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Population status, distribution, and trends of gulls and kittiwakes breeding in eastern Canada, 1998–2007

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Abstract

Along freshwater and marine coasts of eastern Canada, as a group gulls are among the most commonly observed and best known bird species. There are four main gull, or larid, species that breed along the shores and coastlines of this area: three gregarious and wide-ranging species, the Ring-billed Gull *Larus delawarensis*, the Herring Gull *L. argentatus*, and the Great Black-backed Gull *L. marinus*, and one truly marine species, the Black-legged Kittiwake *Rissa tridactyla*. In the 1970s, the first large-scale surveys of breeding gulls along the major freshwater and coastal shorelines of eastern Canada were carried out, and in the intervening years most have been repeated at least once, although many two or more times. While some regional census results have been presented in peer-reviewed scientific articles, most have only been published in Canadian Wildlife Service Technical Reports or simply remain in seabird colony databases. The objective of this report is two-fold: first, to compile in one report census data of gull colonies—most collected between 1998 and 2007—from eastern Canada, specifically the area extending from the Great Lakes eastward along the St. Lawrence River, to the Atlantic Ocean and coastline of Labrador, in order to obtain population estimates for each species and province; secondly, to compile all the census data on each species from the 1970s (and for some species even earlier) to 2000s to compute trends of each species overall and for the major coastlines of each of the six provinces within eastern Canada.

The censuses covered by this report have produced a total population estimate (all four species combined) of approximately 790,000 nesting pairs in 2570 colonies. Not surprisingly these pairs are not evenly distributed in numbers, neither among provinces nor species—nearly half (48%) of all gulls are Ring-billed Gulls breeding on the Great Lakes system in Ontario. In all there are nearly 506,000 pairs of Ring-billed Gulls, 129,000 pairs of Herring Gulls, 124,000 pairs of Black-legged Kittiwakes, and 31,000 pairs of Great Black-backed Gulls. In Québec, as in Ontario, the Ring-billed Gull is the most abundant species, while in Atlantic Canada the Herring Gull and Black-legged Kittiwake are the most common and have similar populations. In terms of distribution, the Herring Gull is by far the most widespread species in eastern Canada, nesting in sizable numbers in all provinces and at more sites (colonies) than the other three species combined. This gull often nests in mixed colonies with its larger congeneric, the Great

Black-backed Gull, as well as with Ring-billed Gulls on the Great Lakes and Upper St. Lawrence. The Great Black-backed Gull nests in relatively small colonies (single or mixed-species), and is fairly widely distributed across Atlantic Canada and Québec. The Black-legged Kittiwake is nearly as abundant as the Herring Gull, however, its distribution is very different—it is absent in Ontario and nearly absent from the three Maritime provinces (<1% of total population). The core of the breeding population is in Québec and Newfoundland, in particular Anticosti Island, Gaspé Peninsula, and Newfoundland. In terms of trends, most gull populations grew and expanded in the 1970s and 1980s as food resources were abundant (forage fish stocks, discards and offal from the thriving cod *Gadus morhua* fishery, human refuse) but then declined in the 1990s as food became scarcer (overfishing of forage fish and cod stocks, closure or changes to municipal dumps) and/or where overabundant populations in urban areas became a nuisance (or a hazard) and thus control programs were implemented. While recent censuses (since 2000) have shown that some populations continue to decline, many have stabilized or even increased.

Four additional, rare gull species currently breed or have nested in the region covered by this report: Black-headed Gull *Chroicocephalus ridibundus*, Little Gull *Hydrocoloeus minutus*, Laughing Gull *Leucophaeus atricilla*, and Glaucous Gull *Larus hyperboreus*. The latter breeds only in Labrador and is the most abundant of these four species, with an estimated population of nearly 3300 pairs in 1978. The Black-headed Gull has one active colony, on Îles-de-la-Madeleine in the Gulf of St. Lawrence, Québec, with 17 pairs counted in 2007. The Little Gull bred sporadically on a number of islands in Georgian Bay, Ontario, from 1979–1991, while the Laughing Gull has nested in Nova Scotia and New Brunswick, as recently as 2001 on Sable Island, Nova Scotia.

Résumé

Sur les rives d'eau douce et les littoraux marins de l'est du Canada, les goélands et les mouettes constituent un des groupes d'oiseaux les plus souvent observés et les mieux connus. Quatre espèces principales de goélands ou de mouettes, ou Laridés, y nichent : trois espèces grégaires à aire de répartition étendue, à savoir le Goéland à bec cerclé (*Larus delawarensis)*, le Goéland argenté (*L. argentatus)* et le Goéland marin (*L. marinus)*, et une espèce véritablement marine, la Mouette tridactyle (*Rissa tridactyla)*. Durant les années 1970, les premiers inventaires à grande échelle de mouettes et de goélands nicheurs ont été effectués sur les principales rives d'eau douce et les principaux littoraux de l'est du Canada; la plupart des inventaires ont été répétés au moins une fois par la suite, et même plus de deux fois dans de nombreux cas. Bien que certains résultats des recensements régionaux aient été présentés dans des articles scientifiques examinés par des pairs, la plupart des résultats ont été publiés seulement dans les Rapports techniques du Service canadien de la faune ou stockés dans les bases de données sur les colonies d'oiseaux marins. L'objectif du présent rapport est double : premièrement, compiler en un seul rapport les données de recensement portant sur l'ensemble des colonies de goélands et de mouettes—la plupart des données ont été recueillies entre 1998 et 2007—dans l'est du Canada, une région s'étendant depuis les Grands Lacs, vers l'est le long du fleuve Saint-Laurent, jusqu'à l'océan Atlantique et jusqu'au littoral du Labrador, afin d'obtenir des estimations de la population par espèce et par province; deuxièmement, compiler toutes les données de recensement sur chaque espèce recueillies des années 1970 (et même avant pour certaines espèces) jusqu'aux années 2000 afin de calculer les tendances générales pour chaque espèce et pour les principaux littoraux de chacune des six provinces de l'est du Canada. Les recensements visés par le rapport ont mené à une estimation de la population totale (les quatre espèces confondues) d'environ 790 000 couples nicheurs dans 2 570 colonies. Comme il fallait s'y attendre, l'effectif des couples nicheurs n'est pas réparti également, ni entre les provinces ni entre les espèces—près de la moitié (48 %) de tous les goélands et de toutes les mouettes sont des Goélands à bec cerclé qui nichent dans le réseau hydrographique des Grands Lacs (Ontario). En tout, on compte près de 506 000 couples de Goélands à bec cerclé, 129 000 couples de Goélands argentés, 124 000 couples de Mouettes tridactyles et 31 000 couples de Goélands marins. Au Québec, comme en

Ontario, le Goéland à bec cerclé est l'espèce la plus abondante, alors que dans le Canada atlantique ce sont le Goéland argenté et la Mouette tridactyle qui sont les espèces les plus communes et aux effectifs comparables. En ce qui concerne la répartition, le Goéland argenté est de loin l'espèce la plus largement répandue dans l'est du Canada, car des populations appréciables nichent dans toutes les provinces et à un plus grand nombre de sites (colonies) que les trois autres espèces confondues. Le Goéland argenté niche souvent en colonies mixtes avec une autre espèce de plus grande taille appartenant au même genre, le Goéland marin, ainsi qu'avec des Goélands à bec cerclé dans la région des Grands Lacs et du cours supérieur du fleuve Saint-Laurent. Le Goéland marin niche en colonies relativement petites (renfermant une seule espèce ou plus d'une espèce) et est réparti assez largement dans le Canada atlantique et au Québec. Même si la Mouette tridactyle est presque aussi abondante que le Goéland argenté, la répartition de l'une et l'autre espèce est fort différente—la Mouette tridactyle est absente en Ontario et pratiquement absente des trois provinces maritimes (moins de 1 % de la population totale). Le cœur de la population nicheuse se retrouve au Québec et à Terre-Neuve, en particulier à l'île d'Anticosti, en Gaspésie et à Terre-Neuve. Pour ce qui est des tendances, la plupart des populations de goélands et de mouettes ont connu une augmentation et se sont étendues durant les années 1970 et 1980 en raison de l'abondance des ressources alimentaires (stocks de poissons fourragers, rejets et déchets de poisson provenant de la prospère pêche à la morue, déchets laissés par les humains), puis ont diminué durant les années 1990 car la nourriture est devenue plus rare (surpêche des stocks de poissons fourrage et des stocks de morue (*Gadus morhua*), fermeture ou modifications des décharges municipales) ou car la surabondance des populations d'oiseaux dans les zones urbaines est devenue une nuisance (ou un danger), ce qui a mené à la mise en œuvre de programmes de contrôle des oiseaux. Bien que les récents recensements (depuis 2000) aient montré que l'effectif de certaines populations a continué à diminuer, bon nombre de populations se sont stabilisées ou ont même augmenté.

