. Nonetheless, experience has led us to believe that counts of individuals are a reliable way to detect general population trends. For example, our Razorbill population estimates have increased consistently and similarly throughout the different regions of the Gulf of St. Lawrence since the 1970s.

To estimate the Alcidae populations more precisely in terms of the number of breeding pairs, we multiplied the number of individuals observed by a correction factor ($K = \text{nb of breeding pairs per individual observed}$) for each species. As indicated above, this factor may also vary according to the time of day, the weather conditions, the nesting phase, or even the habitat (Cairns 1979; Ewins 1985; Rail and Chapdelaine 2002). However, to obtain comparable estimates and facilitate analysis of population trends, we used the same correction factors as in the previous census in the Magdalen Islands. The following factors are used: $K = 1.0$ (breeding pairs per individual observed) for the Black Guillemot and the Atlantic Puffin, and $K = 0.7$ for the Razorbill, the Common Murre and the Thick-billed Murre. These values are approximate and would have to be validated in the field. Their use here has the sole purpose of obtaining population estimates that are a little more realistic than the mere number of individuals observed for the alcids. All the estimates are reported in terms of number of individuals (number of pairs $\times 2$ individuals per pair) in Table 1. The French, English and scientific names of all the bird species named in this report are listed in Appendix 2.

AERIAL CENSUS

Date: June 9, 2007 (between 1:15 p.m. and 2:30 p.m.)

Observers: Jean-François Rail, Richard Cotter, François Shaffer

Pilot: Louis Normand

Method: The day after our arrival in the Magdalen Islands, aboard an Air Montmagny Islander aircraft (9 passengers) that picked us up at Cap-aux-Meules Airport, we flew over several sites accommodating seabirds colonies. This census method was necessary for certain sites inaccessible on foot (for safety reasons, or because of the disturbance this would have caused to the colonies), and having a topography that makes part of the colony difficult to census from a boat. This is particularly the case for the cormorant colonies of Île aux Goélands, Île Shag, Corps Mort and Îles Rouges (Havre-aux-Maisons and Grande-Entrée Lagoons). On the other hand, we had thought that it would be more efficient to estimate the size of the three Great Blue Heron colonies (presumed active) by means of aerial photos as well. Thus, we flew over the heronries of Fatima, Île du Havre-Aubert (Pointe des Canots), and Pointe Rockhill. We had also considered that some large gull colonies would be covered more efficiently (with much less effort) by performing counts on photos instead of conducting a systematic census on the ground. This was the case for Îlot B and Île du Chenal (of Grande-Entrée Lagoon), the Baie du Portage islets (Havre-aux-Basques Lagoon) and Île Paquet. Moreover, in 2002, the Herring Gull and Great Black-backed Gull populations had been estimated in this way on Îlot B. Finally, we wanted to determine if Île aux Loups Marins was totally unoccupied (as it had been in 2002).

As we approached Île aux Goélands, we noticed from the air the presence of gull nests on the wrecked boat nearby (close to Cap à Savage). We thus took the opportunity to fly over the wreck and photograph it so that we could count these nests.

The camera used for this census was a Canon 10D with a Canon 28-135 mm lens with built-in image stabilizer. Another camera was used simultaneously, in case the first one did not give good results, but this did not happen. The photos were computer analyzed using Adobe Photoshop Elements 2.0 software. During nest counts, a coloured dot was placed on each nest, on a layer over the photograph, until all the nests had been marked. Then using the software's "histogram" function we obtained the number of pixels of this colour on the layer, and we thus

could count the number of nests (dots) in the photograph automatically, as long as we knew how many pixels composed each dot (depending on the size of the dot chosen).

Results:

- **Baie du Portage islets (Appendix 3a):** We preferred to use the results of the census on the ground instead of the analysis of the aerial photos.
- **Pointe des Canots heronry (Île du Havre-Aubert):** Inactive.
- **Corps Mort (Appendix 3b):** 76 cormorant nests, of which 7 were Double-crested Cormorant nests and 69 were Great Cormorant nests according to the nest distribution of each species as noted from the boat; 12 Herring Gull nests; 7 Great Black-backed Gull nests.
- **Île aux Goélands (Appendix 4a):** 671 cormorant nests, divided among 454 Double-crested Cormorant nests and 217 Great Cormorant nests according to the species' nest distribution noted during the census by boat (see subsection 2.8).
- **Étang-du-Nord shipwreck (Appendix 4b):** 54 Herring Gull nests; 1 Great Black-backed Gull nest.
- **Fatima heronry (Île du Cap-aux-Meules):** 56 active Great Blue Heron nests.
- **Île aux Cochons (Île Paquet, Appendix 5a):** Unoccupied.
- **Île Rouge (Havre-aux-Maisons Lagoon, Appendix 5b):** Unoccupied.
- **Île Shag (Appendix 6a):** 870 cormorant nests, divided among 750 Double-crested Cormorant nests and 120 Great Cormorant nests according to the species ratio calculated during the census by boat; 18 gull nests, divided among 4 Herring Gull nests and 14 Great Black-backed Gull nests according to the species ratio observed from the boat.
- **Île du Chenal (Grande-Entrée Lagoon, Appendix 6b):** The photos have not been analyzed; see the results of the census by land instead.
- **Îlot B (Grande-Entrée Lagoon, Appendix 7a):** 833 Double-crested Cormorant nests; 9 Great Black-backed Gull nests.
- **Île Rouge (Grande-Entrée Lagoon, Appendix 7b):** Unoccupied.
- **Pointe Rockhill heronry:** 1 active Great Blue Heron nest.
- **Île aux Loups Marins (Appendix 8a):** Unoccupied.
- **Îlets des Étroits (Appendix 8b):** Unoccupied.

CENSUS BY LAND AND BY BOAT

Except for the visits to Île Brion and Rochers aux Oiseaux (when we were aboard an *Excursions en mer Inc.* Zodiac), the boat we used for our trips was a Boston Whaler measuring 5 metres long, equipped with a Johnson 90 hp engine, property of Environment Canada. Some islets that were more difficult to access were reached in a small pneumatic rowboat, while others surrounded by shallow water were reached in hip waders, or simply by taking the stream crossings.

2.1 *Île Rouge in Havre-aux-Maisons Lagoon*

Date: June 8, 2007

Observers: Jean-François Rail, Richard Cotter, François Shaffer

Method: The same evening that we arrived in the Islands, we were able to verify with binoculars (from shore) that the birds had abandoned Île Rouge in Havre-aux-Maisons Lagoon (Appendix 5b). This situation did not change during our stay.

Result: No breeding seabird.

2.2 *Île Paquet*

Date: June 8, 2007

Observers: Jean-François Rail, Richard Cotter, François Shaffer

Method: Observation with binoculars, from shore. Same result. The next day, an airplane flight over the island confirmed this observation (Appendix 5a).

Result: No breeding seabird.

2.3 *Pointe Nelson*

Date: June 8, 2007

Observers: Jean-François Rail, Richard Cotter, François Shaffer

Method: Since this site had been used by terns in the past, we checked in passing (from land) whether there was any activity at this site in 2007.

Result: No breeding seabirds.

2.4 *Île du Havre-aux-Maisons*

Date: June 10 and 19, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr (PC) and Isabelle Turbide (PC)

Method: On June 10, departing from La Petite Baie, we (J.-F. Rail and R. Cotter) proceeded directly by boat to Cap Noir (just south of the beach at Dune-du-Sud). Then, between 10:52 a.m. and 11:46 p.m., we travelled past the cliffs at low speed (southwestward) to the beach west of Pointe Basse. The objective was to count the Black Guillemots associated with these cliffs, but a few gulls sitting on their nests were also observed. We also noticed in passing that gulls seemed to breed in the vicinity of the beach at the southwest tip of Île du Havre-aux-Maisons (Appendix 9a). On June 19 at 10:00 a.m., we returned on foot (accompanied by D. Cyr and I. Turbide) to count all the gull nests, note their contents and determine the proportion of each species. The operation lasted 30 minutes.

Results:

- 95 Black Guillemots associated with the cliffs on the side facing the open sea (thus 95 pairs if $K = 1.0$ pair per individual observed).
- 2 Herring Gull nests (pairs) on these same cliffs.
- 2 Great Black-backed Gull nests (pairs) on the cliffs.
- 156 gull nests (all empty; we also found a fox den in the middle of the colony), which were distributed according to the ratio of adults observed (23 Herring Gulls to 8 Great Black-backed Gulls): 116 Herring Gull nests and 40 Great Black-backed Gull nests.
- 3 other Great Black-backed Gull nests were found on the island, dispersed in the vicinity of La Petite Baie.
- Thus, a total of 118 Herring Gull nests and 45 Great Black-backed Gull nests.
- Other species observed: 20 non-breeding Great Cormorants, 1 male Common Eider, 2 Harlequin Ducks, 1 Common Raven nest with (at least two) young.

2.5 *Île du Cap-aux-Meules*

Date: June 10, 11 and 22, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr, Isabelle Turbide

Method: On June 10 (between 1:36 p.m. and 2:32 p.m.), after launching our boat at La Petite Baie, we (J.-F. Rail and R. Cotter) travelled southward past the cliffs on the east side of Île du Cap-aux-Meules, as far as Anse aux Étangs (past Le Gros-Cap). The Black Guillemots associated with the cliffs were counted, and a few Herring Gull nests were also observed on ledges. The following afternoon (June 11), accompanied by D. Cyr and I. Turbide, we conducted the same type of census, but this time along the west side of Île du Cap-aux-Meules, from Anse des Baleiniers in the north to our starting point at the Étang-du-Nord marina (return at 3:35 p.m.). Apart from the count of individual Black Guillemots, a Herring Gull nest was found on the cliffs. Finally, on June 22, after hearing that gulls nested on the hospital roof, we were able to verify this observation by telescope from an elevated point of view on Île du Cap-aux-Meules.

Results:

- 80 Black Guillemots were seen from the east side of Île du Cap-aux-Meules, and 85 from the west side, for a total of 165 individuals observed (and a population estimate of 165 pairs if $K = 1.0$ pair per individual observed).
- 4 Herring Gull nests: 2 on the cliffs on the east side of Île du Cap-aux-Meules, 1 nest on the west side, and a nest on the hospital roof.

2.6 *Cap-aux-Meules marina*

Date: June 11, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr, Isabelle Turbide

Method: Systematic census of the gull colony on the dike of the Cap-aux-Meules marina (Appendix 9b). In less than one hour (from 10:52 a.m. to 11:45 a.m.), all gull nests were counted and their contents were noted. A visual count (with binoculars, from a distance) of the Great Black-backed Gulls and Herring Gulls on the site was used to estimate the proportion of nests for each species.

Results:

- 136 gull nests, divided among 99 Herring Gull nests and 37 Great Black-backed Gull nests according to the species ratio of adults (66 Herring Gulls to 25 Great Black-backed Gulls, or 73% Herring Gulls vs. 27% Great Black-backed Gulls).

2.7 *The Étang-du-Nord wreck*

Date: June 11, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr, Isabelle Turbide

Method: As we proceeded to go around Île aux Goélands by boat, we passed near part of the wreck of the boat that sank near Cap à Sauvage. In passing, we noted two Black Guillemots flying out of the side of the wreck exposed to the open sea. The broken structure offers well-sheltered hiding places (Appendix 4b). Clearly, the wreck serves as a nesting site for this species, and it is possible that our brief observation underestimates the number of guillemots that use it.

Results:

- 2 Black Guillemots, each from different sites; thus at least two pairs probably nested on the wreck.

2.8 *Île aux Goélands*

Date: June 11, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr and Isabelle Turbide

Method: Gull nests and Black-legged Kittiwake nests were counted with binoculars while we slowly navigated around this small island (Appendix 4a). The kittiwake nests were counted by two observers, per sector of coastline, and the final estimate of the breeding population represents the sum of the averages for each sector. For the Black Guillemot and the Razorbill, adults on or very close to the cliffs (flying in circles around the island or swimming in the water nearby) were counted instead. We also noted a female Common Eider that flew off the island at our approach. We presumed that this was an individual leaving a nest because she was frightened. This was the only “breeding pair” detected in the Magdalen Islands in 2007. The cormorant nests were counted on the aerial photos taken on June 9, but during our observations

by boat we noted the nest distribution of the two cormorant species on the island, which allowed us to allocate the nests to species from the photos.

Results:

- Distribution of cormorants on the island: the Double-crested Cormorant is only found on the plateau of the east point and at the base of the slopes. On the rest of the island all nests were Great Cormorant.
- 1 female Common Eider leaving the island (very probably on a nest; 1 breeding pair).
- 3 Great Black-backed Gull nests.
- 8 Herring Gull nests.
- 167 Black-legged Kittiwake nests.
- 34 Razorbills (24 breeding pairs if $K = 0.7$ pair per individual observed).
- 17 Black Guillemots (17 pairs if $K = 1.0$ pair per individual observed).

2.9 Cap du Sud

Date: June 12, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr, Isabelle Turbide

Method: After mooring our boat in the Anse à la Cabane marina (departure 1:30 p.m.), we counted the Black Guillemots associated with the cliffs from Dune du Bassin, continuing westward to the end of Cap du Sud. Gull and kittiwake nests were also noted in passing, with binoculars.

Return at 2:40 p.m.

Results:

- 2 Great Black-backed Gull nests.
- 12 Herring Gull nests.
- 42 Black-legged Kittiwake nests.
- 91 Black Guillemots (91 pairs if $K = 1.0$ pair per individual observed).

2.10 Havre-aux-Basques Lagoon Islets

Date: June 13, 17, 18 and 24, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr, Isabelle Turbide

Method: The many sites suitable for nesting of terns in Havre-aux-Basques Lagoon (Appendix 10) were visited on foot, and the tern (and other) nests were censused systematically, noting their contents. On June 13, a short distance travelled aboard a pneumatic boat allowed us to reach the Étang de la Martinique islets in the morning (census between 9:42 a.m. and 10:40 a.m.). Then we went to the Pointe des Canots islets in the afternoon (between 3:00 p.m. and 3:07 p.m.). From the first islet reached (the southernmost islet), we determined with binoculars that the second islet did not have a tern colony. Farther north, there seemed to be no activity at the Goulet-du-Nord islet, where terns had nested in the past. Four days later, we waded in water that was sometimes chest deep to reach the Baie du Portage islets (Appendix 3a and 10). This was because the aerial photos taken on June 9 did not enable us to estimate the number of breeding gulls at this location, since the nests were barely visible. The results of the systematic census of the nests during this visit on foot thus were preferred to the results of the aerial photo analysis. The gull nests were attributed to Herring Gulls and Great Black-backed Gulls in the proportions of these two species observed in situ. We counted again the Double-crested Cormorant nests on the same occasion. The site was surveyed in about one hour (between 2:33 p.m. and 3:26 p.m.).

During the morning of June 18, we (J.-F. Rail and R. Cotter) inspected the Îles de Travers on foot (Appendix 10). Although a few terns were observed, only one tern nest was found. The presence of a fox den left little hope to find more tern nests at this location. During the afternoon (starting at 4:12 p.m.), still in hip waders, we reached the islets of Colonie du Nord-Ouest. After recording the contents of the tern nests on three islets, the rain compelled us to return another day (stopped at 5:05 p.m.). We only returned on June 24, this time with the full team (J.-F. Rail, R. Cotter, D. Cyr and I. Turbide), to census the tern nests systematically on the other two islets occupied at this location. During this second visit we discovered obvious signs of predation by a Coyote on all (five) islets: fresh footprints, dead adult terns, some of them partially buried, and depredated nests. The terns found dead were identified by species, and this Arctic Tern/Common Tern ratio was used subsequently to estimate the proportion of tern nests for each species on these islets. Finally, to conclude regarding the Havre-aux-Basques Lagoon Islets, the small islet known as “Colonie de la Planche à Voile” (thus named because the site nearby is heavily used as a departure point for sailboarders) was not frequented by terns during most of our stay on the

Islands. Shortly before our departure, a few terns seemed to want to nest there. However, since these could have been terns that had failed to nest elsewhere (for example, at Colonie du Nord-Ouest or Îles de Travers), we decided not to include them in our census data so as to not take a chance on counting the same individuals twice.