Quatre autres espèces rares de goélands et de mouettes nichent actuellement ou ont déjà niché dans la région visée par le rapport : il s'agit de la Mouette rieuse (*Chroicocephalus ridibundus)*, de la Mouette pygmée (*Hydrocoloeus minutus)*, de la Mouette atricille (*Leucophaeus atricilla)* et du Goéland bourgmestre (*Larus hyperboreus)*. La dernière espèce, qui niche seulement au Labrador, est la plus abondante des quatre, et sa population était estimée à près de 3 300 couples en 1978. On retrouve une colonie active de Mouettes rieuses aux îles de la Madeleine, dans le golfe du Saint-Laurent (Québec); on y a compté 17 couples en 2007. La Mouette pygmée a niché de temps à autre dans plusieurs îles de la baie Georgienne (Ontario), de 1979 à 1991, alors que la Mouette atricille a niché en Nouvelle-Écosse et au Nouveau-Brunswick, aussi récemment qu'en 2001 à l'île de Sable (Nouvelle-Écosse).

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1 Introduction

Gulls are found almost everywhere; globally they have a very wide distribution, occurring in most geographical areas and in all climatic zones except the Antarctic. They generally live close to water, with fresh, brackish, and saltwater habitats all being used (Harrison 1983, Olsen and Larsson 2004). Being relatively large birds, brightly plumaged, very vociferous, and highly gregarious, gulls are conspicuous members of the avifauna literally everywhere.

Species included in this report are members of the sub-family Larinae that breed along coastal Atlantic Canada and along the Great Lakes–St. Lawrence system of Ontario and Québec (hereafter, eastern Canada): Ring-billed Gull *Larus delawarensis*, Herring Gull *Larus argentatus*, Great Black-backed Gull *Larus marinus*, Black-legged Kittiwake *Rissa tridactyla*, Black-headed Gull *Chroicocephalus ridibundus*, Little Gull *Hydrocoloeus minutus*, Laughing Gull *Leucophaeus atricilla*, and Glaucous Gull *Larus hyperboreus*. This report deals primarily with the first four species, which combined account for >99% of the region's gull population, with a summary given for each of the last four species.

The Black-legged Kittiwake is the least known and observed of the four main species, due to its marine nature and more isolated and dispersed breeding colonies. The *Larus* gulls, on the other hand, often live in close association with humans. Most gull species readily use man-made habitats near cities and will take advantage of any artificial source of food by following fishing boats and farm tilling machinery, exploiting dumps, garbage bags or containers, sewage ponds, food left around restaurants or on beaches, visiting fields of strawberries and other fruits, and so on (Godfrey 1986, Howell and Dunn 2007). Their opportunistic behaviour will provide the first obvious sign of any careless management of waste or garbage. Gull colonies are sometimes established near industries or residential neighbourhoods, sometimes even on rooftops of buildings, and such large aggregations of noisy birds can be disturbing or even intimidating to people, all the more so when the colony surroundings are peppered with trashy nest materials and faeces. Gulls can have a significant impact on other bird populations (e.g., terns *Sterna* spp.), and as a consequence, in many areas they have been controlled and included in management plans (see Blokpoel and Tessier 1986). As a result, gulls are

often thought of as overabundant and/or nuisance species, rather than being a symbol of conservation concern.

It is true that many gull populations have thrived on our continent following the adoption of the Migratory Bird Convention Act in Canada in 1917 and the Migratory Bird Treaty in the United States the following year that granted them protection from being hunted and harvested, and even later in the century when they took advantage of the creation of new artificial habitats and anthropogenic food sources. However, this general trend may have reversed in recent times, as some surveys in eastern Canada have documented important declines (Chapdelaine and Rail 1997, Robertson et al. 2001, Morris et al. 2009). In some species, population trends are similar in contiguous regions/jurisdictions, which suggest that large scale underlying factors may be involved. These will have to be studied, but one can imagine that food may be less abundant nowadays owing to better management of our domestic wastes, and to the collapse of some major fisheries that once provided large amounts of discards and offal (Chapdelaine and Rail 1997). Also, climate and oceanographic changes may be having an impact on the availability of forage fish species (e.g., capelin *Mallotus villosus*, sandlance *Ammodytes americanus*, herring *Clupea harengus*) that make up the bulk of most gull species' diets (Regehr and Rodway 1999). But every species occupies a specific niche and population trends will invariably differ among species, especially at the local scale.

Recently, additional efforts have been made in conducting gull surveys in eastern Canada—nearly all gull colonies in this region were surveyed once between 1998 and 2007. The timing now seems appropriate to bring this information together in order to assess the status and trends of our breeding gulls. It should be noted that this report is based on geographic areas, and thus does not present range-wide assessments of each species. Most species have ranges that span to the south, north, west and even east of the area considered. Additionally, within the six provinces considered, birds nesting on smaller inland water bodies are not included, as these dispersed nesting concentrations have not been systematically evaluated in eastern Canada.

2 Study area

The area covered by this report encompasses the coastlines of the four provinces of Atlantic Canada, that is, Newfoundland and Labrador and the three Maritime provinces of Nova Scotia, Prince Edward Island, and New Brunswick, as well as the shoreline of the St. Lawrence system in Québec and Ontario and the Great Lakes and associated waterways in Ontario (Figure 1). This area of coast and shoreline stretches in the east from northern Labrador on the Atlantic Ocean to the western end of Lake Superior in Ontario. Connecting the Atlantic Ocean with the Great Lakes is the St. Lawrence system, which is comprised of three sections: River, Estuary, and Gulf. The River section is approximately 700 km in length from the outflow of Lake Ontario to the start of the Estuary just east of Québec City. The St. Lawrence Estuary, where salt and fresh water meet and mix, is nearly 500 km long and empties into the Gulf of St. Lawrence at approximately Pointe-des-Monts and Matane, Québec (67º longitude; Bouchard and Millet 1993). The Gulf encompasses the entire coastline from the Estuary up to the east end of the Strait of Belle Isle between Newfoundland and Labrador and to Cape North on Cape Breton Island. In this report, we present the population size, and where possible population trends, of each gull species by broad geographic regions (i.e., Ontario, Québec, and Atlantic Canada), by province, and by the major hydrographic divisions (or waterbodies) within coastal eastern Canada: East Coast (coastline of Labrador, all of insular Newfoundland, and eastern Nova Scotia), Bay of Fundy, Gulf of St. Lawrence (in Québec includes Îles-de-la-Madeleine, Gaspé Peninsula, Anticosti Island, North Shore), St. Lawrence River and Estuary, Lower Great Lakes system (includes St. Lawrence, Niagara, and Detroit rivers, Lake Ontario, Lake Erie), Lake Huron (including the North Channel and Georgian Bay), and Lake Superior. The waters of the St. Lawrence Estuary, Gulf of St. Lawrence, Bay of Fundy, and East Coast lie within one of two marine ecozones. In Canada, the Atlantic Marine ecozone begins in the south at the Maine-New Brunswick border and includes the Bay of Fundy, the east coast of Nova Scotia, and the south coast of Newfoundland (including the Avalon Peninsula). The entire Gulf of St. Lawrence as well as Labrador and Newfoundland's eastern shore lie within the Northwest Atlantic ecozone (Wiken et al. 1996). Most of the inland freshwater portions of the area covered by this report, i.e., Great Lakes–St. Lawrence system, are located within the Mixedwood Plains terrestrial ecozone. However, the north and south shores of the St. Lawrence Estuary fall within the Boreal Shield and

Atlantic Maritime ecozones, respectively, while the north shore of Georgian Bay and the North Channel (Lake Huron) are also bordered by the Boreal Shield ecozone (Wiken et al. 1996).

Figure 1
Map of eastern Canada with area surveyed (green) for breeding gulls and kittiwakes

3 Methods

Methods used to census gulls in Canada are well-established and have been amply described in the literature (e.g., Cannell and Maddox 1983, Blokpoel and Tessier 1986, Lock 1988, Rail and Chapdelaine 2002, Morris et al. 2003, Boyne et al. 2006). All recent census results, with the following exceptions, are from surveys that obtained complete counts of either nests or breeding pairs of colonies or stretches of shoreline. In a 2001 survey of Herring and Great Black-backed Gulls nesting on islands in the Grand Manan Archipelago, located in the Bay of Fundy in New Brunswick, complete counts of small islands were obtained but for the larger islands transects were used and the number of nests found along those transects were then extrapolated to the entire area of the island (Ronconi and Wong 2003). Also, aerial surveys of mainland Nova Scotia in 2002 and Prince Edward Island in 2004 obtained total counts of adults on nests for islands with small populations but at larger colonies birds were counted in clusters of 5, 10, or 25 (see Boyne and Beukens 2004, Boyne and McKnight 2005). Lastly, during an aerial survey of coastal Newfoundland in 2000–2002, observers estimated the size of each colony using size classes, specifically small (1–100 individuals), medium (101-500 individuals), large (501-1000 individuals), and very large (>1000 individuals), and then by using these classes a population index (number of individuals) for all of coastal Newfoundland was derived for each gull species (see Boyne et al. 2011 for details). In this report, for each species we divided their population index by two to obtain a total breeding pair population. In addition, in our gull colony database we assigned 25 pairs, 125 pairs, 375 pairs, and 500 pairs to these Newfoundland colonies that were classed as small, medium, large, and very large, respectively. Because size classes were used in this survey of insular Newfoundland, we excluded this region from calculations of average colony sizes. They were included, however, in species distribution maps and bar graphs of the following colony size classes: 1–9 pairs, 10–99 pairs, 100–999 pairs, 1000–9999 pairs, and ≥10,000 pairs.

The type of survey employed depended in part on the species' nesting habit. The Black-legged Kittiwake, unlike the other three gull species, nests only on vertical sea-cliffs. While solitary-nesting Herring and Great Black-backed Gulls may also nest in cliffs, colonies of these two species, as well as those of the Ring-billed Gull, nest typically in open grassy areas on either islands or on the adjacent mainland (Godfrey 1986). For

colonies of all four species, the number of breeding pairs was obtained mostly by direct visual count of nests or breeding pairs, either by direct ground count of the entire colony (accessed by ground or boat) (ground survey) or by visually counting the nests (for shoreline/cliff areas) using binoculars from an anchored or slow moving boat (boat survey). For areas inaccessible by boat or ground vehicle, or for very large colonies or for large stretches of coastline (e.g., Newfoundland, Nova Scotia), aerial surveys were conducted. Typically these surveys involved two observers estimating the number of either breeding pairs, nests, or individuals (aerial survey). Observers on boat or aerial surveys sometimes photographed colonies and then later, with the use of computer software, obtained counts from those photographs (e.g., large kittiwake colony on Île Brion, Québec). In the censuses used in this report, one nest represents one breeding pair, as does an adult suspected of sitting on a nest or an apparently occupied territory as evidenced by the presence of a territorial individual or pair (e.g., see Boyne et al. 2006). Many gull colonies surveyed contained both Herring and Great Black-backed Gulls, and regardless of survey type, unless nest density of one or both species was very low, it would have been very difficult and time consuming to identify to species each nest being counted. Typically for these colonies, the observer(s) simply counted the number of nests as well as the number of adults of each species they believed were nesting in that colony (loafers or non-breeders excluded). The ratio of Herring Gull adults to Great Black-backed Gull adults was then applied to the number of nests counted.

In summary, the type of survey employed in each province was as follows (survey year[s] in parentheses): Newfoundland and Labrador (1998–2006), New Brunswick (1998–2005), Prince Edward Island (2004), and Québec (1990–2007) used aerial, boat, and ground surveys, Nova Scotia (2002–2004) conducted aerial surveys, and Ontario (1999–2000) conducted ground surveys. Details of the survey methodology as well as the data source used for each species and province are presented in Appendix 1.

4 Population size and distribution

4.1 Overall larid population

Combining census data of Ring-billed Gulls, Herring Gulls, Great Black-backed Gulls, and Black-legged Kittiwakes in coastal eastern Canada yields a total population estimate, as of 2007, of 789,774 breeding pairs, or 1.58 million birds (Table 1). Of the four species, the Ring-billed Gull was the most abundant, comprising 64% of the total larid population with 505,558 pairs (Table 1; Figure 2A). There are slightly more Herring Gulls than Black-legged Kittiwakes, 128,705 pairs and 123,760 pairs, respectively, and the Great Black-backed Gull is the least abundant species with only 30,980 pairs. About 75% of the total population of the Ring-billed Gull and the Great Black-backed Gull are found in Ontario and Atlantic Canada, respectively, while half of all Herring Gulls and Black-legged Kittiwakes breed in Atlantic Canada and Québec, respectively (Figure 2B). For all four species combined, about half of all gulls breed in Ontario and about a quarter each in Québec and in the four provinces of Atlantic Canada (Table 1; Figure 3A). The nearly 790,000 pairs were found in 2570 "gull" colonies at 1879 different sites, that is to say some sites (n=598) had two or more gull species. There were 1281 sites with a single breeding gull species. In addition to these four species, four other species currently breed or have bred in coastal eastern Canada, although in very small numbers. The Glaucous Gull is the most common of these four species. It is a regular breeder along the northern Labrador coast, and the most recent comprehensive census, in 1978, obtained a count of nearly 3300 pairs at 77 colonies. The Black-headed Gull is a very rare, but a relatively consistent, breeder in the Gulf of St. Lawrence, with a single colony on Îles-de-la-Madeleine (17 pairs in 2007; Rail 2009); there are also recent breeding records for Labrador. Both the Laughing Gull and Little Gull are sporadic breeders and have not nested in eastern Canada in recent years, the former in the Maritimes and the latter in Québec and Ontario (Bannon and Robert 1996, Burger 1996, Taylor et al. 2002, Joos and Weseloh 2007). From a waterbody perspective, slightly more than half (53%) of all gulls (the four major species combined) are found on the Great Lakes in Ontario (418,980 pairs), with similar proportions (~15%) breeding along the St. Lawrence River and Estuary (118,298 pairs), the Gulf of St. Lawrence (109,285 pairs), and the East Coast (123,588 pairs), while 2% are found in the smallest waterbody, the Bay of Fundy (19,623 pairs) (Table 1; Figure 3B).

Table 1

Estimated number of pairs of Ring-billed Gulls, Herring Gulls, Great Black-backed Gulls, and Black-legged Kittiwakes nesting in eastern Canada

Province Waterbody —	*Region*	Census Year(s)	Ring-billed Gull	Herring Gull	Great Black-backed Gull	Black-legged Kittiwake	Total	Reference(s)
ATLANTIC CANADA								
Newfoundland and Labrador								
East Coast —	*Labrador*	1998–2003	81	218	363	103	1536[1]	Robertson and Elliot 2002; Robertson et al. 2002; CWS unpubl. (Robertson, Chaulk)
East Coast and Gulf of St. Lawrence —	*Newfoundland*	2000–2006[2]	10905	31975	6246	54690	103816	Boyne et al. 2011; Robertson et al. 2001; CWS unpubl. (Robertson)
	Total:		10986	32193	6609	54793	105352	
Nova Scotia								
East Coast		2002–2004	0	7110	11044	82	18236	Boyne and Beukens 2004; CWS unpubl. (Boyne; Chardine, J., CWS)
Bay of Fundy		2002–2004	0	1127	1868	0	2995	Boyne and Beukens 2004; CWS unpubl. (Chardine, J., CWS)
Gulf of St. Lawrence		2002–2004	0	116	567	90	773	Boyne and Beukens 2004; CWS unpubl. (Chardine, J., CWS)
	Total:		0	8353	13479	172	22004	
Prince Edward Island								
Gulf of St. Lawrence		2004	691	1795	1110	0	3596	Boyne and McKnight 2005
New Brunswick								
Bay of Fundy		1998–2004	6	14233	2187	202	16628	Mawhinney et al. 1999; Kehoe and Diamond 2001; Ronconi and Wong 2003; McAlpine et al. 2005; CWS unpubl. (Robertson)
Gulf of St. Lawrence		2005	4367	2406	1025	373	8171	Boyne et al. 2006; Davis et al. 2011
	Total:		4373	16639	3212	575	24799	
	Atlantic Canada Total:		16050	58980	24410	55540	155751	
QUÉBEC								
Gulf of St. Lawrence —								
	Iles-de-la-Madeleine	2007	0	545	779	7175	8499	Rail 2009
	Gaspé Peninsula	2002[3]	2835	5134	1322	37649	46940	Cotter and Rail 2007
	Anticosti Island	2004	0	20	0	16642	16662	CWS unpubl. (Banque Informatisée des Oiseaux Marins du Québec, BIOMQ);
	North Shore	1990–2005[4]	6561	12924	2022	3137	24644	Rail and Cotter 2007; Roberge 2004; Société Duvetnor 1999; Bédard and Nadeau 1995; CWS unpubl. (BIOMQ)
	Sub-total:		9396	18623	4123	64603	96745	
St. Lawrence River and Estuary		1990–2007[5]	99949	12321	2411	3617	118298	Bédard and Nadeau 1995; CWS and Société Duvetnor 2001, 2006; Mousseau 2007; SPEE 2008; CWS unpubl. (Brousseau, BIOMQ)
	Québec Total:		109345	30944	6534	68220	215043	
ONTARIO								
Great Lakes —	*Lake Superior*	1999–2000	5857	11895	0	0	17752	Hebert et al. 2008; Morris et al. 2009; CWS unpubl. (Ontario database)
	Lake Huron	1999–2000	99381	22389	9	0	121779	CWS unpubl. (Ontario database)
	Lower Great Lakes	1999	274925	4497	27	0	279449	Morris et al. 2003; Weseloh et al. 2003; CWS unpubl. (Ontario database)
	Ontario Total:		380163	38781	36	0	418980	
GRAND TOTAL			505558	128705	30980	123760	789774	