Results:

- 561 Double-crested Cormorant nests at Baie du Portage.
- 121 gull nests on the Baie du Portage islets, distributed according to the proportion of adults observed in situ (23 Herring Gulls to 110 Great Black-backed Gulls, or 17% Herring Gulls to 83% Great Black-backed Gulls), thus 21 Herring Gull nests and 100 Great Black-backed Gull nests.
- 2 Great Black-backed Gull nests on the south islet of Pointe des Canots.
- 82 Common Tern nests on the south islet of Pointe des Canots.
- 1 Common Tern nest on Îles de Travers (12 terns observed but apparently non-breeding, including 3 Arctic Terns).
- 429 tern nests on the islets of Colonie du Nord-Ouest, distributed according to the species ratio of terns found dead in situ (1 Arctic Tern to 38 Common Terns), thus 418 Common Tern nests and 11 Arctic Tern nests.
- 137 Common Tern nests on the islets of Étang de la Martinique.

2.11 Cap du Sud-Ouest and Cap Noir

Date: June 13, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr and Isabelle Turbide

Method: From the Anse à la Cabane marina, we quietly navigated along the line of cliffs, heading westward until their end at the Dune de l'Ouest beach. From the boat, we counted all adult razorbills and guillemots observed, as well as gull nests. For the Black-legged Kittiwake and Great Cormorant nests, the visual estimates were completed on some occasions with counts on photos (taken from the boat) for the sectors exhibiting high nest densities. The census was conducted between 12:37 p.m. and 1:58 p.m.

Results:

- 16 Great Cormorant nests on Cap du Sud-Ouest, and 57 nests on Cap Noir.

- 2 Great Black-backed Gull nests on Cap du Sud-Ouest.
- 8 Herring Gull nests on Cap du Sud-Ouest, and 3 nests on Cap Noir.
- 511 Black-legged Kittiwake nests on Cap du Sud-Ouest, and 11 nests on Cap Noir.
- 27 Razorbills on Cap du Sud-Ouest (19 pairs with $K = 0.7$ pair per individual observed).
- 24 Black Guillemots on Cap du Sud-Ouest, and 116 on Cap Noir (respective estimates of 24 and 116 breeding pairs with $K = 1.0$ pair per individual observed).

2.12 Rochers aux Oiseaux

Date: June 14, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr, Isabelle Turbide, Olivier Barden (SCF), Alain Desrosiers (ministère des Ressources naturelles et de la Faune du Québec: MRNF) and Luc Miousse (Parks Canada)

Method: The breeding bird population was estimated by travelling slowly along the cliff contour (Appendix 11), counting the birds with binoculars from the *Excursions en mer Inc. Zodiac* (once again piloted by Mr. Gaston Arseneau). It should be noted that Northern Gannets were not included in this census, because they are already the object of a five-year census by aerial photo (the next one is scheduled for 2009). Moreover, most of the breeding birds on the plateau of the main rocky islet (exclusively Northern Gannets) would have been invisible from the boat (Appendix 11a). In the case of the alcids, the birds in incubating position on the cliffs were counted sector by sector by two different observers, and the sum of the averages of the two estimates was then calculated for each sector. The observers for each species were as follows: D. Cyr and I. Turbide for the Razorbill; J.-F. Rail and R. Cotter for the Common Murre; O. Barden and A. Desrosiers for the Thick-billed Murre; no Atlantic Puffin or Black Guillemot was observed. For the larids, the population estimates come from the count of the adults observed in incubating position. On the cliffs of the main rocky islet, the Black-legged Kittiwakes were counted in the same way, but on digital photos taken from the boat. The census was conducted between 9:15 a.m. and 11:15 a.m.

Results:

- 2 Great Black-backed Gull pairs observed on the plateau of the main rocky islet (this is therefore a minimum because the plateau was largely invisible from the boat).

- 1889 Black-legged Kittiwake nests (1873 on the main rocky islet and 16 on Rochers aux Margaux).
- 567 Thick-billed Murres on the main rocky islet (397 pairs if $K = 0.7$ pair per individual observed).
- 4987 Common Murres (3491 pairs if $K = 0.7$ pair per individual observed; 4340 on the main rocky islet and 647 on Rochers aux Margaux).
- 1357 Razorbills (950 pairs if $K = 0.7$ pair per individual observed; 1340 on the main rocky islet and 17 on Rochers aux Margaux).
- No Black Guillemot.
- No Atlantic Puffin.

2.13 Cap du Dauphin

Date: June 14, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr, Isabelle Turbide

Method: We slowly travelled by boat along the small cliffs in the vicinity of Cap du Dauphin (Appendix 12a), counting all the Black Guillemots visibly associated with this site, i.e., the individuals perched on the cliff, swimming in the water nearby or coming and going between the cliff and the sea. One Razorbill was also observed in this relatively small sector (covered in 15 minutes, between 2 p.m. and 2:15 p.m.).

Results:

- 15 Black Guillemots (or 15 pairs if $K = 1.0$ pair per individual observed).
- 1 Razorbill (it is presumed that there is 1 breeding pair).

2.14 Pointe de l'Est

Date: June 2007

Observers: François Shaffer, Stéphanie Gagnon, and Olivier Barden (from CWS); and Sylvain St-Onge, Alain Desrosiers, Alain Lehoux, and Renée Faubert (from MRNF)

Method: Within the context of the Plant and Wildlife Inventory Program of Protected Areas in Southern Quebec, a team of biologists and technicians from the Canadian Wildlife Service and

the ministère des Ressources naturelles et de la Faune (Quebec) conducted several vertebrate wildlife inventories in the Pointe de l'Est National Wildlife Area (NWA) and in the Refuge faunique de Pointe-de-l'Est (between June and September 2007). Moreover, François Shaffer, species-at-risk biologist for the Canadian Wildlife Service, also patrolled this territory in June to document the nesting of the Horned Grebe, the Roseate Tern and the Piping Plover. Given the presence of this substantial workforce in situ, logic dictated that we “delegate” the Pointe de l'Est (Appendix 12b) breeding seabird census to them, which they graciously accepted. Since the species usually present are Laridae, the proposed census methods were systematic nest counts (taking note of the contents of the nests) and counts of individuals.

Results:

- Two Great Black-backed Gull nests (pairs).
- 17 Black-headed Gull nests (and 35 individuals observed).
- 351 Common Tern nests (pairs).
- Presence of a small number (undetermined) of Arctic Terns.
- One Roseate Tern observed.

2.15 Île Brion

Date: June 15 and 16, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr; and (from Attention Frag'Îles) Alain Richard and Catherine Turbide

Method: Between 8:31 a.m. and 11:36 a.m. on 15 June, we surveyed the cliffs with binoculars, from the *Excursions en mer Inc. Zodiac*, piloted by Mr. Gaston Arseneau. We counted the number of adult for the alcids; for the other species we counted the nests instead. In the most densely used sectors, Black-legged Kittiwake nests were counted on digital photos (taken from the boat). The camera was a Canon 10D with a Canon 28-135 mm lens equipped with a built-in image stabilizer. In the afternoon (1:35 p.m. to 2:12 p.m.), a small sector on the southwest of the island where the cliffs are located some distance back from the shore and thus are difficult to census by boat, was visited on foot to estimate its use by the Atlantic Puffin. Finally, the presence of the Leach's Storm-Petrel was verified during the night (between midnight and 2:30 a.m.). The lighthouse sector, the forest trail leading from the lighthouse to the landing area

(where the former wharf was located), the vicinity of the landing area, and the trail running eastward along the north side of the island (for a distance of about 1.2 km from the landing area) were censused. The team (J.-F. Rail, R. Cotter and D. Cyr) slowly travelled these sectors on foot, listening for the Leach's Storm-Petrel calls, making frequent listening stops during which recordings of Leach's Storm-Petrel calls were played (with a small MP3 player and mini-speakers) to stimulate the response of these birds. The position of the listening points where Leach's Storm-Petrels were present was noted with a GPS (Appendix 13).

Results:

- 52 Great Cormorant nests.
- 82 Double-crested Cormorant nests.
- 1 Great Black-backed Gull nest.
- 1890 Black-legged Kittiwake nests.
- 1619 Common Murres (1133 pairs with $K = 0.7$ pair per individual observed).
- 427 Razorbills (299 pairs if $K = 0.7$ pair per individual observed).
- 403 Black Guillemots (403 pairs if $K = 1.0$ pair per individual observed).
- 78 Atlantic Puffins (78 pairs if $K = 1.0$ pair per individual observed).
- Confirmation of the presence of Leach's Storm-Petrels presumed to be breeders (about 6-8 individuals seen or heard, probably at least four different breeding pairs).

2.16 Île du Bassin

Date: June 19, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr, Isabelle Turbide

Method: After accessing the island by boat (from northwest of Baie du Bassin, see Appendix 14a), we systematically counted the tern nests and noted the contents of each nest. The proportion of Common Terns was estimated summarily by observing several adults in flight. Two empty Great Black-backed Gull nests were also noted.

Results:

- 665 Common Tern nests (only the Common Tern was identified in flight).
- 2 Great Black-backed Gull nests.

It should be noted that there were obvious signs of predation (probably by a fox) on the island: about 35 adult terns were found dead.

2.17 Île du Chenal in Grande-Entrée Lagoon

Date: June 20, 2007

Observers: Jean-François Rail, Richard Cotter, Isabelle Turbide, François Shaffer; and (from Attention Frag'Îles) Pascal Poirier, Alain Richard, Catherine Turbide, Simon Castonguay

Method: Île du Chenal (Appendix 6b) was covered systematically by successive transects, with the field team members walking parallel to each other and fairly close together to avoid missing nests. The contents of all the gull nests were noted, and the proportion of Herring Gull nests to Great Black-backed Gull nests was estimated using species ratios determined for two sectors (which seemed to differ in this regard), counting the visible adults of each species with binoculars from an elevated point of view. The contents of most of the tern nests were also noted. However, to limit the duration of our visit, in certain parts of the island the number of active nests were simply counted without recording the contents. We noted the presence of a few Arctic Terns but we did not try to estimate their number or proportion (which seemed fairly low). One Roseate Tern was also heard and observed among the Common Terns, but this was the only member of its species detected. As for Îlot B, the examination of the aerial photos taken on June 9 allowed us to observe that this islet was now completely occupied by Double-crested Cormorants (Appendix 7a); a visit to the islet on foot or by boat was pointless, because the cormorant nests were easy to count in the photos.

Results:

- 745 gull nests, distributed as follows: in a first sector, 487 nests were attributed according to a ratio of adults observed of 5 Herring Gulls to 78 Great Black-backed Gulls, thus 29 Herring Gull nests and 458 Great Black-backed Gull nests; on the rest of the islet, the other 258 were divided among 167 Herring Gull nests and 91 Great Black-backed Gull nests, according to the ratio of adults observed of 70 Herring Gulls to 38 Great Black-backed Gulls. Thus, in all, 196 Herring Gull nests and 549 Great Black-backed Gull nests were estimated on Île du Chenal.

- 783 tern nests; the vast majority of these belong to the Common Tern, but a small number (undetermined) undoubtedly belong to the Arctic Tern, whose presence was confirmed (no estimate).
- One Roseate Tern; it can't be presumed that this is a breeding pair, because pairs formed of one Roseate Tern and one Common Tern have already been seen in the Magdalen Islands in the past.
- Apart from the above observations used to estimate population size, we noted the carcasses of 2 Common Terns and 3 Great Black-backed Gulls.

2.18 *Île Shag*

Date: June 20, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr, Isabelle Turbide

Method: While travelling slowly around the island (Appendix 6a) by boat, we counted with binoculars the alcids (individuals) associated with the site and the kittiwake nests. We used aerial photos (taken on June 9) to count the cormorant and gull nests (located on top of the island rather than on its cliffs). However, it was aboard the boat that we calculated the “Great Cormorant/Double-crested Cormorant” ratios for several of the island’s sectors, so that we could distribute the nests counted in the aerial photos correctly by species (since this identification was difficult to do in the photos). The visit was conducted between 4:40 p.m. and 5:20 p.m.

Results:

- Cormorant species ratios: 100% Double-crested Cormorants for the nests located in the sectors on the north side; 77% Double-crested Cormorants to 23% Great Cormorants (species ratio 208/63) for the rest of the island.
- Gulls: 1 nest observed from the boat, to be added to the seventeen (17) nests on the island plateau counted in the aerial census photos; the gulls observed had a species ratio of 20% (10/50) Herring Gulls to 80 % Great Black-backed Gulls.
- 355 Black-legged Kittiwake nests.
- 21 Razorbills (15 pairs if $K = 0.7$ pair per individual observed).
- 1 Common Murre (estimate of 1 pair with $K = 0.7$ pair per individual observed).
- 12 Black Guillemots (12 pairs with $K = 1.0$ pair per individual observed).

2.19 *Île aux Loups*

Date: June 21, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr, Isabelle Turbide

Method: We travelled by boat at low speed past the small cliffs on both sides of the Pointe-aux-Loups marina (Appendix 14b). This very small sector was covered quickly (between 7:40 a.m. and 7:51 a.m.). The Black Guillemots associated with these cliffs were noted, as well as Herring Gull nests.

Results:

- 21 Black Guillemots (21 pairs with $K = 1.0$ pair per individual observed).
- 2 Herring Gull nests (pairs).

2.20 *Îlets des Étroits*

Date: June 21, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr, Isabelle Turbide

Method: Although the Îlets des Étroits appeared to be unoccupied in the June 9 aerial census, a few terns were noticed from the road about ten days later flying over the 2nd islet (Appendices 8b and 15a). On June 21 at 9:00 a.m., we landed on this islet (not without difficulty because the shallow water did not allow us to approach in our Boston Whaler; we crossed the last 150 m in a small pneumatic rowboat). The systematic census of the tern nests (by successive transects, with the observers walking parallel to each other only a few metres apart) was used to find all tern nests, most of which were empty (the contents were noted). In this instance we also identified the terns flying over the islet. Two empty gull nests, apparently abandoned, were observed. The census was completed at 9:36 a.m.

Results:

- 46 tern nests, which were attributed to the Common Tern because all 20 terns observed in flight during our visit were identified as this species.
- The 2 gull nests found were empty and seemed to be abandoned (no adult on the horizon). We did not consider that these involved a recent nesting attempt.

2.21 *Île d'Entrée*

Date: June 21, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr and Isabelle Turbide

Method: A low-speed boat trip around the island (Appendix 15b), punctuated by frequent stops in the sectors with concentrations of seabirds, was completed in a little over two hours (from 12:15 p.m. to 2:28 p.m.). Since nests of alcids are nearly impossible to detect, for each species we counted the individuals observed nearby (in flight or on the water) or on the cliffs. The gull and cormorant nests were counted with binoculars as well. For the Black-legged Kittiwake, the nests were counted in digital photos taken from the boat in the cliff sectors exhibiting high nest concentrations.

Results:

- 140 Great Cormorant nests.
- 1 Great Black-backed Gull nest (pair).
- 4 Herring Gull nests (pairs).
- 2307 Black-legged Kittiwake nests.
- 3 Common Murres (2 pairs with $K = 0.7$ pair per individual observed).
- 239 Razorbills (167 pairs with $K = 0.7$ pair per individual observed).
- 225 Black Guillemots (225 pairs if $K = 1.0$ pair per individual observed).

2.22 *Corps Mort*

Date: June 22, 2007

Observers: Jean-François Rail, Richard Cotter, Dominic Cyr and Isabelle Turbide

Method: All the alcids associated with this site were counted while we travelled slowly by boat around Corps Mort (Appendix 3b), between 3:34 p.m. and 4:00 p.m. Three Black-legged Kittiwake nests were discovered at the same time in the western part (volcanic rock). The gull and cormorant nests, located closer to the island's summit, were counted instead from aerial photos taken on June 9. However, our observations by boat allowed us to determine the distribution of the two cormorant species on Corps Mort, which turned out to be useful because it was difficult to discriminate between the two species in the aerial photos.

Results:

- Distribution of cormorants on the island: there were only a few Double-crested Cormorants located on the southeast slope of the island; elsewhere there seemed to be only Great Cormorants.
- Gulls: see the aerial census.
- 3 Black-legged Kittiwake nests.
- 4 Common Murres (3 pairs with $K = 0.7$ pair per individual observed).
- 49 Razorbills (34 pairs with $K = 0.7$ pair per individual observed).
- 42 Black Guillemots (42 pairs if $K = 1.0$ pair per individual observed).