[1] This total is a minimum because Labrador has been only partially surveyed for nesting gulls; furthermore, this total includes 771 pairs from mixed Herring Gull and Great-Black-backed Gull colonies for which species was not identified.
[2] Includes a Black-legged Kittiwake colony (Cape St. Mary's; 10,000 pairs) that was last censused in 1979.
[3] Includes a Ring-billed Gull colony (Pointe de Sandy Beach; 1172 pairs; BIOMQ) that was surveyed in 2004; in 2002 this colony was unoccupied.
[4] All Migratory Bird Sanctuaries were surveyed in 2005; colony data from Mingan Archipelago National Park Reserve and elsewhere date from 1990–1999.
[5] Most colonies surveyed between 2001 and 2007, however a few were last surveyed in 1990 or 1995.

Figure 2

Proportion (%) of the total breeding population estimate of four gull species in eastern Canada, by species (A) and geographic region (B)

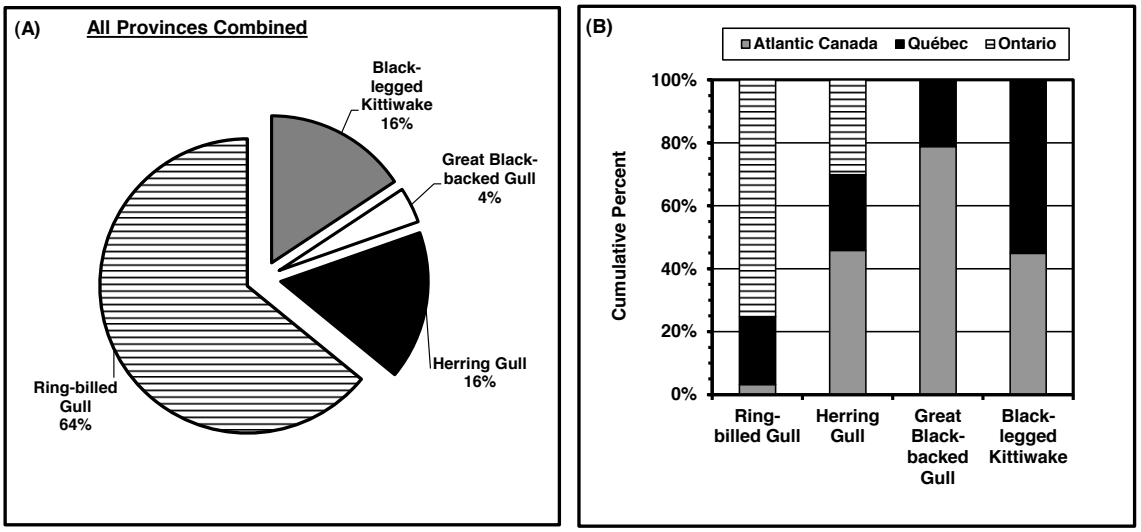
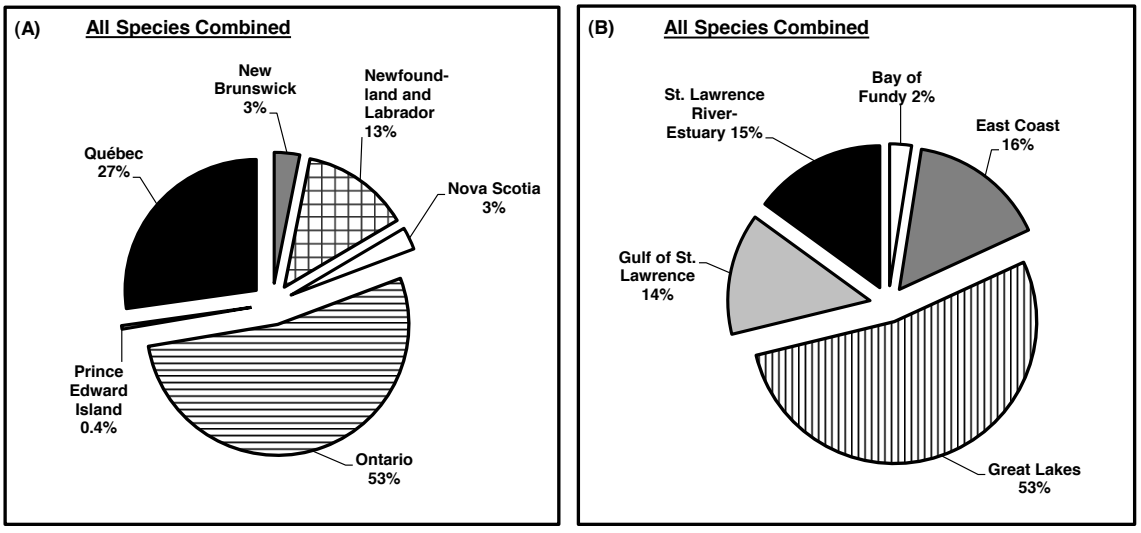


Figure 3

Proportion (%) of the total breeding population estimate of four gull species in eastern Canada, by province (A) and waterbody (B)



4.2 Ring-billed Gull

The Ring-billed Gull is the most abundant of the four larid species with a breeding population of approximately 505,558 pairs (or 1.01 million birds) (Table 1). Its distribution is largely restricted to the Great Lakes in Ontario (75% of total population), the St. Lawrence River and Estuary in Québec (20%), and Newfoundland (2%) (Figures 4, 5). While Newfoundland has only one-tenth the number of Ring-billed Gulls as Québec it has twice as many colonies (Table 2). There were 267 Ring-billed Gull colonies in coastal eastern Canada, ranging in size from 1 to 51,000 pairs (Table 2). The largest number of colonies is found in Ontario, especially Lake Huron which harbours over a third of all colonies (96 of 267 colonies) in eastern Canada.

Figure 4
Distribution of Ring-billed Gull breeding colonies (number of pairs) in eastern Canada (number of colonies in parentheses)