2.23 *Île de Grande-Entrée*

This island, where 47 Black Guillemots had been noted during the previous census (June 17, 2000) unfortunately was not censused in 2007. We thus will use the 2000 estimate for this island in our estimate of the total Black Guillemot population in the Magdalen Islands.

Table 1. Estimates of the number of breeding individuals in the colonial and seabird colonies¹ of the Magdalen Islands, 2007

Colony name	GRCO	DCCO	COEI	HERG	GBBG	BLKI	BHGU	COTE	ARTE	ROTE	TBMU	COMU	RAZO	BLGU	ATPU	GBHE	NOGA	LESP	TOTAL
1-Île d'Entrée	280			8	2	4614						4	334	450					5692
2-Cap du Sud-Ouest	32			16	4	1022							38	48					1160
3-Cap Noir	114			6		22								232					374
4-Corps Mort	138	14		24	14	6						6	68	84					354
5- Havre-aux-Basques Lagoon Islets		1122		42	204			1276	22										2666
a-Baie du Portage Islets		1122		42	200														1364
b-Colonie de la Planche à Voile Islet																			0
c-Pointe des Canot Islets					4			164											168
d-Îles de Travers								2											2
e-Colonie du Nord-Ouest Islets								836	22										858
f-Etang de la Martinique Islets								274											274
g-Goulet du Nord Islet																			0
6-Île aux Goélands	434	908	2	16	6	334							48	34					1782
7-Île du Cap-aux-Meules				8										330					338
8-Île aux Cochons (Île Paquet)				0	0			0											0
9-Îles des Étroits				0	0			92		0									92
10-Île Shag	240	1500		8	28	710					2	2	30	24					2542
11-Flot B of the Grande-Entrée Lagoon		1666			18														1684
12-Île du Chenal (Grande-Entrée Lagoon)				392	1098			1566	+	1									3058
13-Île aux Loups Marins		0		0	0									0					0
14-Île Rouge (Grande-Entrée Lagoon)		0		0	0									0					0
15-Pointe de l'Est				0	4		34	702	+	1									742
16-Île Brion	104	164		0	2	3780						2266	598	806	156			8 ²	7884
17-Rochers aux Oiseaux				0	4	3778					794	6982	1900		2 ³			46922 ⁴	60382
18-Cap du Dauphin													2	30					32
19-Île Rouge (Havre-aux-Maisons Lagoon)		0		0	0														0
20-Île de Grande-Entrée														94 ⁵					94
21-Île du Havre-aux-Maisons				236	90									190					516
22-Cap du Sud				24	4	84								182					294
23-Île aux Loups				4										42					46
24-Fatima (Île du Cap-aux-Meules)																112			112
25-Mont Moore (Grosse-Île)																0 ⁶			0
26-Pointe des Canoës (Île du Havre-Aubert)																0			0
27-Cap-aux-Meules Marina				198	74														272
28-Île du Bassin					4			1330											1334
29-Etang-du-Nord Wreck				108	2									4					114
30-Pointe Rockhill (Grosse-Île)																2			2
TOTAL	1342	5374	2	1090	1558	14350	34	4966	24+	2	794	9260	3018	2550	158	114	46922	8	91566

¹Species codes: GRCO=Great Cormorant; DCCO=Double-crested Cormorant; COEI=Common Eider; HERG=Herring Gull; GBBG=Great Black-backed Gull; BLKI=Black-legged Kittiwake; BHGU=Black-headed Gull; COTE=Common Tern; ARTE=Arctic Tern; ROTE=Roseate Tern; TBMU=Thick-billed Murre; COMU=Common Murre; RAZO=Razorbill; BLGU=Black Guillemot; ATPU=Atlantic Puffin; GBHE=Great Blue Heron; NOGA=Northern Gannet; LESP=Leach's Storm-Petrel

²Minimum: very partial census of Île Brion

³Datum from amateur ornithologists

⁴in 2004; ⁵in 2000; ⁶in 2006 (according to F. Shaffer)

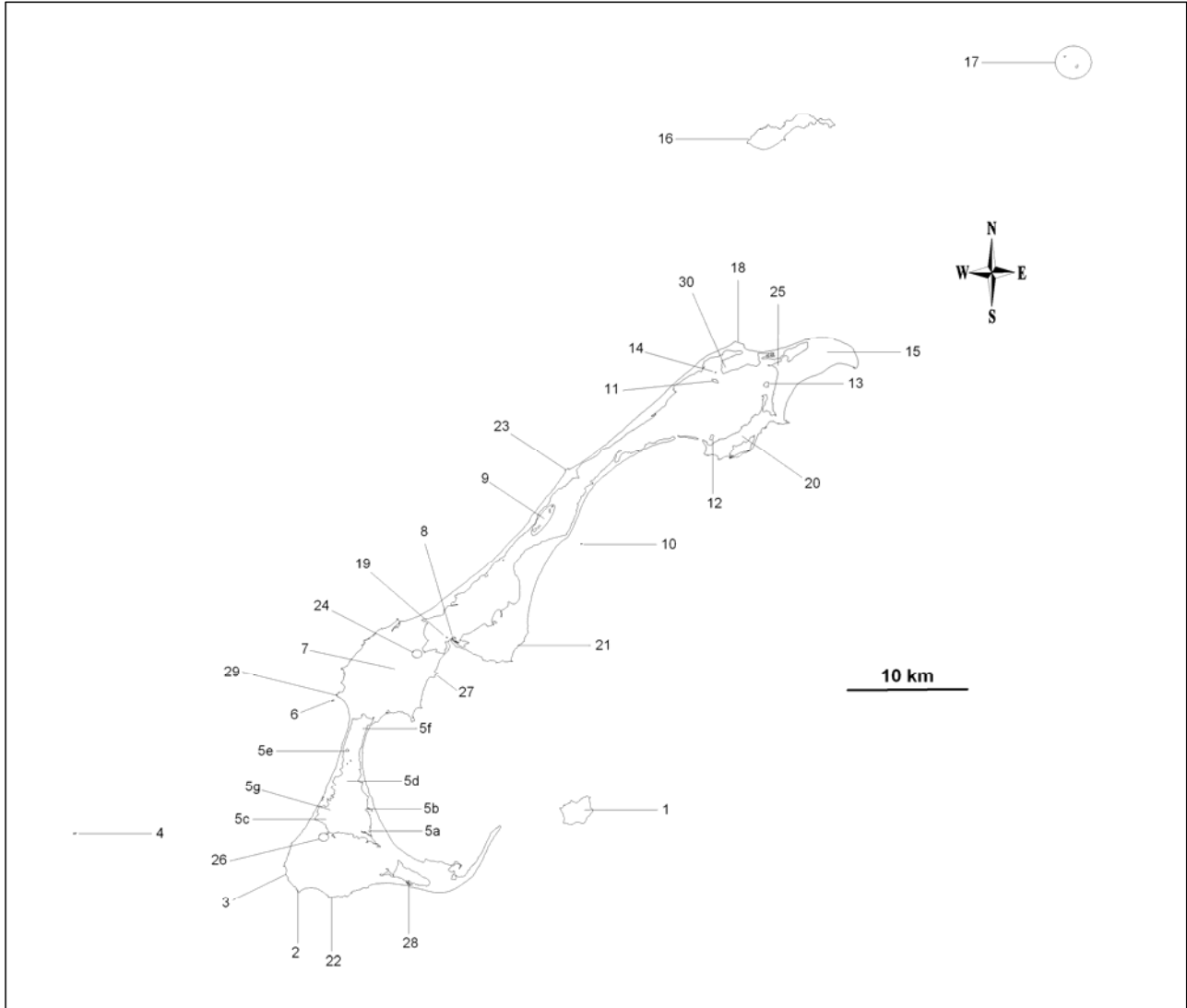


Figure 1. Location of seabird nesting sites in the Magdalen Islands. The numbering used corresponds to that in Table 1 (previous page)

3. DISCUSSION

3.1 *Leach's Storm-Petrel*

On Île Brion, no Leach's Storm-Petrel was detected in the vicinity of the lighthouse or the landing area, or along the forest trail connecting these two sites. However, along the forest trail running eastward on the north side of the island, there were five locations, in the small section we surveyed during the night, where we heard the species. At three of these locations, two Leach's Storm-Petrels answered the recordings at the same time. Several very excited birds even came circling and calling very close to our heads. Given the close proximity of the five coordinates where the species were noted (distributed over 400 metres), we cannot exclude the possibility that the same individual was heard or seen in more than one location. In all, we probably saw between 6 and 8 different individuals, corresponding to at least four breeding pairs. However, the sole objective of this census was to confirm that the species was still breeding on Île Brion. The Leach's Storm-Petrel has already been detected or confirmed breeding in other sectors of Île Brion, and a quantitative census would have required several days of effort to cover all the habitats suitable for this species. Moreover, given the aggressive response of several individuals and the fact that the calls heard invariably came first from birds on the ground, (presumably at the entrance to their burrow) in the stunted black spruce forest habitat (on the south side of the trail, i.e., towards the centre of the island), there is no doubt that the species still breeds on Île Brion. Our data are insufficient to draw conclusions regarding the population trend, even though we did not detect the presence of the species in previously used sectors (near the lighthouse and the landing area). Moreover, in the past no census produced realistic estimates of this population's size. However, the relatively recent colonization of Île Brion by the Red Fox is not a positive sign for the future.

Elsewhere in the Magdalen Islands, there have already been mentions of nesting (without any estimate of population size) of the Leach's Storm-Petrel on Île du Cap-aux-Meules between 1954 and 1961 (Rowdon 1961, in Fradette 1992), and on the main island of Rochers aux Oiseaux (see references in Fradette 1992, McNeil et al. 1973), and its presence was already suspected on Île aux Loups Marins in 1982 (Y. Aubry, pers. comm.). However, the Leach's Storm-Petrels abandoned Île du Cap-aux-Meules and Île aux Loups Marins long ago, and the last confirmation of the species nesting on Rochers aux Oiseaux dates back to 1983 (Y. Aubry, pers. comm.). In

short, the future of this species in the Magdalen Islands probably depends on the ability of the Leach's Storm-Petrels to coexist with the Red Fox on Île Brion.

3.2 Northern Gannet

As indicated in the previous section (*Methodology and Results*), this species was not censused in 2007 because it is already being monitored every five years. The 2004 data thus will be used to present the picture of the Magdalen Islands seabird community (Table1) and to analyze its population trend. Figure 2 speaks for itself; the Northern Gannet breeding population in the Magdalen Islands has not extended its range (Rochers aux Oiseaux is the only colony), but it is growing rapidly (for a bird that only lays one egg after 5 years of age). Its growth has been relatively constant since the mid-70s, that is, since the use of DDT was stopped.

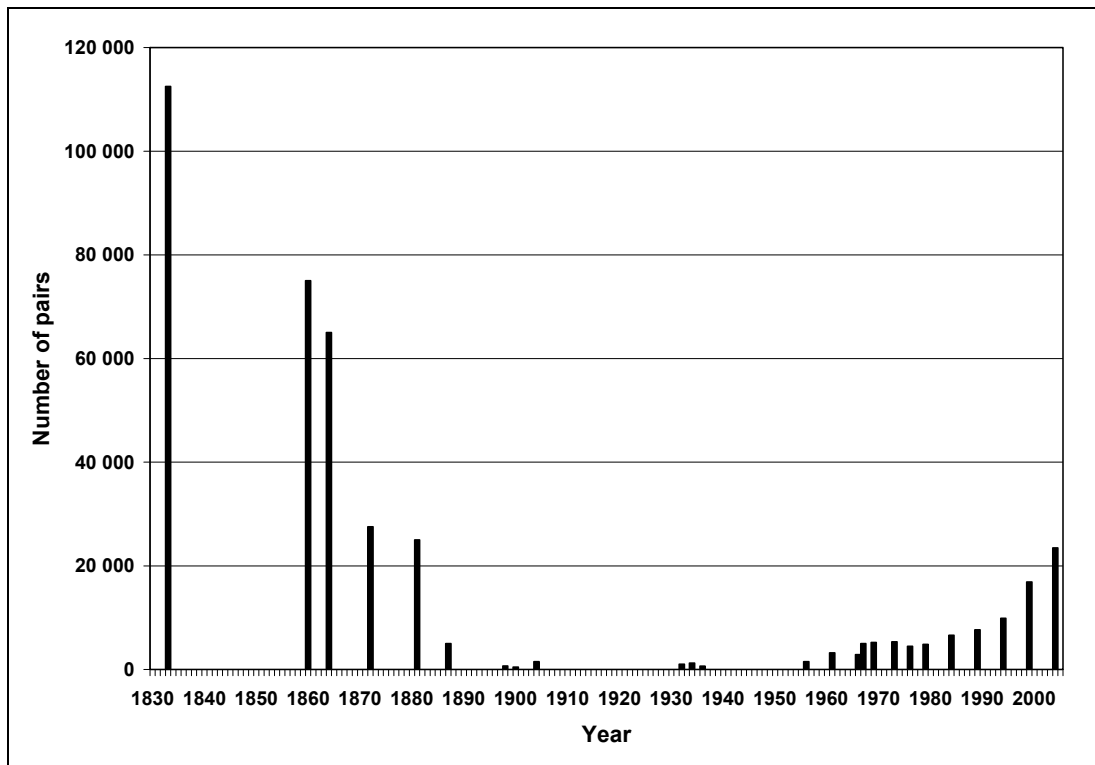


Figure 2. Northern Gannet population trend on Rochers aux Oiseaux, 1830 to 2004

Heavily decimated during the 1800s and reduced to 1500 individuals or less in the first half of the 20th century, the Northern Gannet had seen its population increase in the 50s and 60s, before DDT put an end to this growth period. Since the colony's growth rate was still high between 1999 and 2004 (nearly 7% per year), there is every reason to believe that this colony will continue growing in the years ahead. However, at this pace, all the available nesting space should be filled by approximately 2014 to 2018, and the colony's size should peak at about 48,000 nests (Rail et al. In prep.). In the longer term, the rapid erosion of the main rocky island of Rochers aux Oiseaux should have a downward influence on this colony's size. This erosion would explain how more than 100,000 pairs bred there in 1833 (Fisher and Vevers 1943): Rochers aux Oiseaux probably had a much bigger surface area.

3.3 *Great Cormorant*

The total of 671 Great Cormorant breeding pairs divided among 7 colonies confirms that the Magdalen Islands are very important for this species in Quebec, because this represents about one third of the colonies and 70% of the provincial population. A few small colonies can also be found on the Lower North Shore and in the Gaspé.

In the Magdalen Islands, as elsewhere, this species shows very great fidelity to its nesting sites, having been found exclusively at the same (seven) locations since 1990. Previously, in 1976, the Great Cormorant was absent from Île aux Goélands (Mousseau et al. 1976), and probably also from Cap du Sud-Ouest, where it was mentioned for the first time in 1987 (40 adults, Fradette 1992).

However, the population size fluctuated a fair amount over the past few decades, from a little over a thousand (1026) breeding birds in all in 1976 (Mousseau et al. 1976), to 1528 in 1990 (Bourque and Richard 1992; CWS unpublished data), then to 1982 about ten years later (CWS unpublished data). However, the 2007 census showed a population reduction of about one third (compared to 2000-2002), which brought the Great Cormorant population of the Magdalen Islands down to a slightly lower level than in 1990 (Figure 3). The future will tell us whether this represents a stabilization of the population or a decline that must be cause for concern in the longer term.

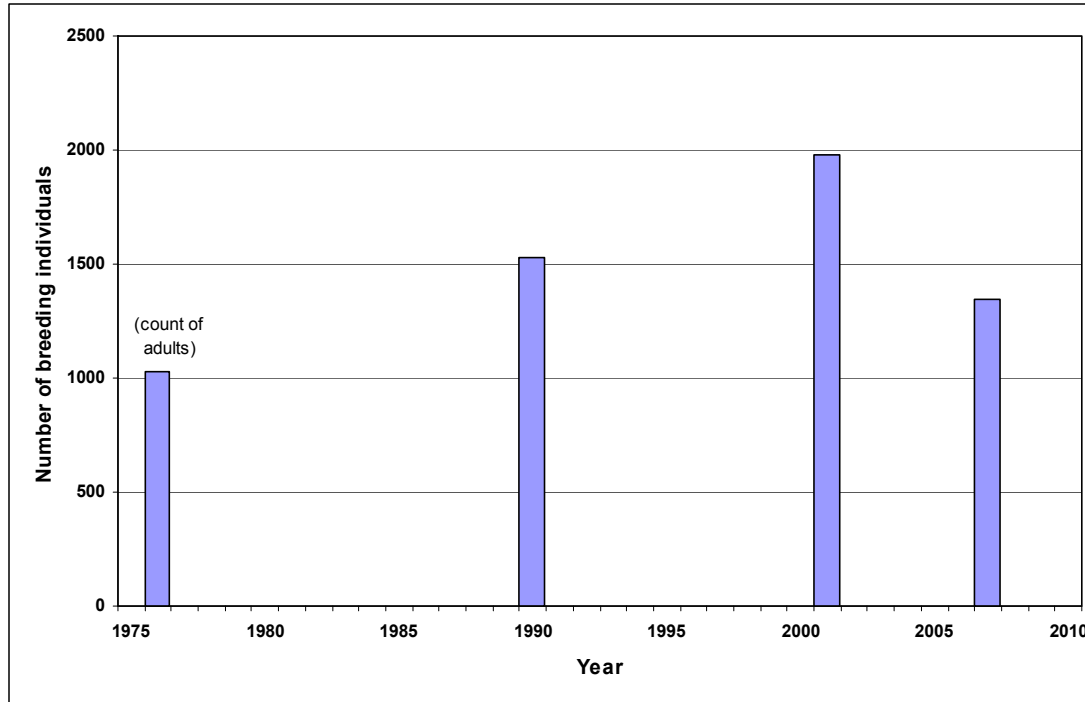


Figure 3. Population trend of the Great Cormorant in the Magdalen Islands, 1976-2007. Note that the 1976 result comes from a count of adults and not of nests, and that this could explain the lower result; both adults of a pair were not necessarily present at the nest when the adults were counted, while the subsequent results obtained by nest counts assume that there are two adults per nest.

3.4 *Double-crested Cormorant*

It is known that the Double-crested Cormorant first nested on Île aux Loups Marins in the 1950s, and that for nearly 30 years this was the species' only nesting site in the Magdalen Islands (Fradette 1992; Chapdelaine et al. 2007). This colony showed constant and rapid growth between 1972 and 1988, increasing from 396 pairs to 3005 pairs (see Fradette 1992). However, over time, the nests built in coniferous treetops degraded the forest habitat to the extent that now barely a tree is left standing on this island. A small number of pairs tried to breed on the ground, but the presence of foxes on the island did not favour this option (F. Shaffer, pers. comm.). Thus, the island was found to be completely deserted in the 2002 census. The few Great Blue Herons and the hundreds of gulls who previously bred on this island had left in 1992 and 1995 respectively (Desrosiers 1993; Shaffer 1995).

It thus seems that the Double-crested Cormorants were gradually forced to find new nesting sites. In 1987 Daniel Jauvin noted the presence of 50 pairs on Île Rouge in Grande-Entrée Lagoon. The next year it was the turn of Île aux Goélands to be colonized by 14 pairs (ministère du Loisir, de la Chasse et de la Pêche du Québec, unpublished data), followed in 2000 by Île Brion (38 pairs) and Île Rouge in Havre-aux-Maisons Lagoon (CWS, unpublished data). Finally, in 2007, the Double-crested Cormorant was discovered breeding at 4 other locations: on Corps Mort (7 pairs), on the Baie du Portage islets in Havre-aux-Basques Lagoon (561 pairs), on Île Shag (750 pairs), and on Îlot B of Grande-Entrée Lagoon (833 nests). However, the colonies of the two islands called Île Rouge (Havre-aux-Maisons and Grande-Entrée Lagoons), which had become relatively large in 2002 (407 and 536 pairs respectively), had been abandoned in 2007. The presence of a fox on the first island easily explains the reason for this abandonment; this predator, omnipresent in the Islands, is also the most likely cause of the abandonment of the other Île Rouge (in Grande-Entrée Lagoon), because this island is separated from the main island chain only by half a kilometre of water.

In all, in 2007, the species nonetheless bred at 6 sites, and the population estimate came to 2687 pairs, close to the level observed in 1988. At that time, this species was concentrated on Île aux Loups Marins, where J.-P. Lebel had counted 3005 nests (Fradette 1989). The abandonment of this important colony probably explains the population reduction observed between 1990 and 2002 (from 1591 to 981 pairs), but it now appears that, because of the colonization of several new nesting sites, the Double-crested Cormorant is doing well in the Magdalen Islands (Figure 4). However, some colonies appear vulnerable to the eventual presence of foxes (e.g., the Baie du Portage islets and Île aux Goélands). In addition, Îlot B in Grande-Entrée Lagoon is also at risk of disappearing due to erosion. But other colonies are practically inaccessible to this predator (Île Shag, Corps Mort, the cliffs of Île Brion), which assures the species' future in the Magdalen Islands.

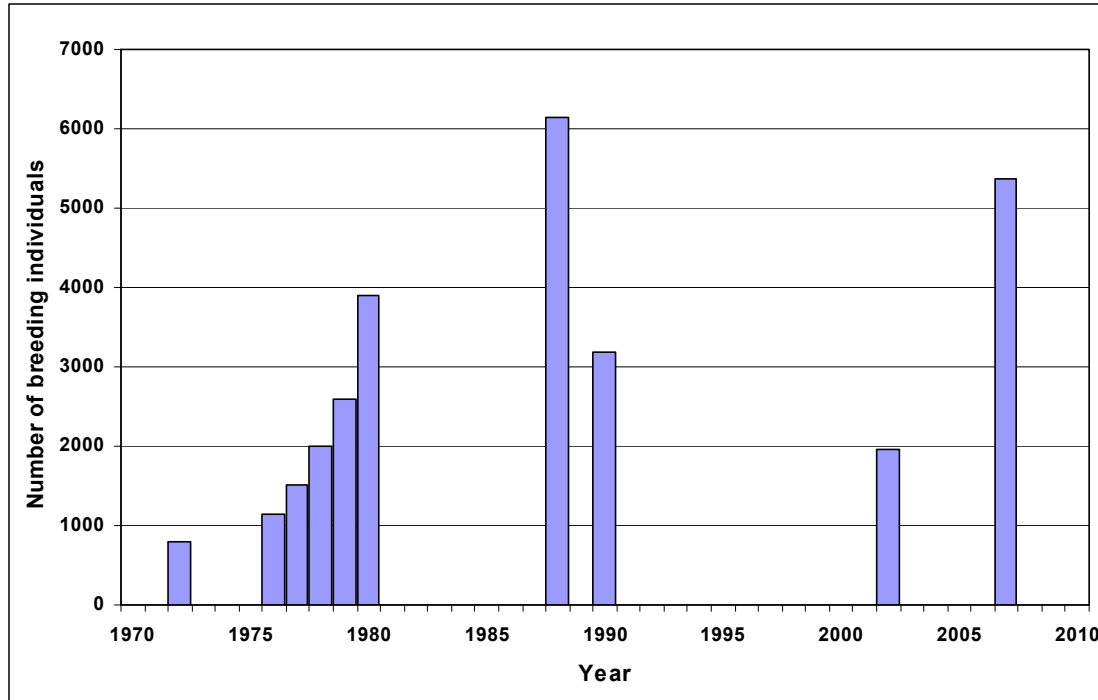


Figure 4. Population trend of the Double-crested Cormorant in the Magdalen Islands, 1972-2007

3.5 *Common Eider*

The observation of a female flying away off Île aux Goélands on our approach does not leave any great doubt regarding nesting by the species at this location. A nest containing five eggs had been discovered at the same location in 1990 (ministère du Loisir, de la Chasse et de la Pêche du Québec, unpublished data), and nesting by the eider had also been confirmed in 1988 (Munro 1995). However, this is our only mention concerning the breeding population of the Islands.

Elsewhere in the Magdalen Islands, Île Brion is the only site where the species has bred regularly in the past. It is difficult to determine what the hatching chronology of the species' eggs would be on Île Brion, but our 2000 and 2007 censuses at this location (conducted on June 20 and June 15 respectively) probably took place on dates too early to observe crèches (amalgamated broods) on the periphery of the island, if the Common Eider bred there. In comparison, the observations of crèches around Île Brion reported by Aubry (1982), Coderre (1985) and Fradette (1990a) were all made between July 15 and the end of August. Thus, the fact that we did not see any Common Eiders from the boat cannot exclude the possibility that females were present on their nest, well

hidden in the island's vegetation. In 2007, we stayed on the island for about a day, but this was not enough to conduct a census on the ground of the sectors most hospitable to Common Eider nesting, located towards the east end of the island (Fradette 1992). Moreover, no access is possible to visit Pointe de l'Est, now separated from the rest of Île Brion. On the other hand, the reappearance of the Red Fox on Île Brion since 1987 is certainly a factor that could limit nesting by Common Eiders on this island, if not prevent it outright. To summarize, if the Common Eider still breeds on the island, its numbers are probably very small, and no improvement is foreseeable as long as the Red Fox will be present.

3.6 *Great Black-backed Gull*

Between 1976 and 1990, the number of sites where this species breeds in the Magdalen Islands doubled (from 8 to 16) and the number of breeding birds rose from 1901 to 2423 (+27.5 %). Subsequently, from 1990 to 2007, there was little variation in the number of colonies. However, desertion (due to foxes) of the major colonies on Île aux Loups Marins and Île Brion could not be offset completely by colonization of new sites, because the Great Black-backed Gull breeding population lost about 1000 individuals between 1990 and 2002, and has remained stable ever since (see Figure 5). In fact, apart from Île du Chenal in Grande-Entrée Lagoon, there are now only a few pairs per nesting site, and the colonies are often located in suboptimal habitats. For example, 11 of the 15 colonies surveyed in 2007 in the Magdalen Islands included less than 15 pairs. Moreover, two of the three biggest colonies censused in 2007 (on Île du Chenal, and on the beach at the southwest end of Île du Havre-aux-Maisons) were frequented by foxes and showed obvious signs of predation and a large number of empty nests (see Appendix 1d). Thus, it seems that the habitats conducive to nesting and shelter from foxes are a limiting factor for this gull in the Magdalen Islands. If the current situation persists, where 70% of the Great Black-backed Gulls in the Islands breed at one site (Île du Chenal) and very few chicks survive to flying age due to the Red Fox, it is difficult to conceive how the population could be maintained in the long term.

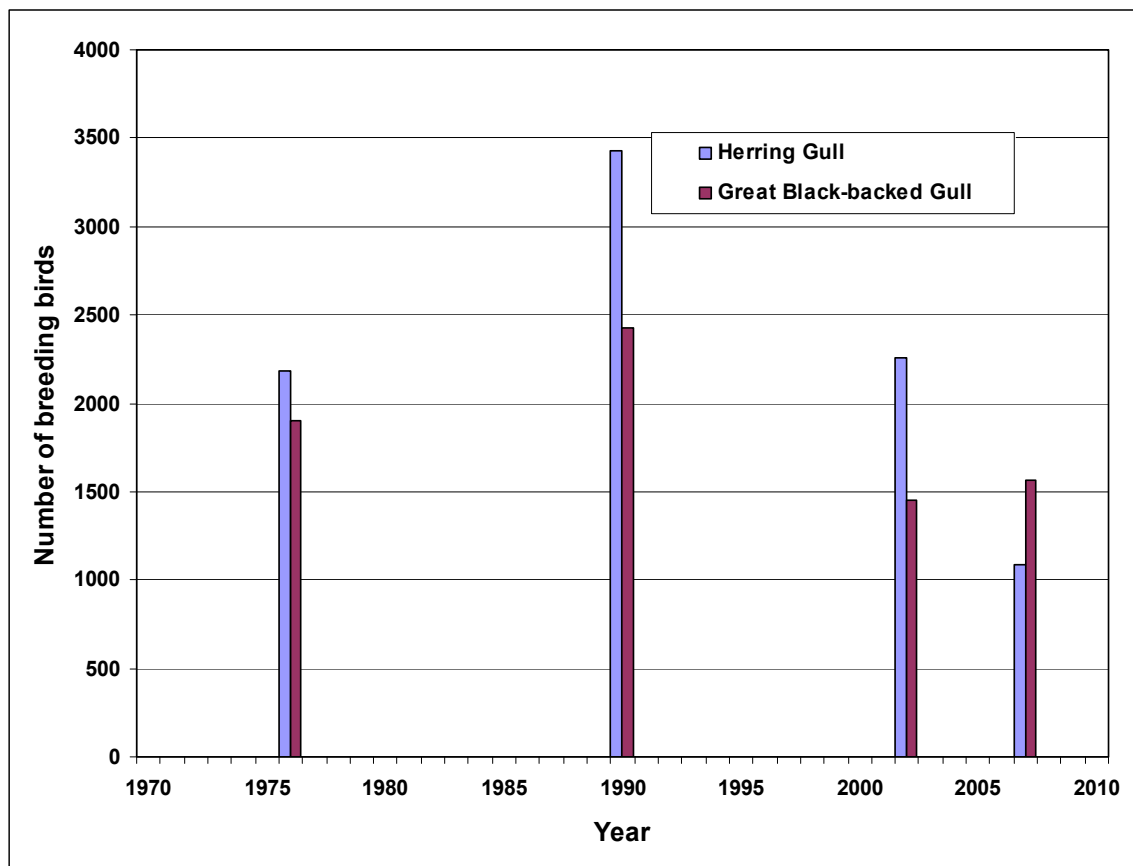


Figure 5. Population estimates of Herring Gulls and Great Black-backed Gulls in the Magdalen Islands, 1976-2007

3.7 *Herring Gull*

Between 1976 and 1990, the Herring Gull population of the Magdalen Islands grew substantially, increasing from 2180 to 3428 individuals (+ 57.2%), with the number of colonies rising from 9 to 14. However, after 1976, the biggest colonies, namely Île Brion, Île aux Loups Marins (see subsection 3.4 for more details concerning the factors involved) and Île Paquet, were abandoned in turn, probably due to the arrival of the Red Fox. The number of Herring Gull colonies remained relatively stable between 1990 and 2007, with some colonies being abandoned while others (generally small) appeared at new sites.

To all indications, as in the case of the Great Black-backed Gull, the presence of foxes in the Magdalen Islands limits the number of nesting sites for this species. In 2007, dens were even observed (and many empty nests: see Appendix 1d) at the sites where the two biggest colonies

were found. The population, which currently consists of a little over 1000 individuals, has declined nearly 70% since 1990 and does not seem inclined to stabilize like the Great Black-backed Gull population (Figure 5). In fact, the decline was even faster between 2002 and 2007 than between 1990 and 2002. Considering that the biggest colonies undoubtedly will have very poor reproductive success due to the foxes in the vicinity, low recruiting in the long term does not give reason to forecast stabilization of the Herring Gull population in the Magdalen Islands, unless the species concentrates at other more adequate and productive sites.

Another factor to consider in the population trend of this species is the impact of fishing activities, particularly those aimed at groundfish, which make a major contribution (through fish offal and discards) to the diet of the gulls that follow the boats. On the North Shore, for example, the correlation has been shown between cod landings and the size of the Herring Gull populations: the gulls had prospered at the same time as this fishery, and when it collapsed in the late 1980s, up to the moratorium imposed in 1994, the gull populations also diminished suddenly (Chapdelaine et Rail 1997).

3.8 *Black-legged Kittiwake*

In 1976, the Black-legged Kittiwake only bred in three locations in the Magdalen Islands: Île d'Entrée (76 individuals; Burton 1978), Île Brion (550 pairs; Mousseau et al. 1976), and Rochers aux Oiseaux (no data in 1976, but 5000 pairs in 1973 according to Brown et al. 1975). Other sites were colonized subsequently, specifically Île Shag in 1977 (Pilon et al. 1983), Cap du Sud-Ouest (Le Gros Cap) in 1987 (Fradette 1992), Île aux Goélands in 1990 (Bourque and Richard 1992), and finally Cap du Sud, Cap Noir and Corps Mort in 2007.