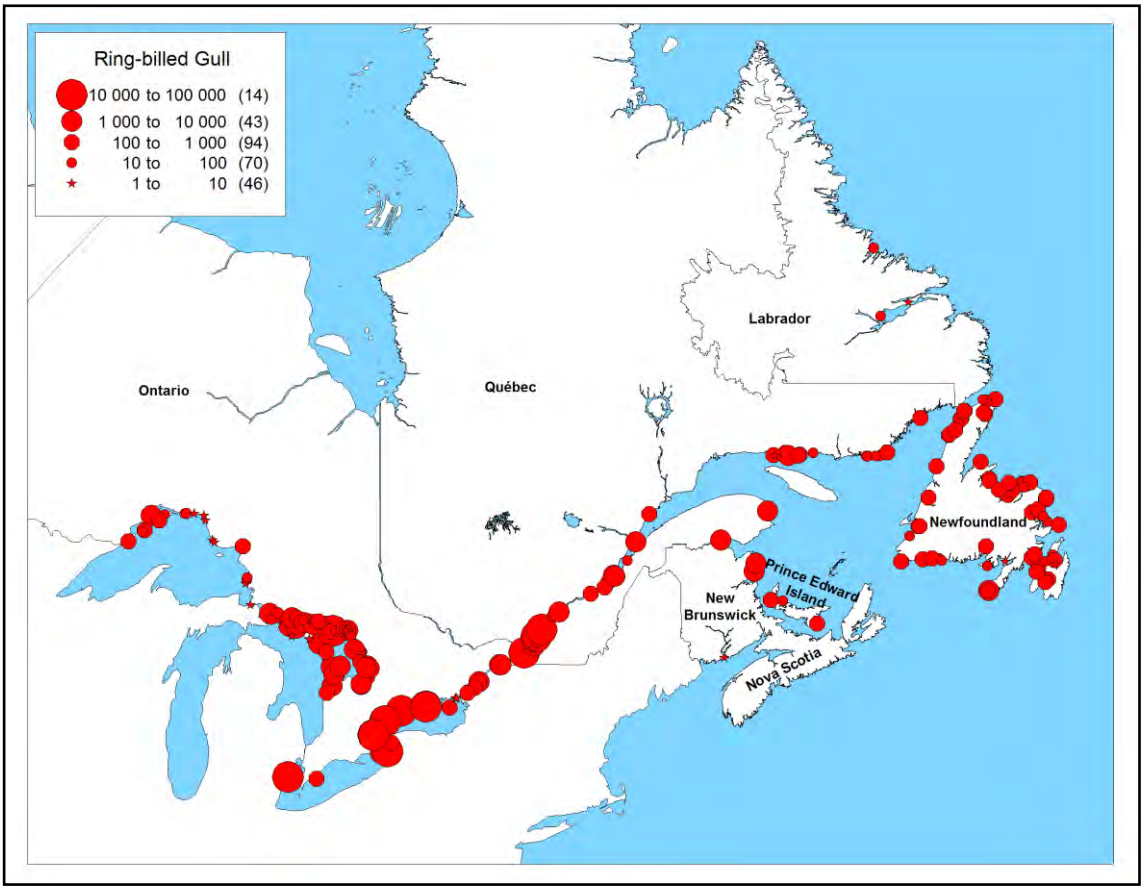


Table 2
Number and average size of Ring-billed Gull and Black-legged Kittiwake colonies in eastern Canada

				Ring-billed Gull					Black-legged Kittiwake				
				No.	Colony Size				No.	Colony Size			
Province	Waterbody		*Region*	Colonies	Average	SD	Min	Max	Colonies	Average	SD	Min	Max
ATLANTIC CANADA													
Newfoundland and Labrador	East Coast		*Labrador*	3	27	24	3	50	2	52	4	49	54
	East Coast and Gulf of St. Lawrence		*Newfoundland*	70	na[1]				95	na			
		Total:		73					97				
Nova Scotia	Bay of Fundy			0					0				
	East Coast			0					3	27	46	1	80
	Gulf of St. Lawrence			0					1	90		90	90
		Total:		0					4	43	49	1	90
Prince Edward Island	Gulf of St. Lawrence	Total:		3	230	253	69	522	0				
New Brunswick	Bay of Fundy			1	6		6	6	2	101	47	68	134
	Gulf of St. Lawrence			2	2184	64	2138	2229	3	124	57	59	166
		Total:		3	1458	1258	6	2229	5	115	48	59	166
		Maritime Provinces Total:		6	844	1054	1	2229	9	83	59	1	166
		Atlantic Canada Total:		79					106				
QUÉBEC	Gulf of St. Lawrence		*Iles-de-la-Madeleine*	0					9	797	946	3	2307
			Gaspé Peninsula	2	1418	347	1172	1663	16	2353	5439	3	18550
			Anticosti Island	0					5	3328	7013	23	15870
			North Shore	18	365	871	1	3745	15	209	424	7	1659
		Sub-total:		20	470	889	1	3745	45	1436	4011	3	18550
	St. Lawrence River-Estuary			16	6247	12677	5	51000	12	301	717	2	2555
		Québec Total:		36	3037	8819	1	51000	57	1197	3600	2	18550
ONTARIO	Great Lakes		*Lake Superior*	20	293	937	1	4234	0				
			Lake Huron	96	1035	2257	1	10578	0				
			Lower Great Lakes	36	7637	11824	1	45510	0				
		Ontario Total:		152	2501	6635	1	45510	0				
Grand Total				267					163				

[1] na=not available; for most colonies only an approximate size was recorded (i.e., small, medium, large, or very large; see Methods).

There are four very large colonies, each with over 35,000 pairs. The largest is on Île Deslauriers (St. Lawrence River, just east of Montreal) with approximately 51,000 pairs (in 2006), followed by colonies on the south end of Fighting Island (Detroit River) with 45,510 pairs (1999), Gull Island in Presqu'ile Provincial Park along Lake Ontario with 38,981 pairs (1999), and Port Colborne (mainland section; Lake Erie) with 37,637 pairs (1999) (see also section 5.3.1). Together these four colonies account for a third (34%) of the total Ring-billed Gull breeding population. In Atlantic Canada the majority of colonies (47 of 79; 59%) consisted of 100–999 pairs, while in Ontario and Québec, except for the less frequent largest size class, there was a relatively even distribution of colonies among the classes (Figure 6A). Not unexpectedly, distribution of colony size classes in the principal waterbodies is similar to that of the region and province within which the waterbody is located (Figure 6B). The average size of colonies in Ontario and Québec were similar, 3037 and 2501 pairs, respectively; in the Maritimes however colonies were considerably smaller, averaging only 844 pairs (Table 2).

Figure 5

Proportion (%) of the total breeding population estimate of the Ring-billed Gull in eastern Canada, by province (A) and waterbody (B)

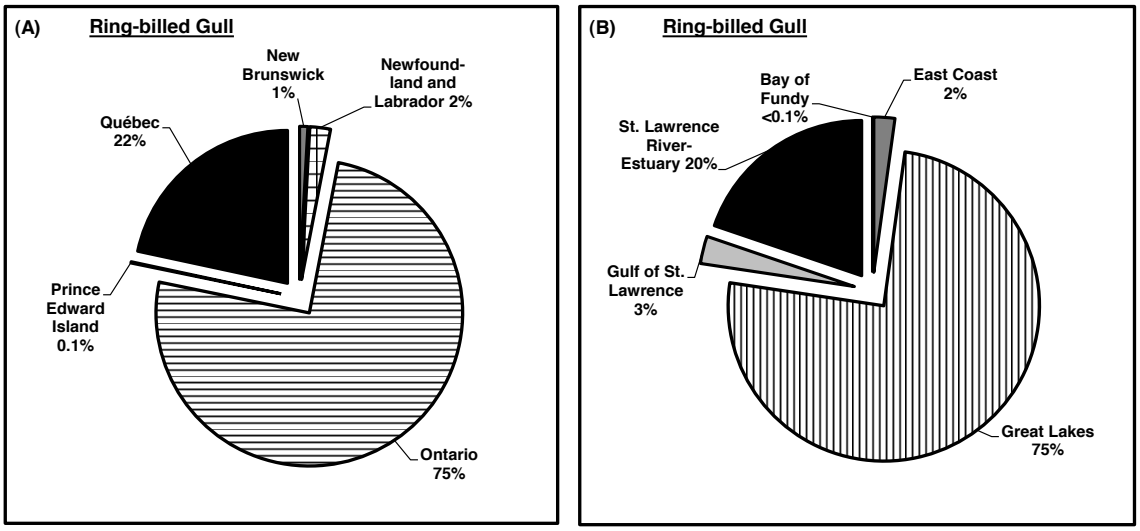
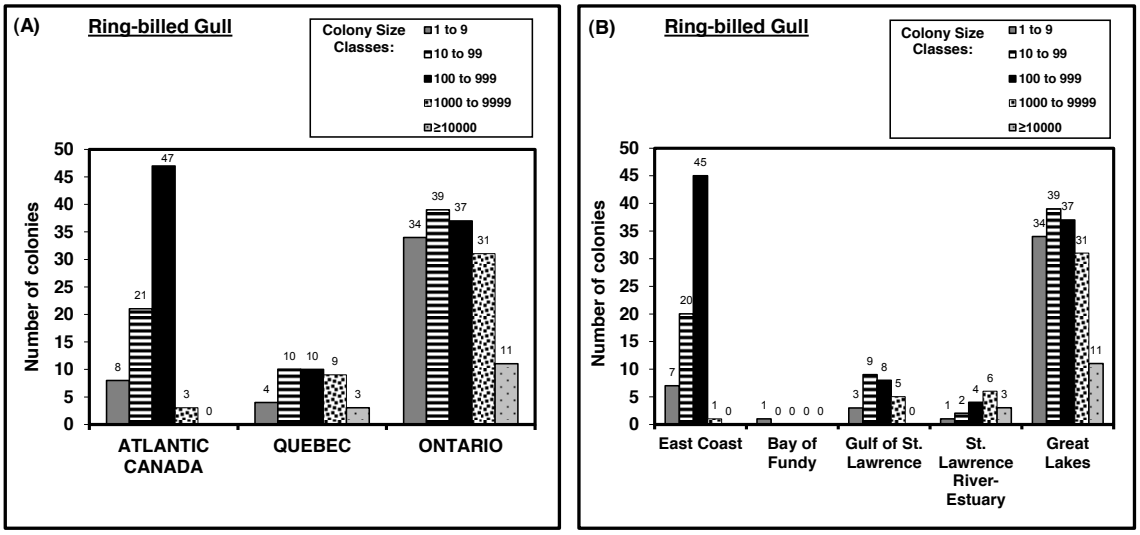