Regarding the population trend, after growth of nearly 50% between 1976 and 1990, a slight decline was observed in the total number of breeding birds in the Magdalen Islands over the past two censuses (from 16,618 birds in 1990 to 15,292 in 1999-2002, to 14,350 in 2007). However, the trends varied enormously from one colony to another. Thus, the numbers increased for practically all colonies, except for the two colonies that originally were the biggest and where the opposite trend was observed. On Rochers aux Oiseaux, the population fell gradually from about 10,000 individuals in 1976 to only 3778 in 2007. On Île Brion, the number of Black-legged Kittiwakes had reached 7402 individuals in 1990, but currently this colony is identical in size to

the Rochers aux Oiseaux colony. As a result, the largest concentration of Black-legged Kittiwakes in the Magdalen Islands can now be found on Île d'Entrée.

The factors that could explain the trends in this species are nebulous. Since the early 1990s, an almost generalized decline of the Black-legged Kittiwake has been observed throughout the Gulf of St. Lawrence. A little like the case of the Herring Gull, it seems that the Black-legged kittiwake populations had peaked in the late 1980s and then declined. However, the Herring Gull populations ended up stabilizing in several regions, which does not seem to be the case for the Black-legged Kittiwake. The interpretation of the population trends in the Magdalen Islands is complex, given that some colonies show divergent trends.

3.9 Black-headed Gull

This species of European origin only arrived recently in the Americas (Newfoundland in 1977). The first breeding record in the Magdalen Islands dates back to 1981, when about 10 individuals were found breeding at Étang de la Martinique (in Havre-aux-Basques Lagoon). Subsequently, the Black-headed Gull probably bred every year at this location (between 9 and 15 individuals) until 2000. During that year, 6 pairs were found at Pointe de l'Est, in addition to four adults observed at Étang de la Martinique. After 2004, however, the “migration” was over and the Black-headed Gull bred only at Pointe de l'Est. Three distinct nesting sites were used successively at Pointe de l'Est (see Figure 6).

The present 2007 census set the record for the greatest number of Black-headed Gulls, 17 nests (pairs) and 35 individuals. Despite the year-to-year fluctuations, the trend of this small population seems clear: in the long term, the population probably will continue to grow in the Magdalen Islands – unless it becomes the target of foxes. On June 20, 2007, the average clutch size indicated that reproduction was proceeding normally, and there were only two empty nests out of 17 (Appendix 1b).



Figure 6. Nesting sites of the Black-headed Gull at Pointe de l'Est, from 2000 to 2007.

Elsewhere in Québec, the species has bred at only one other location, Île à Calculot in the Mingan Archipelago National Park Reserve of Canada (on the North Shore of the Gulf of St. Lawrence), where a single pair nested in 1988 and in 1998 (Roberge 2004).

3.10 Common and Arctic Terns

Terns are among the emblematic species of the Magdalen Islands. Because of the many potential habitats for their nesting (low and sandy islets, sand spits) and their feeding (large expanses of lagoons and coastal environments; sand lances, sticklebacks and other abundant small fish), the population of the Islands is fairly large, consisting of nearly 2500 breeding pairs in 2007. The Common and Arctic Terns are discussed together here, because the colonies are often mixed and, more often than not, the data gathered do not specify the proportion of each species. However, it is known that the Common Tern is the more plentiful of the two species by far. Pearce et al.

(1972) and Mousseau et al. (1976) had estimated the proportion of Arctic Terns in the Magdalen Islands at about 5%, while in 1990 this proportion was estimated at 15% (Bourque and Richard 1992). For their part, Shaffer and Laporte (1993) estimated the proportion of Arctic Terns at 2.7%. One thing is certain – the data are insufficient to determine the population trend for each species.

Between 1990 and 2007, several complete censuses of the tern colonies were conducted in the Magdalen Islands. During this period, if we exclude the total from 1995 (when between 500 and 1000 nests had been destroyed by foxes just before the census), the total population estimated ranged between 2231 and 2824 pairs, and no specific trend was apparent (Figure 7). Before 1990, an almost complete census had been conducted by Mousseau et al. (1976). When the 125 individuals counted by Burton (1978) on Île Brion are added, there were about 1400 breeding terns in 1976... precisely one quarter of the population censused in 1990 (about 2800 pairs, or 5600 individuals). However, four years earlier, Pearce et al. (1972) counted 1464 pairs by visiting only three colonies; so it is difficult to explain such a low total observed in 1976 and to state with certainty that terns were less numerous in the 1970s.

Many factors influence the tern populations in the Islands: apart from anthropic disturbance (hikers, all-terrain vehicles, egg collecting) and habitat creation and loss (e.g., creation of Îlot B and Île du Chenal in Grande-Entrée Lagoon in 1982, disappearance of the islet at the tip of Dune du Sud after a storm in the 1970s), there is the constantly intense pressure by predators (gulls and Red Fox).

Since 1993, within the context of the conservation efforts aimed at the Roseate Tern, the Canadian Wildlife Service has made a lot of efforts to protect certain tern colonies against foxes, particularly by installing electrified fences and developing means to extirpate these predators from certain sites. However, the Red Fox is currently plentiful in the Magdalen Islands and represents a recurring and significant threat to all the tern colonies. It is appropriate to ask whether the tern population will be able to maintain its current level in the long term, with the omnipresence of foxes in the Islands, as well as the recent arrival of the Coyote. As is the case with most seabirds, terns have great longevity and relatively low fecundity. An increase in the adult mortality rate will affect the breeding population instantly and much more strongly than a decline in reproductive success. It was found that in the three biggest tern colonies, there is

predation of adult terns by Red Foxes or Coyotes (76 individuals found dead, or 3% of the breeding population of the Magdalen Islands) in addition to nest depredation (see Appendix 1e).

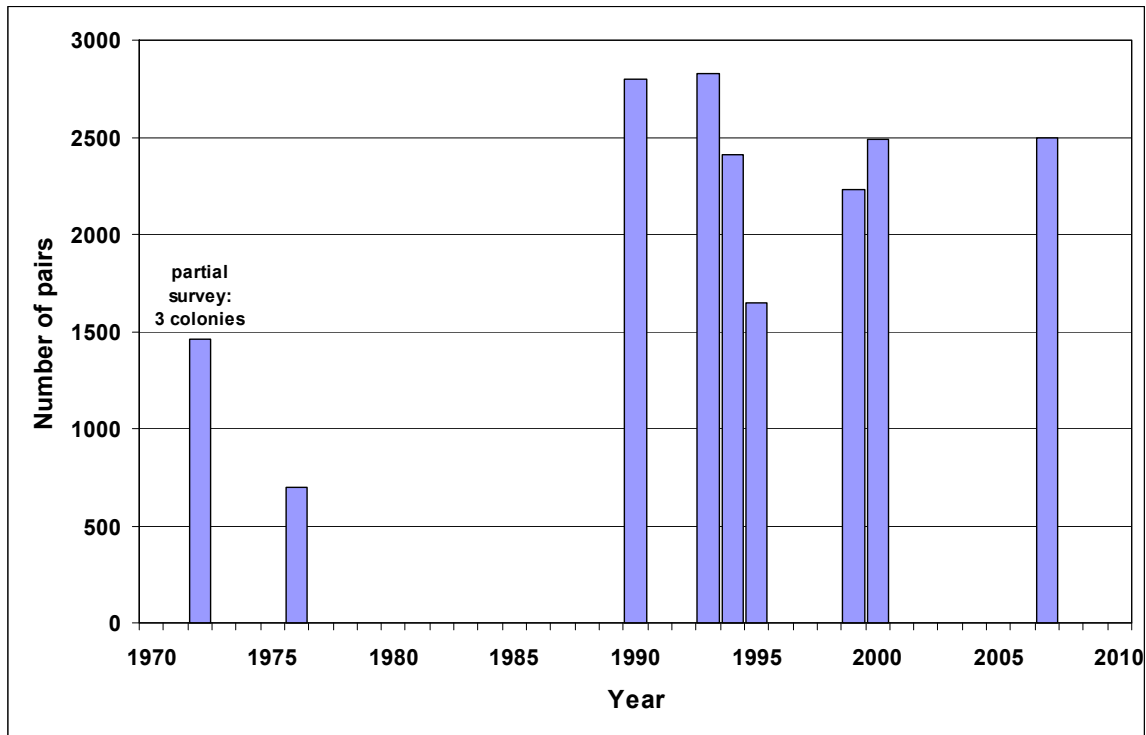


Figure 7. Tern population estimates in the Magdalen Islands, 1972-2007. Note that the 1995 result is an underestimate, because between 500 and 1000 nests had been destroyed by foxes just before the census

3.11 Roseate Tern

This elegant tern bred in the Magdalen Islands for the first time in 1972, when 13 birds were noticed on Îlets des Étroits. Subsequently, between 1 and 7 individuals were detected almost every year, and several different locations were used: Île Paquet, Île du Chenal, the Havre-aux-Basques Lagoon Islets, the islet north of Dune du Sud, Pointe de l’Est, and Pointe Nelson. Only one individual had been seen in 2004, 2005 and 2006. In 2007, we located one on Île du Chenal and a second at Pointe de l’Est. During censuses, it is not always possible to confirm whether these birds are breeding and to verify whether they then form hybrid pairs (with a Common Tern, for example) or pair with a congener. However, the numbers observed cannot much underestimate the number of breeding birds, which can be summed up at a few individuals (Figure 8).

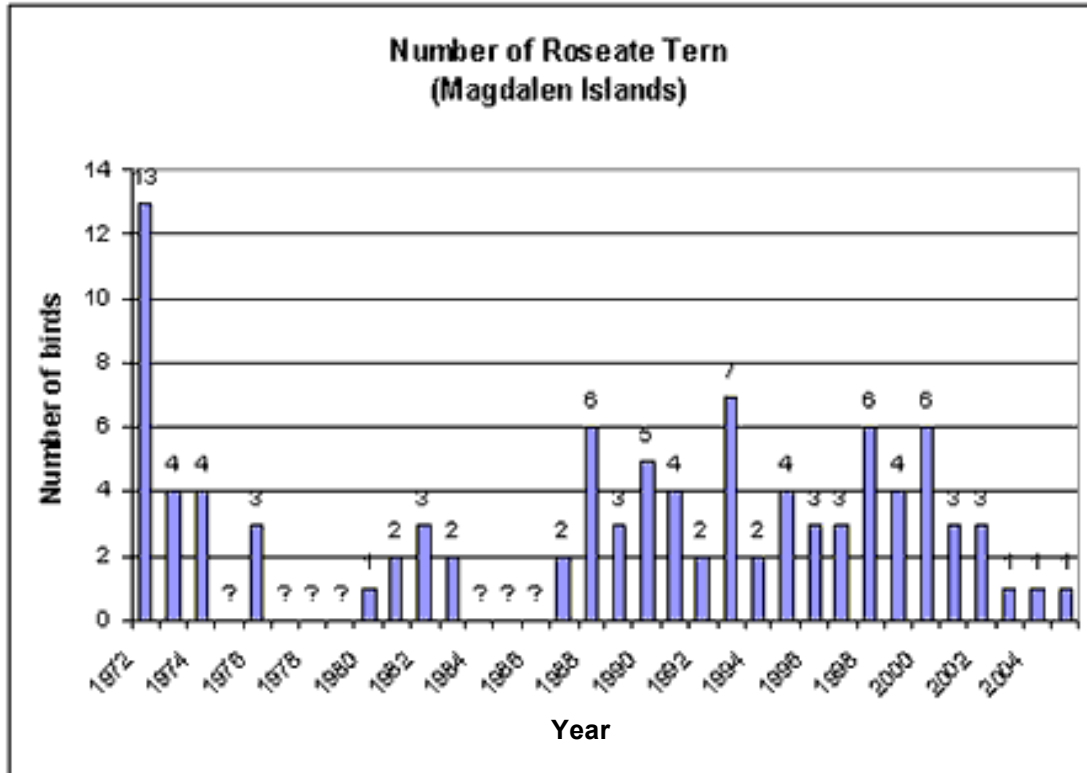


Figure 8. Number of Roseate Terns observed in the Magdalen Islands, from 1972 to 2006 (Source: http://www.qc.ec.gc.ca/faune/oiseaux_menaces/html/sterne_dougall_e.html)

The status of this tiny population is precarious in the Magdalen Islands, to say the least, especially with the accessibility of its nesting sites to the Red Fox. In the rest of Canada, only a small number can be found in Nova Scotia (135 pairs). The North American population itself is considered to be endangered, with only about 3500 to 4000 pairs. Needless to say, continuous efforts to conserve the Common and Arctic Tern colonies (by controlling predators, in particular) are essential if one wishes to maintain or increase the meagre Roseate Tern population in the Magdalen Islands.

3.12 Common Murre

Nesting by this species in the Magdalen Islands was confirmed in the 1800s at Rochers aux Oiseaux (Bryant 1861) and Île Brion (Young 1897). According to the first estimates, the population was much smaller in the early 1900s than today, with about 400 individuals on Rochers aux Oiseaux in 1904 (Bent 1919) and only 12 on Île Brion in 1933 (Johnson 1940). In fact, the Common Murre remained very scarce on the Islands for a long period, because in 1983

Yves Aubry (pers. comm.) only counted 125 around Rochers aux Oiseaux, and the species even seems to have disappeared from Île Brion in the late 1970s (Mousseau 1984). However, a clear progression of the species population was noted in the last two censuses. Thus, the population estimate was impressive, stable at nearly 7000 individuals in 2000 and 2007 on Rochers aux Oiseaux, while on Île Brion it jumped from 212 individuals in 2000 to 2266 individuals in 2007. Moreover, in 2007 we observed that some individuals now seem to breed on Île d'Entrée, Corps Mort and Île Shag. The trend thus appears to be completely encouraging for this species in the Magdalen Islands.

3.13 Thick-billed Murre

Rochers aux Oiseaux is located nearly 2000 km southeast of the only other Thick-billed Murre nesting site in Quebec, Cape Wolstenholme (on the northwestern tip of the Ungava Peninsula). Elsewhere in Quebec, the last breeding records date back to the 1960s (3 individuals on Falaise aux Goélands on Anticosti Island in 1963; 2 breeding pairs on Îles Sainte-Marie on the Lower North Shore in 1962). The Magdalen Islands colony thus represents the southernmost point in the species' range in eastern North America.

As Fradette (1992) shows, the historical observations on Rochers aux Oiseaux often indicated that the Thick-billed Murre was at least as plentiful as the Common Murre. In 2000, however, this ratio was strongly in favour of the Common Murre (which represented 86% of murre: 7168 Common Murres to 1160 Thick-billed Murres). In 2007, in view of the decline in the Thick-billed Murre population (estimated at 794 individuals), their proportion had fallen to only 10% on Rochers aux Oiseaux.

These two murre species certainly have a very similar ecology on Rochers aux Oiseaux. However, it is known that when the two species cohabit, they differ slightly in their feeding habits (Birkhead and Nettleship 1987; Vader et al. 1990; Bryant and Jones 1999). Could the variations in the abundance of their preferred prey, competition between the two species for nesting sites, or other factors explain why the Thick-billed Murre declined between 2000 and 2007 in the Magdalen Islands, and not the Common Murre? Too little is known to answer this question. However, in the long term, if the water temperature of the Gulf of St. Lawrence were to

rise due to climate warming, we should not be surprised at the disappearance of this colony, located at the southern limit of the species' range.

3.14 Razorbill

It is not recent knowledge that, like the Common and Thick-billed Murres, the Razorbill breeds on Rochers aux Oiseaux, Île Brion and Île d'Entrée. However, the first population estimates are relatively recent. Except for a mention of 1800 individuals on Rochers aux Oiseaux in 1904 (Bent 1919), the oldest is from 1961 (150 pairs; Bagg and Emery 1961). Fradette's table (1992) clearly shows a rising population trend in the Razorbill colonies of Île Brion and Île d'Entrée between 1970 and 1990, while the trend was less clear for the Rochers aux Oiseaux colony. The 2000 census results confirmed this trend, with the biggest numbers ever observed for each colony. Moreover, two small colonies had been added, at Cap du Sud-Ouest and Île aux Goélands. Between 2000 and 2007, the population estimates rose again in most of the colonies: from 304 to 334 individuals on Île d'Entrée; from 24 to 38 individuals at Cap du Sud-Ouest; from 36 to 48 individuals on Île aux Goélands; from 1884 to 1900 individuals on Rochers aux Oiseaux. Only Île Brion suffered a notable decline, from 1074 to 598 individuals. The appearance of three new nesting sites should also be noted: Cap du Dauphin, Île Shag and Corps Mort.