Figure 6
Frequency of breeding colony size classes (number of pairs) of the Ring-billed Gull in eastern Canada, by geographic region (A) and waterbody (B)



4.3 Herring Gull

The Herring Gull is the second most abundant gull species in coastal eastern Canada, with an estimated 128,705 breeding pairs (257,410 individuals) (Table 1). This species is relatively evenly distributed, in terms of abundance, with Ontario, Québec, the three Maritime provinces together, and Newfoundland and Labrador each comprising between 21% and 30% of the total population (Figures 7, 8A). This distribution is reflected amongst the waterbodies with the East Coast harbouring the largest number of breeding pairs, followed closely by the Great Lakes (Figure 8B).

In terms of number of colonies, this large larid had more colonies than the other 3 main species combined, 1377 versus 1194 (Tables 2, 3). However, over half (58%) of all Herring Gull colonies were found in one province, Ontario (Table 3). Among all 1377 colonies, only 13 had 1000 or more pairs (Figure 9) (Tables 4–11). The three largest colonies were located on Île Nue de Mingan, an island along Québec's North Shore of the Gulf of St. Lawrence (6900 pairs; censused in 1996), on Kent Island in New Brunswick's Bay of Fundy (5926 pairs in 2001), and on Chantry Island in Lake Huron (3457 pairs in 1999). [Note: the Île Nue de Mingan colony is no longer active; a 2008 census found 0 nests (Yann Troutet, Parks Canada, pers. comm.)]. Over half of Herring Gull colonies in Atlantic Canada (235 of 440; 53%) and Ontario (439 of 792; 55%) consisted of 10–99 pairs, while in Québec the most common class size was 100–999 (66 of 145; 46%) (Figure 9). The average size of colonies in the Maritimes and Québec

was similar, 173 pairs (n=155 colonies) and 213 pairs (n=145 colonies), respectively. In Ontario, however, the average colony size was considerably smaller at only 49 pairs (n=792 colonies) (Table 3).

Figure 7

Distribution of Herring Gull breeding colonies (number of pairs) in eastern Canada (number of colonies in parentheses)

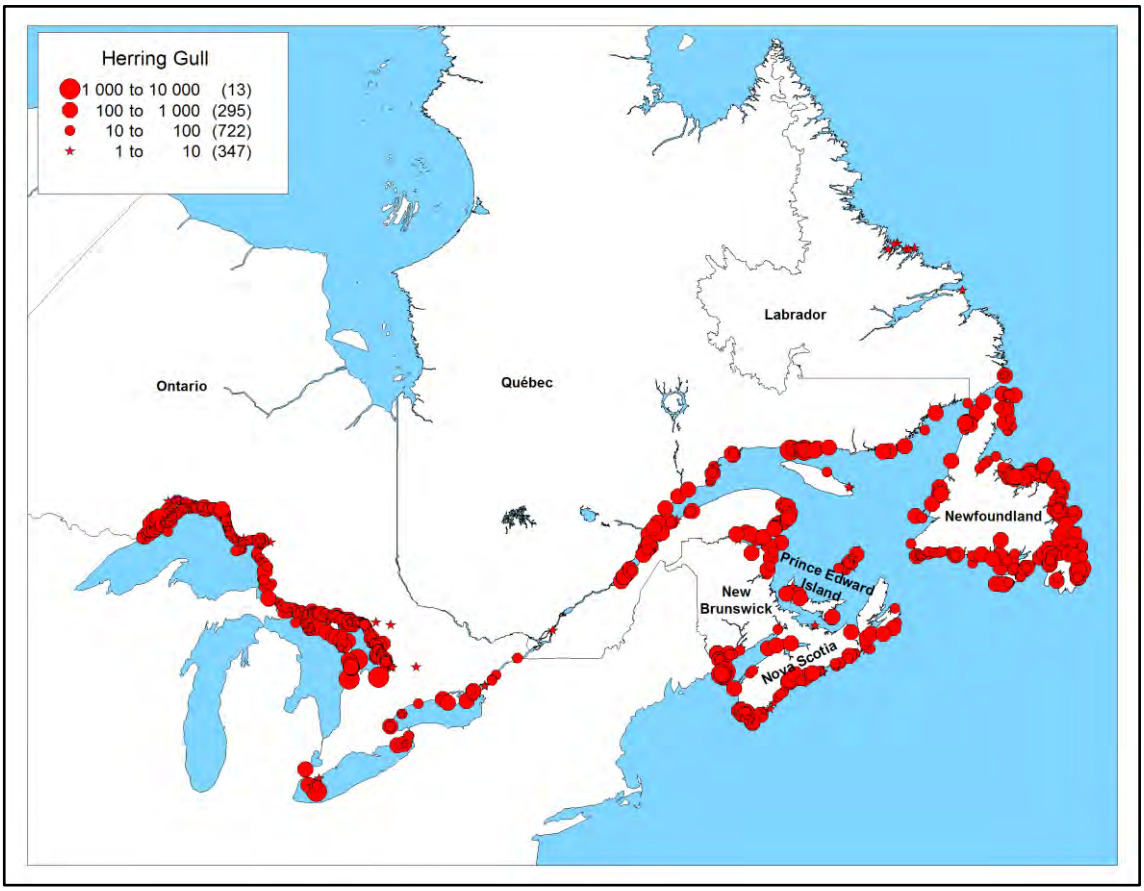


Table 3
Number and average size of Herring Gull and Great Black-backed Gull colonies in eastern Canada

			Herring Gull					Great Black-backed Gull				
			No.	Colony Size				No.	Colony Size			
Province	Waterbody	*Region*	Colonies	Average	SD	Min	Max	Colonies	Average	SD	Min	Max
ATLANTIC CANADA												
Newfoundland and Labrador	East Coast	*Labrador*	16	14	31	1	127	96	4	8	1	63
	East Coast and Gulf of St. Lawrence	*Newfoundland*	269	na[1]				196	na			
	Total:		285					292				
Nova Scotia	Bay of Fundy		8	141	74	40	240	11	170	232	3	753
	East Coast		82	87	131	1	707	194	57	87	1	628
	Gulf of St. Lawrence		2	58	71	8	108	10	57	52	5	141
	Total:		92	91	127	1	707	215	63	101	1	753
Prince Edward Island	Gulf of St. Lawrence Total:		8	224	287	2	855	14	79	122	1	435
New Brunswick	Bay of Fundy		44	323	937	1	5926	44	50	65	1	285
	Gulf of St. Lawrence		11	219	296	4	937	16	64	53	3	175
	Total:		55	303	847	1	5926	60	54	62	1	285
	Maritime Provinces Total:		155	173	524	1	5926	289	62	95	1	753
	Atlantic Canada Total:		440					581				
QUÉBEC	Gulf of St. Lawrence	*Iles-de-la-Madeleine*	14	39	59	2	196	15	52	143	1	558
		Gaspé Peninsula	28	183	227	1	902	23	57	83	1	289
		Anticosti Island	3	7	6	3	14	0				
		North Shore	43	301	1057	1	6900	67	30	57	1	329
	Sub-total:		88	212	753	1	6900	105	39	80	1	558
	St. Lawrence River-Estuary		57	216	212	1	899	59	41	62	1	286
	Québec Total:		145	213	600	1	6900	164	40	74	1	558
ONTARIO	Great Lakes	*Lake Superior*	318	37	51	1	407	0				
		Lake Huron	413	54	217	1	3457	9	1	0	1	1
		Lower Great Lakes	61	74	164	1	1067	9	3	3	1	11
	Ontario Total:		792	49	166	1	3457	18	2	2	1	11
Grand Total			1377					763				

[1] na=not available; for most colonies only an approximate size was recorded (i.e., small, medium, large, or very large; see Methods).