This species is thus on the right track in the Magdalen Islands. The only question mark is the sharp decline observed on Île Brion (between 2000 and 2007). It should be noted that Razorbill populations have been growing for the past 30 years elsewhere in the Gulf (Estuary, North Shore, Gaspé, see Chapdelaine et al. 2001; Rail and Chapdelaine 2004; Cotter and Rail 2007).

3.15 Black Guillemot

The species is present everywhere in the Magdalen Islands wherever there are cliffs, even small ones, except curiously on Rochers aux Oiseaux, where the high concentration of birds breeding on the cliffs may possibly exclude this small Alcidae.

Practically no population estimate is available for the Black Guillemot in the Islands before 1976 (Mousseau et al. 1976; Burton 1978). Although some of the sites where the species nests probably had not been covered in 1976, it must be considered that the Black Guillemot is much more plentiful today because the numbers have increased in almost all the known colonies. In

fact, the biggest colony in 1976 was Île Brion with 75 birds observed, while more than 400 individuals were counted there in 2007 (and even 703 birds in 2000). The number of Black Guillemots counted in all colonies in the Islands increased rapidly overall: from 158 in 1976, to 664 in 1990, to 1555 in 2000. Several new colonies were also discovered. However, the 2007 census showed declines in several colonies, particularly on Île Brion, for a total of 1275 individuals, down 18% between 2000 and 2007. The current population estimate for the Islands is thus 1275 pairs, if a correction factor of 1.0 breeding pair per individual observed is used (see the calculation methods for the population estimates, in Section 2).

The Black Guillemot often uses very cramped nesting sites (cracks in the smallest cliff) where no other seabirds are found. Thus, apart from some sectors of Île Brion, the species does not really compete with the other species for nesting areas, especially since this type of habitat is abundant in the Islands. The various prey that make up its diet are not species prized by the fishing industry. Nor is this a species that seems very vulnerable to disturbance. Considering its relatively high current population level, the future of the Black Guillemot does not seem threatened at all in the Magdalen Islands.

3.16 Atlantic Puffin

The Atlantic Puffin was probably present on Rochers aux Oiseaux and Île Brion in the age of the great explorers (Fradette 1992). However, except for one datum from 1904, the first population estimates come from Gaboriault (1956), who counted 10 individuals on Rochers aux Oiseaux, and Boulva (1970, in Fradette 1992), who observed 46 in 1966 on Île Brion. Subsequently, until the 1980s, the upward population trend was obvious and constant, both on Rochers aux Oiseaux and Île Brion (Fradette 1992).

Unfortunately, our 2000 and 2007 censuses found that this trend had reversed. Thus, the population estimate fell from 17 pairs in 2000 to “maybe” one pair in 2007 on Rochers aux Oiseaux, while on Île Brion the decline was 76% during the same period (from 320 pairs to 78 pairs). The Atlantic Puffin also suffered unexplained declines in several colonies on the North Shore (Rail and Cotter 2007). If the causes of this decline are not identified or do not disappear on their own, the small Atlantic Puffin population of the Magdalen Islands could be in danger of disappearing in the near future.

3.17 Great Blue Heron

The first heronry was discovered on the Islands in 1971, when 10 nests were counted on Île aux Loups Marins (McNeil et al. 1973). However, this colony was abandoned after 1990, with the disappearance of the forest on this island. Among the four other heronries found between 1979 and 1992, none was noticed in 2007 at Pointe des Canots, Mont Moore was abandoned in 2006 (F. Shaffer, pers. comm.), and only one active nest was noticed in 2007 at Pointe Rockhill; which today leaves only the Fatima colony as a heronry worthy of the name. This heronry's size has been fairly stable for 20 years, ranging between 49 and 67 nests since 1988 (Bourque and Richard 1992; Desrosiers 1993; CWS unpublished data). In 2002 and 2007, we counted 52 and 56 Great Blue Herons nests in the aerial photos.

4. CONCLUSION

The seabird community of the Magdalen Islands had lost nothing of its richness and abundance in 2007. Particularly due to the rapid growth of the Northern Gannet colony on Rochers aux Oiseaux, nearly 100,000 seabirds now breed on the Islands, divided among 17 species (I am not including the Great Blue Heron among the seabirds). However, when analyzing the status of the different species, what catches the attention is the large number of them with precarious status in the Islands, either because of their small population (e.g., Roseate Tern, Common Eider, Black-headed Gull, Great Blue Heron), or because most or all of their nesting sites are accessible to the Red Fox and thus vulnerable to predation (gulls and terns, Black-headed Gull, Leach's Storm-Petrel). Moreover, we find that the populations of several species show worrying and sometimes unexplained trends (Herring Gull, Atlantic Puffin, Thick-billed Murre).

Currently, the biggest short-term threat to the seabird populations of the Magdalen Islands is still probably the Red Fox, which is omnipresent. Its impact was noticeable both for predation of nests and the disappearance of several fine seabird colonies it invaded. Here the size of the Red Fox population sometimes seems to fluctuate enormously from year to year, probably due in part to the trapping effort of previous winters. Thus, in autumn 1983, after a few years of poorly controlled trapping, it was estimated that between 60 and 100 foxes (Anonymous 1983) remained in the Magdalen Islands (excluding Île Brion, Île d'Entrée and Île aux Goélands). Despite the recommendation at that time to stop trapping foxes in the Islands for five years, the season was only closed in autumn 1991, following the Fradette report (1990b), which estimated that the population ranged between 35 and 75 individuals, a decline of about 42% between 1970 and 1990. Subsequently, during the four winters without trapping, censuses recorded successive increases in the number of foxes in 1992 (Bourque 1992) and 1994 (Pereira and Richard 1994). More recently, during the winters of 2000-2001 to 2006-2007, the number of annual catches by trapping averaged 53 (data from the ministère des Ressources naturelles et de la Faune du Québec), similar to the pre-1977 result. This number was extremely variable, however (between 6 and 147). In short, the fox population of the Magdalen Islands fluctuates greatly and rapidly, which should reflect on the predation pressure it imposes on the seabirds. The trend and management of the fox population thus should be watched closely, and the same principle applies to the predator newly arrived in the Island, the Coyote.

Fortunately for the future, several major sites, more isolated from the main archipelago or offering steep cliffs, benefit from good natural protection against invasion by land predators and anthropic disturbance. The best example of this is obviously the Rochers aux Oiseaux site, which accommodates nearly two thirds of the breeding seabirds in the Magdalen Islands.

5. ACKNOWLEDGMENTS

I would first like to thank my colleagues Richard Cotter and François Shaffer, with whom it is always a pleasure to work, both in the field and in editing this document. I should also note the participation of the team working in the Pointe de l'Est National Wildlife Area, composed of Stéphanie Gagnon and Olivier Barden of the CWS, and the ministère des Ressources naturelles et de la Faune du Québec through Sylvain St-Onge, Alain Desrosiers, Alain Lehoux and Renée Faubert. Several members of the Attention Frag'Îles organization also lent us a hand on Île du Chenal: Pascal Poirier, Alain Richard, Catherine Turbide and Simon Castonguay. Sophie Fortier contributed to the quality of this report by her meticulous editing. I thank the ministère du Développement durable, de l'Environnement et des Parcs du Québec (Andrée Giroux, Solange Renaud) for the authorization to circulate in the Île Brion Ecological Reserve, and Mr. Gaston Arseneau of *Excursions en mer Inc.*, our captain during the visits to Île Brion and Rochers aux Oiseaux. My compliments to our host in the Islands, Ryna Deraspe, who showed us all the warmth of a Madelinot welcome. The involvement of Air Montmagny and our pilot Louis Normand for the aerial census was once again greatly appreciated. Finally, the financial participation and collaboration of Parks Canada were essential to carry out this census; I thank Nelson Boisvert and Luc Miousse (Magdalen Islands National Marine Conservation Area), and especially our two invaluable aides in our adventures in the field, Dominic Cyr and Isabelle Turbide.

6. LITERATURE CITED

- Anonymous 1983. Étude des populations de renard roux aux Îles-de-la-Madeleine. Le Groupe-Conseil Polytec Inc., for Ministère du Loisir, de la Chasse et de la Pêche du Québec, Service de l'aménagement et de l'exploitation de la faune, Québec, 65 pp.
- Aubry, Y. 1982. Aperçu de l'avifaune de l'île Brion, Québec. Province of Québec Society for the Protection of Birds. Tchébec 12: 86-101.
- Bagg, A.M. and R.P. Emery 1961. Regional reports, nesting season, June 1 to August 16, 1961. Audubon Field Notes 15(5): 450-453.
- Barbraud, C. and G. Gélinaud 2005. Estimating the sizes of large gull colonies taking into account nest detection probability. Waterbirds 28: 53-60.
- Bent, A.C. 1919. Life histories of North American diving birds. U.S. Natl. Mus. Bull. 107, 239 pp. Washington, D.C.
- Birkhead, T.R. and D.N. Nettleship 1987. Ecological relationships between Common Murres, *Uria aalge*, and Thick-billed Murres, *Uria lomvia*, at the Gannet Islands, Labrador. III. Feeding ecology of the young. Can. Journal of Zoology 65: 1638-1649.
- Boulva, J. 1970. Letter to Dr. R. McNeil dated November 3 1970. Cited in Fradette, P. 1992. Les oiseaux des Îles-de-la-Madeleine: populations et sites d'observations. Attention frag'Îles, Mouvement pour la valorisation du patrimoine naturel des Îles, L'Étang-du-Nord, 292 pp.
- Bourque, F. 1992. Inventaire de terriers et estimation des densités de renard roux pour différents secteurs aux Îles-de-la-Madeleine. Ministère du Loisir, de la Chasse et de la Pêche du Québec, Service de l'aménagement et de l'exploitation de la faune, Bas-Saint-Laurent, Gaspésie, Îles-de-la-Madeleine. Technical report, 21 pp.
- Bourque, F. and Y. Richard 1992. Inventaire des colonies d'oiseaux marins des Îles-de-la-Madeleine, 1990. Report for Aménagement et Exploitation de la faune Québec, 17 pp. + appendices.
- Brown, R.G.B., D.N. Nettleship, P. Germain, C.E. Tull and T. Davis 1975. Atlas of Eastern Canadian Seabirds. Canadian Wildlife Service, Environment Canada, Ottawa, 220 pp.
- Bryant, H. 1861. Remarks on some of the birds that breed in the Gulf of St. Lawrence. Proc. Boston Soc. Nat. Hist. 8:65-75.
- Bryant, R. and I.L. Jones 1999. Food resource use and diet overlap of Common and Thick-billed Murres at the Gannet Islands, Labrador. Waterbirds 22: 392-400.
- Burton, J. 1978. L'alimentation estivale du Fou de Bassan, du Grand Cormoran et du Cormoran à aigrettes aux Îles-de-la-Madeleine, en relation avec les pêches commerciales. Unpublished report presented to Environment Canada by Centre de recherches écologiques de Montréal, 35 pp. + appendices.
- Cairns, D. 1979. Censusing hole-nesting auks by visual counts. Bird Banding 50: 358-364.

- Chapdelaine, G., P. Brousseau and J.-F. Rail 2007. Banque informatisée des oiseaux marins du Québec (BIOMQ) (Québec Seabird Registry). Database, updated November 16 2007. Environment Canada, Canadian Wildlife Service, Québec Region.
- Chapdelaine, G., A.W. Diamond, R. Elliot and G.J. Robertson 2001. Status and population trends of the Razorbill in eastern North America. Canadian Wildlife Service Occasional Paper 105. Ottawa, 21 pp.
- Chapdelaine, G. and J.-F. Rail 1997. Relationship between cod fishery activities and the population of herring gulls on the North Shore of the Gulf of St. Lawrence, Québec, Canada. ICES Journal of Marine Science 54: 708-713.
- Coderre, A. 1985. Inventaire de l'avifaune de l'île Brion. Direction du Patrimoine écologique du ministère de l'Environnement du Québec, unpublished report, 55 pp.
- Cotter, R., and J.-F. Rail 2007. Third Census of Seabird Populations of the Gaspé Peninsula, Québec, 2002. Canadian Field-Naturalist 121 (3): 274-286.
- Desrosiers, A. 1993. Inventaire des héronnières du Québec – 1992. Technical report, Ministère du Loisir, de la Chasse et de la Pêche, 31 pp.
- Ewins, P. J. 1985. Colony attendance and censusing of Black Guillemots *Cephus grylle* in Shetland. Bird Study 32: 176-185.
- Fisher, J. and H.G. Vevers 1943. The breeding distribution, history and population of the North Atlantic Gannet (*Sula bassana*). Journal of Animal Ecology 12: 173-213.
- Fradette, P. 1989. Observations ornithologiques des Îles-de-la-Madeleine en 1988. Bulletin ornithologique 33 (4): 174-177.
- Fradette, P. 1990a. Inventaire de l'avifaune de l'île Brion, les 25 et 26 juillet 1990. Unpublished report for Ministère de l'Environnement, Québec, 8 pp.
- Fradette, P. 1990b. État de la population du Renard roux aux Îles-de-la-Madeleine. Ministère du Loisir, de la Chasse et de la Pêche du Québec, Service de l'aménagement et de l'exploitation de la faune, Bas-Saint-Laurent, Gaspésie, Îles-de-la-Madeleine. Technical report, 37 pp.
- Fradette, P. 1992. Les oiseaux des Îles-de-la-Madeleine: populations et sites d'observations. Attention frag'Îles, Mouvement pour la valorisation du patrimoine naturel des Îles, L'Étang-du-Nord, 292 pp.
- Gaboriault, W. 1956. Les oiseaux des Îles-de-la-Madeleine (2nd list). August 3 to 28 1956.
- Johnson, R.A. 1940. Present range, migration and abundance of the Atlantic Murre in North America. Bird-Banding 11: 1-17.
- McNeil, R., J. Boulva, W. Gaboriault and J.G. Strauch Jr. 1973. Observations récentes sur les oiseaux aux Îles-de-la-Madeleine, Québec. Rev. Géog. Montr. 27(2):157-171.
- Mousseau, P. 1984. Synthèse des données écologiques de l'île Brion, Îles-de-la-Madeleine, Québec. Direction des réserves écologiques et des sites naturels, Ministère de l'Environnement du Québec, 173 pp.

- Mousseau, P., N. David, R. McNeil and J. Burton 1976. Les Îles-de-la-Madeleine: sites de nidification et d'alimentation des oiseaux aquatiques. *In* Programme intégré de recherche en écologie dynamique aux Îles-de-la-Madeleine, Office de planification et de développement du Québec, Québec, 204 pp.
- Munro, J. 1995. Eider à duvet, pp. 316-319 *In* Gauthier, J. and Y. Aubry (under the direction of). Les Oiseaux nicheurs du Québec: Atlas des oiseaux nicheurs du Québec méridional. Association québécoise des groupes d'ornithologues, Province of Quebec Society for the Protection of Birds, Canadian Wildlife Service, Environment Canada, Québec region, Montréal, xviii + 1295 pp.
- Pearce, P.A., W.B. Hugson and A.D. Smith 1972. Magdalen Islands notes, June 20-24, 1972. Unpublished document, 7 p.
- Pereira, S. and Y. Richard 1994. Inventaire de terriers de renard roux pour différents secteurs aux Îles-de-la-Madeleine. Ministère de l'Environnement et de la Faune, Service de l'aménagement et de l'exploitation de la faune, Bas-Saint-Laurent, Gaspésie, Îles-de-la-Madeleine. Technical report, 22 pp.
- Pilon, C., J. Burton and R. McNeil 1983. Reproduction du Grand Cormoran (*Phalacrocorax carbo*) et du Cormoran à aigrettes (*P. auritus*) aux Iles-de-la-Madeleine, Québec. *Canadian Journal of Zoology* 61: 524-530.
- Rail, J.-F. and G. Chapdelaine 2002. Quinzième inventaire des oiseaux marins dans les refuges de la Côte-Nord: techniques et résultats détaillés. Technical Report Series Number 392, Canadian Wildlife Service, Québec Region, Environment Canada, Sainte-Foy, xvi + 307 pp.
- Rail, J.-F., L. Champoux, G. Chapdelaine and R. Lavoie (In preparation). Une mise à jour sur le suivi de la situation du Fou de Bassan au Québec. Technical Report Series, Canadian Wildlife Service, Québec region, Environment Canada.
- Rail, J.-F. and G. Chapdelaine 2004. Fifteenth Census of Seabird Populations in the Sanctuaries of the North Shore of the Gulf of St. Lawrence, 1998-99. *Canadian Field-Naturalist* 118: 256-263.
- Rail, J.-F., and R. Cotter 2007. Sixteenth Census of Seabird Populations in the Sanctuaries of the North Shore of the Gulf of St. Lawrence, 2005. *Canadian Field-Naturalist* 121 (3) : 287-294.
- Roberge, B. 2004. Plan de gestion de l'avifaune marine et aquatique. Réserve de parc national du Canada de l'Archipel-de-Mingan. Volume 2: Atlas de l'avifaune marine et aquatique. Parks Canada, Mingan Management Unit, 106 p.
- Rowdon, L.F. (no date: 1961). Annotated list of the birds sighted on the Magdalen Islands from the year 1954 to 1961, mimeograph.
- Shaffer, F. 1995. Suivi des populations de sternes et de goélands aux Îles-de-la-Madeleine en 1995. Unpublished report, Canadian Wildlife Service, Ste-Foy, 13 p.

Shaffer, F. and P. Laporte 1993. Inventaire de la Sterne de Dougall (*Sterna dougallii*), des colonies de sternes et de goélands aux Iles-de-la-madeleine en 1993. Internal report, Canadian Wildlife Service, Québec region, 51 p.

Vader, W., R.T. Barrett, K.E. Erikstad and K.-B. Strann 1990. Differential responses of Common and Thick-billed Murres to a crash in the Capelin stock in the southern Barents Sea. *Studies in Avian Biology* 14: 175-180.

Young, C.J. 1897. Notes on the birds of the Magdalen Islands. *Ott. Nat.* 11(8): 145-158.

7. APPENDICES

Appendix 1. Tables detailing the contents of nests noted during the 2007 census in the Magdalen Islands

Appendix 1a. Contents of Double-crested Cormorant nests in Baie du Portage, June 17, 2007

	Number of eggs per nest							H ¹	N ²	Average ³ ± Standard error
	0	1	2	3	4	5	6			
Eastern islet	43	29	59	80	53	11	0	42	317	2.82 ± 0.07
Western islet	1	3	3	7	4	0	0	226	244	2.71 ± 0.25
Total	44	32	62	87	57	11	0	268	561	2.81 ± 0.07

¹Nests in which one or more eggs hatched; number of chicks not specified.

²Total number of nests counted.

³Empty and hatched nests are excluded from the calculation of the average clutch size and its standard error.

Appendix 1b. Contents of Black-headed Gull nests at Pointe de l'Est, June 20, 2007

	Number of eggs per nest							H ¹	N ¹	Average ¹ ± Standard error
	0	1	2	3	4	5				
No. of nests	2	1	5	8	1	0	0	0	17	2.60 ± 0.19

¹See notes for Appendix 1a.

Appendix 1c. Contents of Great Black-backed Gull nests in the Magdalen Islands in 2007

Islands visited	Date	Eggs per nest				H ¹	N ¹	Average ¹ ± Standard error
		0	1	2	3			
Pointe des Canots	June 13	0	1	0	0	1	2	1.00 ± -
Pointe de l'Est	June 14-17	0	0	0	0	2	2	- ± -
Île du Bassin	June 19	2	0	0	0	0	2	- ± -
Île du Havre-aux-Maisons	June 9	0	0	1	0	0	1	2.00 ± -
Total		2	1	1	0	3	7	1.50 ± 0.50

¹See notes for Appendix 1a.

Appendix 1d. Contents of *Larus* sp. (Great Black-Backed Gull or Herring Gull) nests in the Magdalen Islands, in 2007

Islands visited	Date	Number of eggs per nest					D ²	H ³	N ³	Average ³ ±	Standard error
		0 ¹	1	2	3	4					
Cap-aux-Meules Marina	June 11	16	4	9	58	0	0	47	2	136	2.76 ± 0.06
Baie du Portage (sub-total)	June 17	15	5	3	10	0	0	2	86	121	2.28 ± 0.21
Eastern islet	"	15	4	3	8	0	0	2	54	86	2.27 ± 0.23-
Western islet	"	0	1	0	2	0	0	0	32	35	2.33 ± 0.67
Beach of Havre-aux-Maisons	June 19	156	0	0	0	0	0	0	0	156	- ± -
Île du Chenal	June 20	330	33	79	183	1	0	9	110	745	2.51 ± 0.04
	Total	517	42	91	251	1	0	58	198	1158	2.55 ± 0.04

¹Note that some of the nests could have been emptied by predators that left no traces.

²Nests that had *visibly* been destroyed by predators.

³See notes for Appendix 1a.

Appendix 1e. Contents of *Sterna* sp. (Common or Arctic tern) nests in the Magdalen Islands, in 2007

Islands visited	Date	Number of eggs per nest					D ¹	H ¹	A ²	N ¹	Average ¹ ±	Standard error
		0 ¹	1	2	3	4						
Étang de la Martinique	June 13	39	23	31	43	1	0	0	0	137	2.22 ± 0.08	
Main islet	"	30	14	18	33	0	0	0	0	95	2.29 ± 0.10	
Southwestern islet	"	8	9	9	4	1	0	0	0	31	1.87 ± 0.18	
Northern islet	"	1	0	4	6	0	0	0	0	11	2.60 ± 0.16	
Pointe des Canots	June 13	6	9	12	55	0	0	0	0	82	2.61 ± 0.08	
Îles de Travers	June 18	0	0	1	0	0	0	0	0	1	2.00 ± -	
Colonie du Nord-Ouest	June 18-24	30	50	94	220	1	0	34	0	0	429	2.47 ± 0.04
Islet 1	June 18	9	34	52	97	1	0	1	0	0	194	2.35 ± 0.06
Islet 2	June 18	2	3	15	79	0	0	0	0	0	99	2.78 ± 0.05
Islet 3	June 18	1	6	4	13	0	0	1	0	0	25	2.30 ± 0.18
Islet 4	June 24	9	4	14	20	0	0	19	0	0	66	2.42 ± 0.11
Islet 5	June 24	9	3	9	1	0	0	13	0	0	45	2.35 ± 0.15
Île du Bassin	June 19	102	175	211	175	2	0	0	0	0	665	2.01 ± 0.03
Île du Chenal	June 20	59	31	76	229	0	0	0	0	388	783	2.59 ± 0.04
Second islet (des Étroits)	June 21	35	6	2	3	0	0	0	0	0	46	1.73 ± 0.27
Pointe de l'Est	June 21	21	29	138	163	0	0	0	0	0	351	2.41 ± 0.04
	Total	292	323	565	888	4	0	34	0	388	3060	2.32 ± 0.02

¹See notes for Appendices 1a and 1d.

²Active nests whose contents were not noted (to speed up the census), not included in the calculations of average clutch size and standard error.

Appendix 2. List of English, French and scientific names of the bird species named in this report

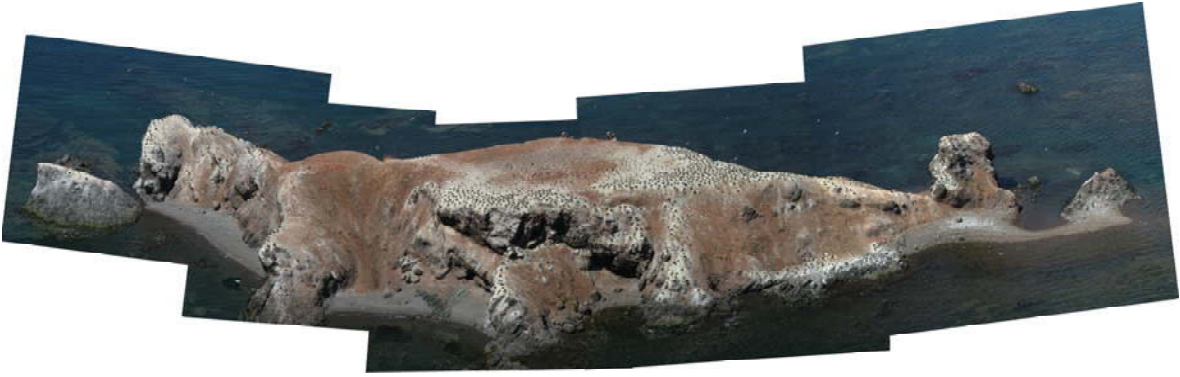
Horned Grebe	Grèbe esclavon	<i>Podiceps auritus</i>
Leach's Storm-Petrel	Océanite cul-blanc	<i>Oceanodroma leucorhoa</i>
Northern Gannet	Fou de Bassan	<i>Morus bassanus</i>
Great Cormorant	Grand Cormoran	<i>Phalacrocorax carbo</i>
Double-crested Cormorant	Cormoran à aigrettes	<i>Phalacrocorax auritus</i>
Great Blue Heron	Grand Héron	<i>Ardea herodias</i>
Common Eider	Eider à duvet	<i>Somateria mollissima</i>
Harlequin Duck	Arlequin plongeur	<i>Histrionicus histrionicus</i>
Piping Plover	Pluvier siffleur	<i>Charadrius melodus</i>
Black-headed Gull	Mouette rieuse	<i>Larus ridibundus</i>
Herring Gull	Goéland argenté	<i>Larus argentatus</i>
Great Black-backed Gull	Goéland marin	<i>Larus marinus</i>
Black-legged Kittiwake	Mouette tridactyle	<i>Rissa tridactyla</i>
Roseate Tern	Sterne de Dougall	<i>Sterna dougallii</i>
Common Tern	Sterne pierregarin	<i>Sterna hirundo</i>
Arctic Tern	Sterne arctique	<i>Sterna paradisaea</i>
Common Murre	Guillemot marmette	<i>Uria aalge</i>
Thick-billed Murre	Guillemot de Brünnich	<i>Uria lomvia</i>
Razorbill	Petit Pingouin	<i>Alca torda</i>
Black Guillemot	Guillemot à miroir	<i>Cepphus grylle</i>
Atlantic Puffin	Macareux moine	<i>Fratercula arctica</i>
Common Raven	Grand Corbeau	<i>Corvus corax</i>



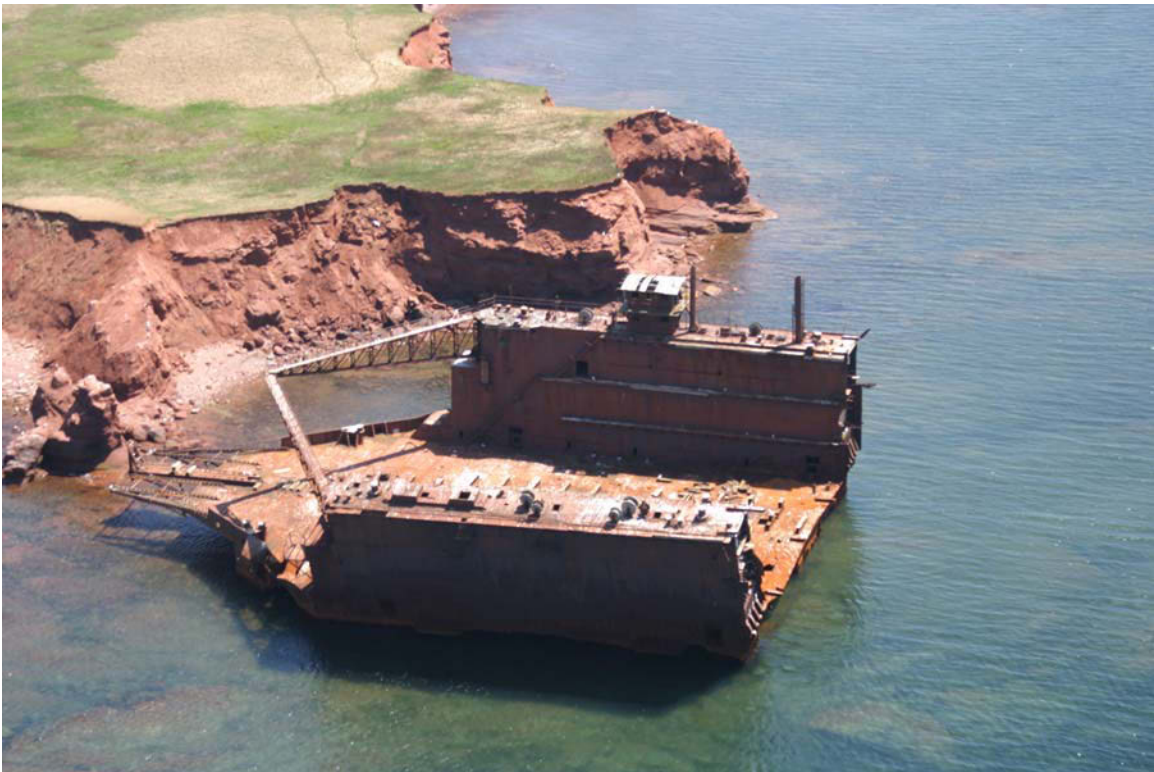
Appendix 3a. The two Baie du Portage islets, Havre-aux-Basques Lagoon



Appendix 3b. Aerial view of Corps Mort (south side) (merged photos)



Appendix 4a. Aerial view of Île aux Goélands and its cormorant colony (south side)
(merged photos)



Appendix 4b. Étang-du-Nord wreck, aerial view



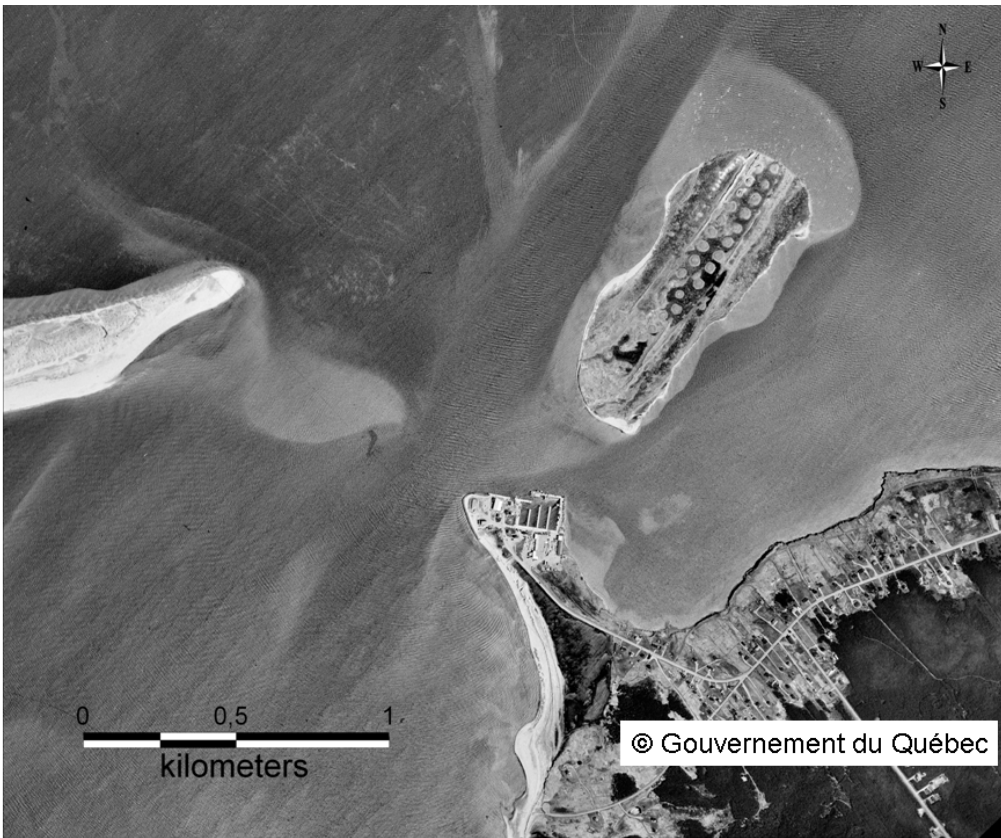
Appendix 5a. Aerial view of Île Paquet (aux Cochons) in the foreground and Île du Havre-aux-Maisons with its little marina