Figure 8

Proportion (%) of the total breeding population estimate of the Herring Gull in eastern Canada, by province (A) and waterbody (B)

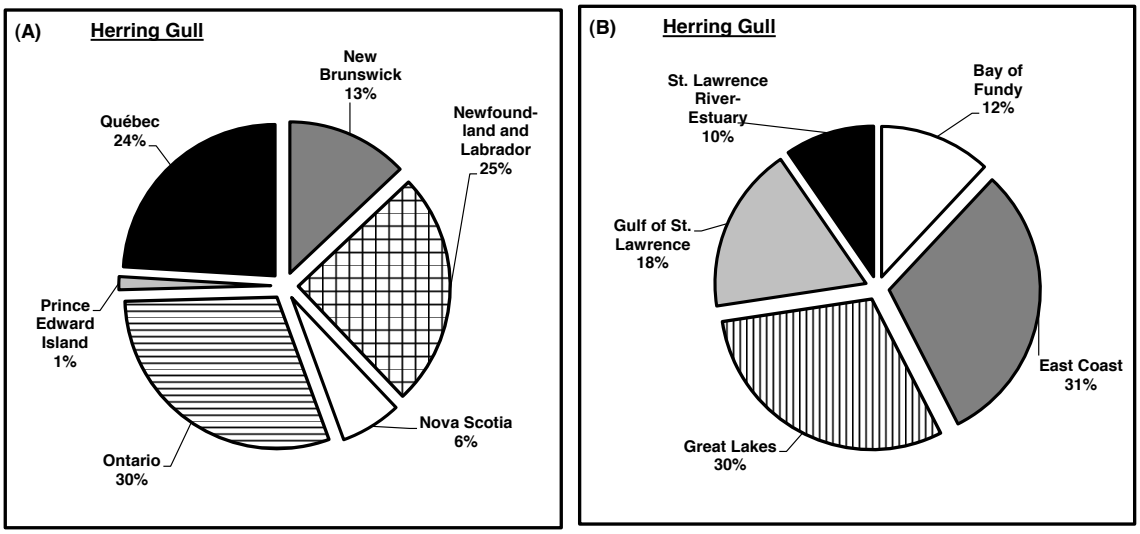
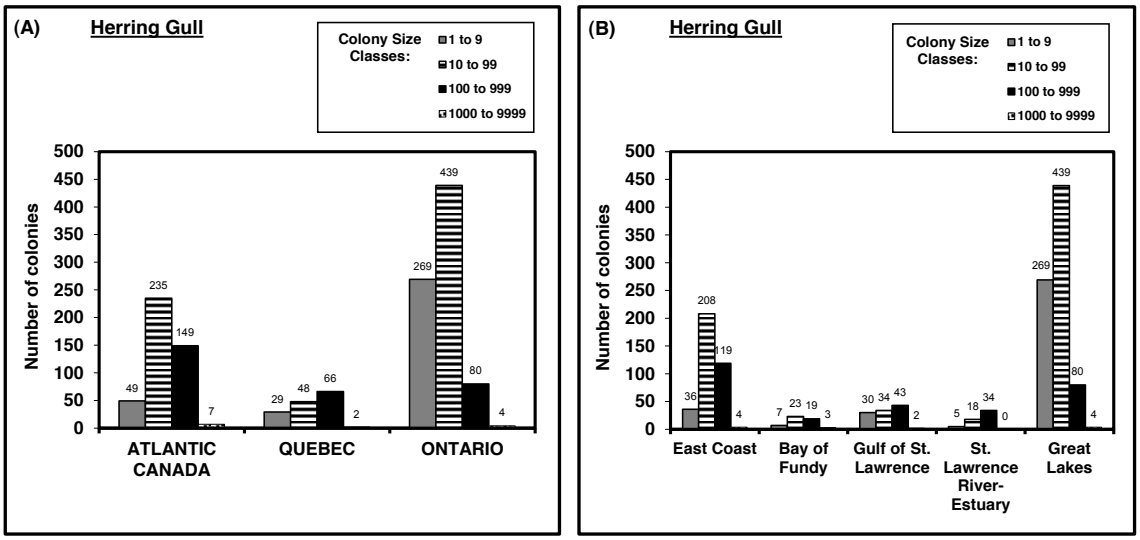


Figure 9

Frequency of colony size classes (number of pairs) of the Herring Gull in eastern Canada, by geographic region (A) and waterbody (B)



4.4 Great Black-backed Gull

It is the largest gull in North America. This predominantly marine gull is the least abundant of the four main larids, with an estimated population of 30,980 pairs (61,960 individuals) (Table 1). Reflecting its marine origins, 79% of all Great Black-backed Gulls were found in Atlantic Canada (24,410 pairs) and 13% along the Gulf of St. Lawrence in Québec (4123 pairs) (Table 1; Figures 10, 11); only 8% (2447 pairs) of its population nested along fresh or brackish water, mostly along the St. Lawrence River and Estuary in Québec. Very few nest in the Great Lake system in Ontario; during a comprehensive gull census in 1999–2000 only 36 pairs were counted, and the majority of these were on the Lower Great Lakes system (especially Lake Ontario with 22 pairs). In 2004–2006, there was a die-off of Great Black-backed Gulls due to an outbreak of Type E botulism, and in 2007 only one pair was counted on Lake Ontario (Weseloh 2007a).

The coast and off-shore islands of Labrador, Newfoundland, and eastern Nova Scotia (i.e., East Coast) harbour over half of all Great Black-backed Gulls breeding pairs (57%, 17,653 of 30,980 pairs; Table 1) and colonies (64%, 486 of 763 colonies; Table 3). In each province, with the exception of Ontario, the Great Black-backed Gull has more colonies than any other gull species. Of the 763 colonies recorded during recent censuses, only 21 had 250 or more pairs (Tables 4, 6–9) while 92 had 100 or more pairs (Figure 12). Nova Scotia has 13 of these large colonies, including the two largest—Boot Island in the Bay of Fundy with 753 pairs (censused in 2002) and Outer Island in Shelburne County with 628 pairs (in 2002) (Table 6). The third largest colony was found on Île du Chenal (Grande-Entrée lagoon) on Îles-de-la-Madeleine in the Gulf of St. Lawrence in Québec, with 549 pairs (in 2007) (Table 9), while the fourth largest colony was found on Prince Edward Island at Poverty Beach, with 435 pairs (in 2004) (Table 7). The average colony size was slightly larger for the Maritimes, 62 pairs (n=289 colonies), than for Québec, 40 pairs (n=164 colonies) (Table 3).

Figure 10

Distribution of Great Black-backed Gull breeding colonies (number of pairs) in eastern Canada (number of colonies in parentheses)