Appendix 5b. Île Rouge in the Havre-aux-Maisons Lagoon, with the bridge between Île du Havre-aux-Maisons and Île du Cap-aux-Meules in the background



Appendix 6a. Aerial photo of Île Shag and its cormorant colony



Appendix 6b. Aerial view (orthophoto) of Île du Chenal in the Grande-Entrée Lagoon, just northeast of the marina at Pointe de la Grande-Entrée



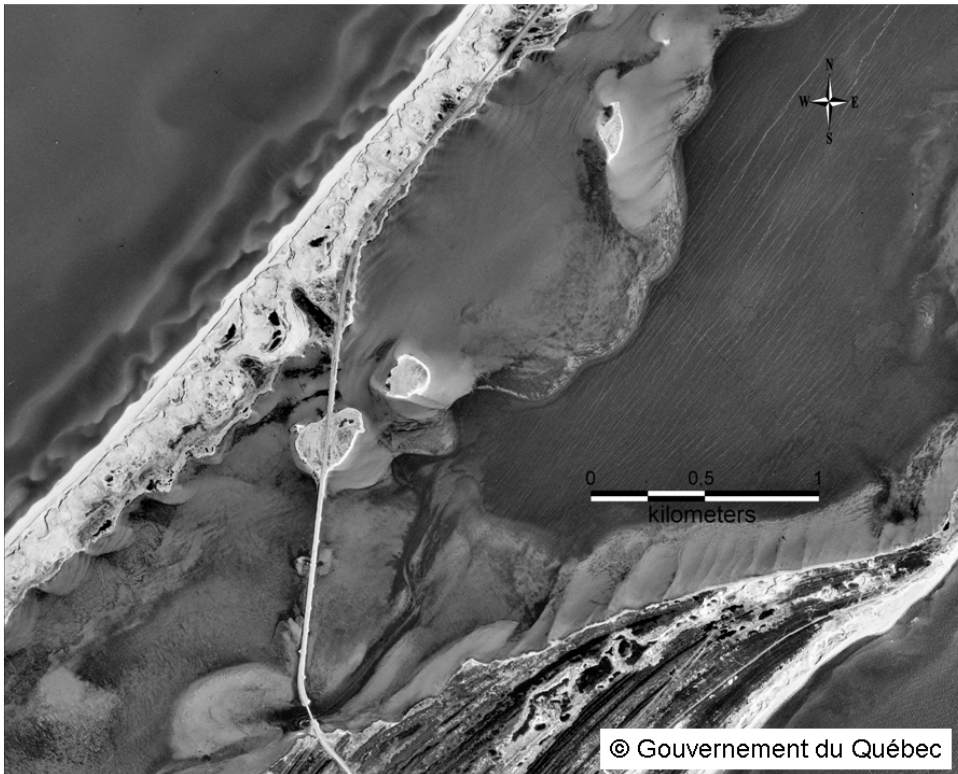
Appendix 7a. Aerial photo of Îlot B in the Grande-Entrée Lagoon. The islet has eroded substantially and was fully occupied by the Double-crested Cormorant in 2007.



Appendix 7b. Also in the Grande-Entrée Lagoon is the tiny Île Rouge, not occupied by seabirds in 2007



Appendix 8a. No coniferous forest cover is left on Île aux Loups Marins, once populated by Double-crested Cormorants and Great Blue Herons



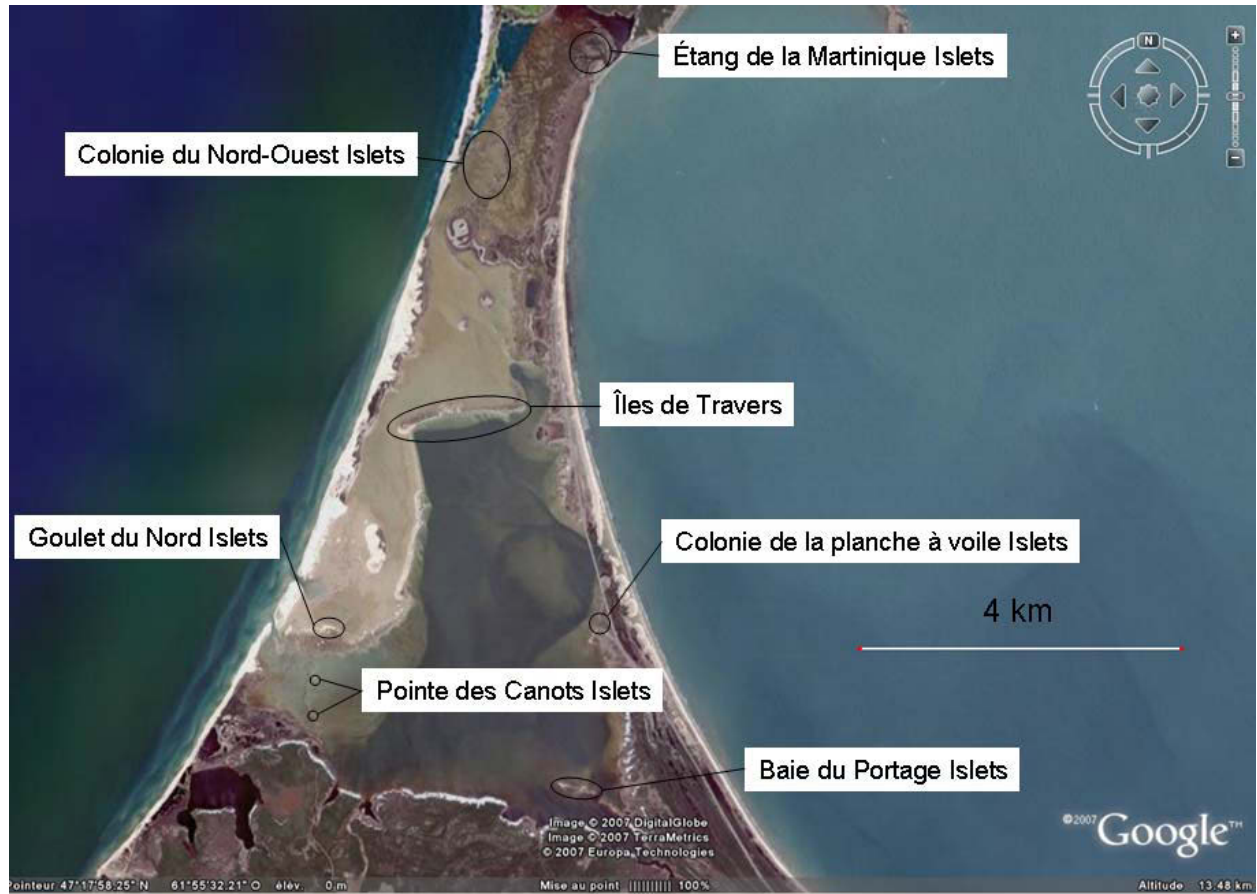
Appendix 8b. Geographic location of Îlets des Étroits, in the Grande-Entrée Lagoon. The 2nd islet is the one at the top of the photo (also see Appendix 15a).



Appendix 9a. View of Île du Havre-aux-Maisons in winter. The island's southern shores are primarily made up of cliffs, good for Black Guillemot nesting.



Appendix 9b. Made of concrete blocks and rockmound, the breakwater that protects the Cap-aux-Meules marina is used by gulls as a nesting site



Appendix 10. Several groups of islets in Havre-aux-Basques Lagoon are used for nesting by seabirds, especially terns



Appendix 11a. The main island of Rochers aux Oiseaux



Appendix 11b. The small islets of Rochers aux Oiseaux, named Rochers aux Margaux



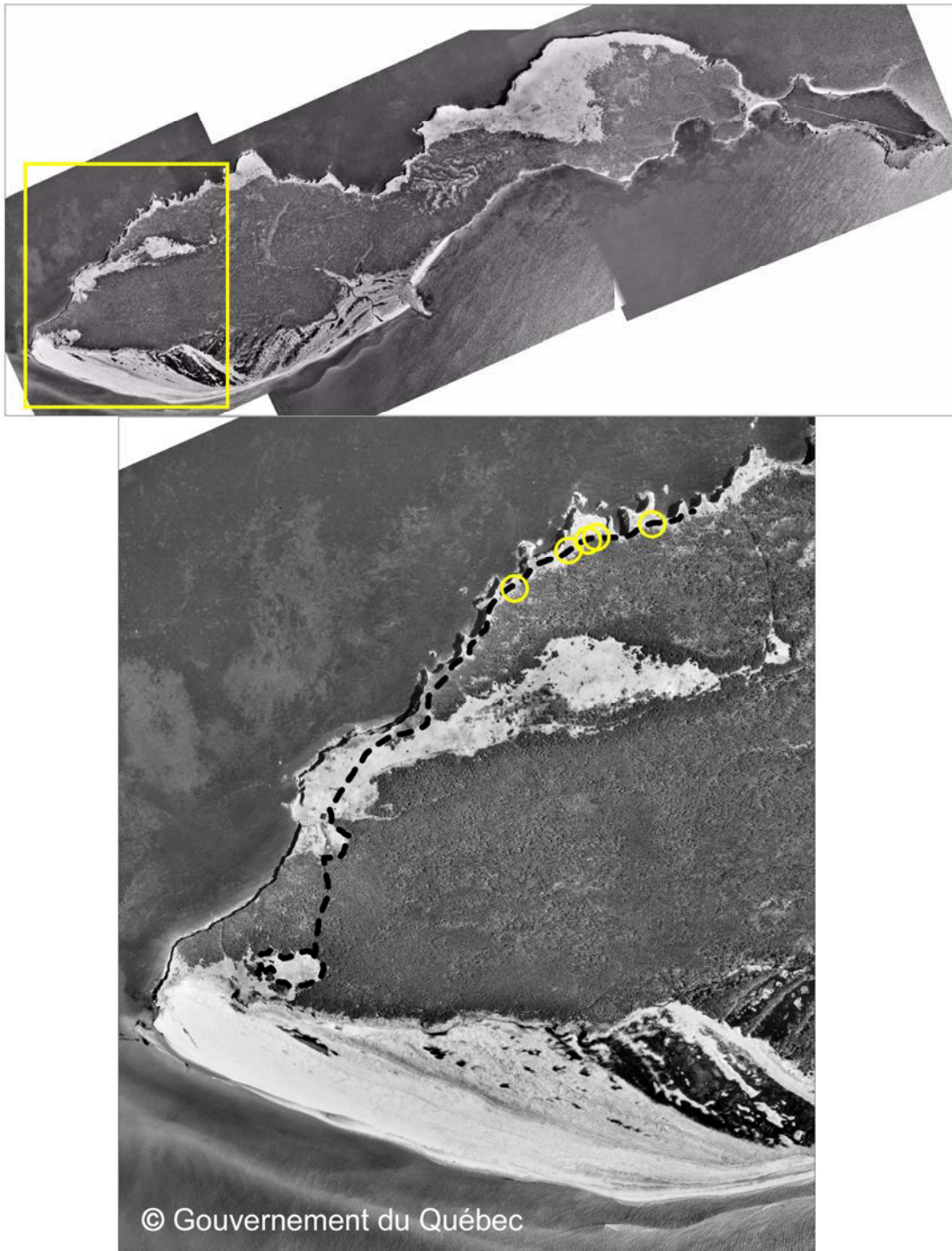
Appendix 11c. View of the distance between Rochers aux Margaux and the main island of Rochers aux Oiseaux, to which they were probably joined, long time ago. McNeil et al. (1973) estimated that the main island had lost at least 50% of its surface area in a century and a half, due to rapid erosion.



Appendix 12a. Aerial view (orthophoto) of Grosse Île, with its small extent of northern facing cliffs (Cap du Dauphin). Also shown is the northern end of the Grande-Entrée Lagoon, including islet B (bottom left), Île Rouge (just above it) and Île aux Loups Marins (bottom right).



Appendix 12b. Île de l'Est is largely protected by the Pointe de l'Est national wildlife area and Québec's Refuge faunique de Pointe-de-l'Est



Appendix 13. View of Île Brion (top figure), with a close-up of the sector visited (dotted line) during the night survey of Leach's Storm-Petrels. The circles represent listening stops at which the birds were detected.



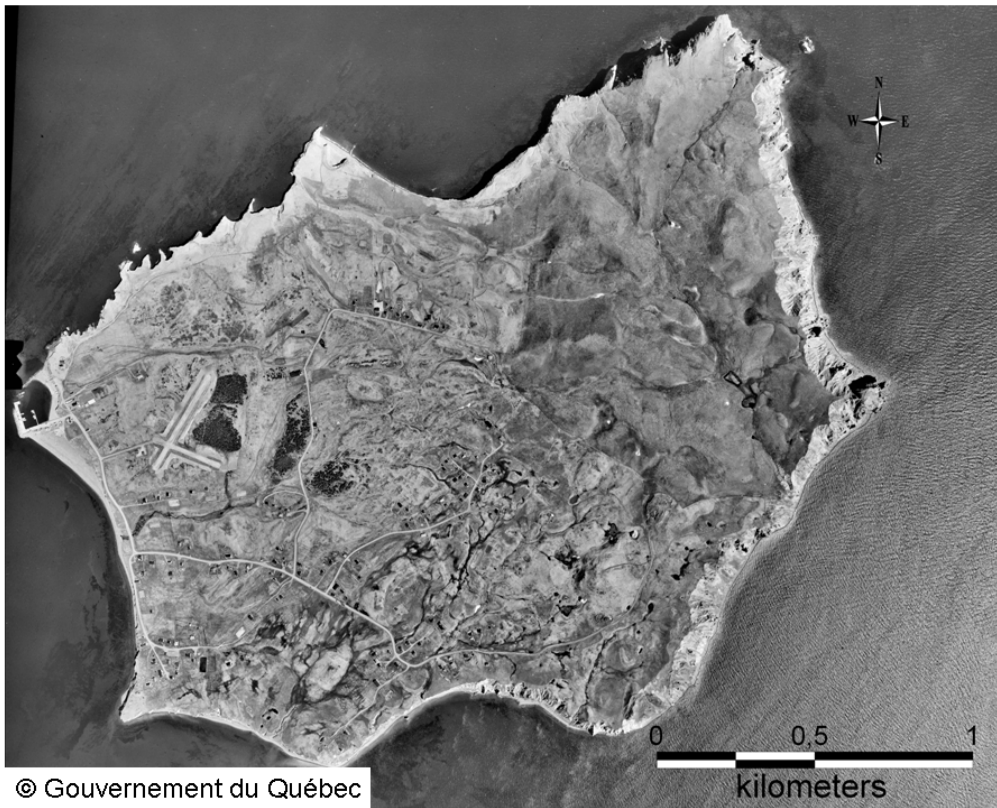
Appendix 14a. Île du Bassin, located just at the entrance to the pass (opening in the dune) that links Le Bassin Lagoon to the sea (to the south)



Appendix 14b. At Île aux Loups, a few Black Guillemots nest in the small cliffs on either side of the Pointe-aux-Loups marina (top left)



Appendix 15a. The 2nd islet seen from the air, looking east (Îlets des Étroits, see Appendix 8b)



Appendix 15b. Île d'Entrée's contours are primarily cliffs

www.ec.gc.ca

Des renseignements supplémentaires peuvent être obtenus à :

Environnement Canada

Informathèque

351, boulevard St-Joseph

Place Vincent-Massey, 8^e étage

Gatineau (Québec) K1A 0H3

Téléphone : 1-800-668-6767 (au Canada seulement) ou 819-997-2800

Télécopieur : 819-994-1412

ATS : 819-994-0736

Courriel : enviroinfo@ec.gc.ca