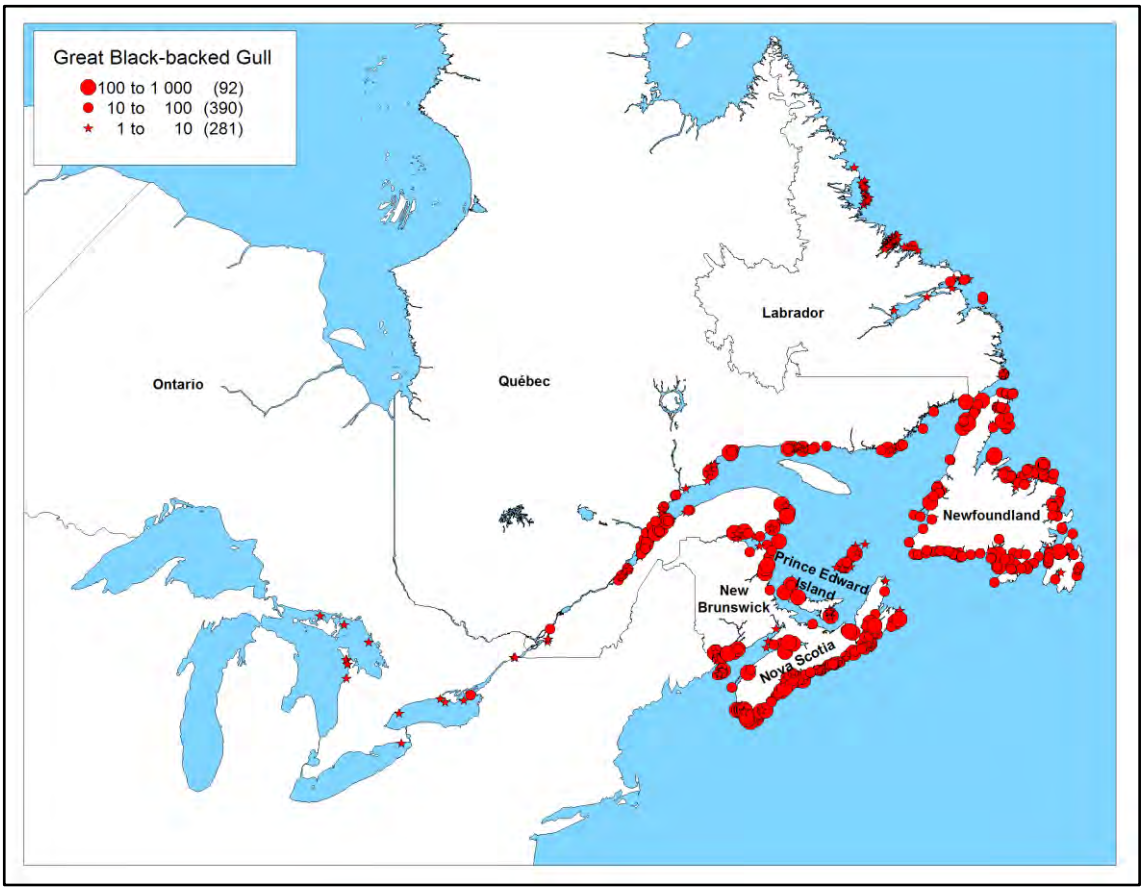


Figure 11

Proportion (%) of the total breeding population estimate of the Great Black-backed Gull in eastern Canada, by province (A) and waterbody (B)

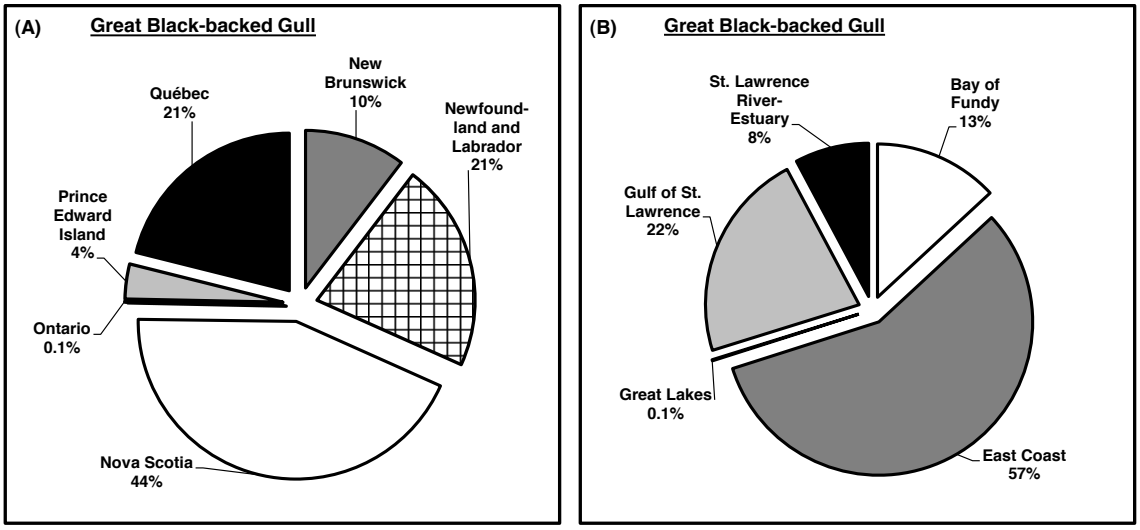
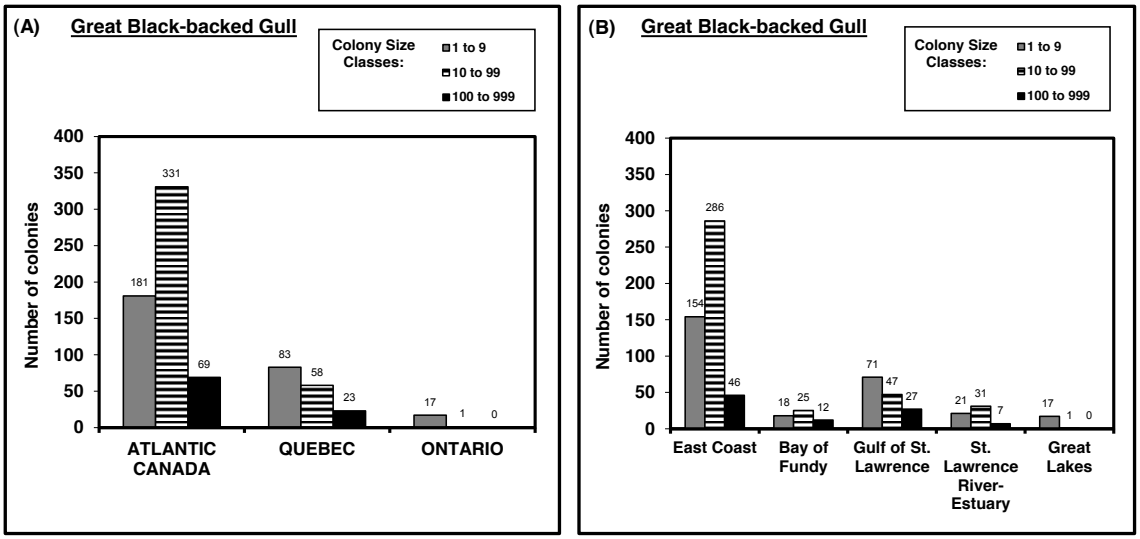


Figure 12

Frequency of colony size classes (number of pairs) of the Great Black-backed Gull in eastern Canada, by geographic region (A) and waterbody (B)



4.5 Black-legged Kittiwake

Along coastal eastern Canada, this small gull is slightly less abundant than the Herring Gull, with approximately 123,760 pairs (or 247,520 individuals) (Table 1). Unlike its larger cousin, however, its distribution is fairly restricted; it is completely absent in Ontario and Prince Edward Island and less than 1% of its total population breeds in New Brunswick and Nova Scotia (Figures 13, 14). In the remaining two provinces, Québec's population is larger than Newfoundland and Labrador's, 68,220 pairs vs. 54,793 pairs; in the latter province the Black-legged Kittiwake is the most abundant gull species (Table 1). Within these two provinces, three regions comprise 88% of the total kittiwake population: Newfoundland (44%; 54,690 pairs), Gaspé Peninsula (30%; 37,649 pairs), and Anticosti Island (13%; 16,642 pairs).

Reflecting its restricted distribution, the Black-legged Kittiwake has the fewest number of breeding colonies of the four principal gull species, with 163 recorded in the censuses (Table 2). Seventeen kittiwake colonies had 1000 or more pairs, and 10 of these are located in Québec (Tables 9, 10) and 7 along Newfoundland (Table 4). The three largest colonies are found in Québec: 18,550 pairs at Bonaventure Island (censused in 2002) and 13,411 pairs at Presqu'île de Forillon, both on the Gaspé Peninsula (in 2002), and 15,870 pairs at Falaise aux Goélands on Anticosti Island (in 2004). Combined, these three colonies comprise 39% of the total kittiwake population in eastern Canada. The next 6 largest colonies are all found along Newfoundland's Avalon Peninsula: Cape St. Mary's with 10,000 pairs (last censused in 1979), Great Island (Witless Bay) with 8524 pairs (in 2005), Baccalieu Island with 6456 pairs (in 2003), Gull Island (Witless Bay) with 5351 pairs (in 2006), The Drook/Freshwater Bay with 3724 pairs (in 2005), and Deadmans Bay with 2866 pairs (in 2006) (Table 4). The next largest colony is one of the westernmost of all kittiwake colonies, Île Laval with 2555 pairs (in 2006) (Table 10); this island is located approximately 275 km downstream from Québec City along the north shore of the St. Lawrence Estuary. In both Atlantic Canada and Québec, as well as among all waterbodies, the most common size classes are 10–99 and 100–999 pairs, with similar number of colonies in each class (Figure 15).

Figure 13

Distribution of Black-legged Kittiwake breeding colonies (number of pairs) in eastern Canada (number of colonies in parentheses)

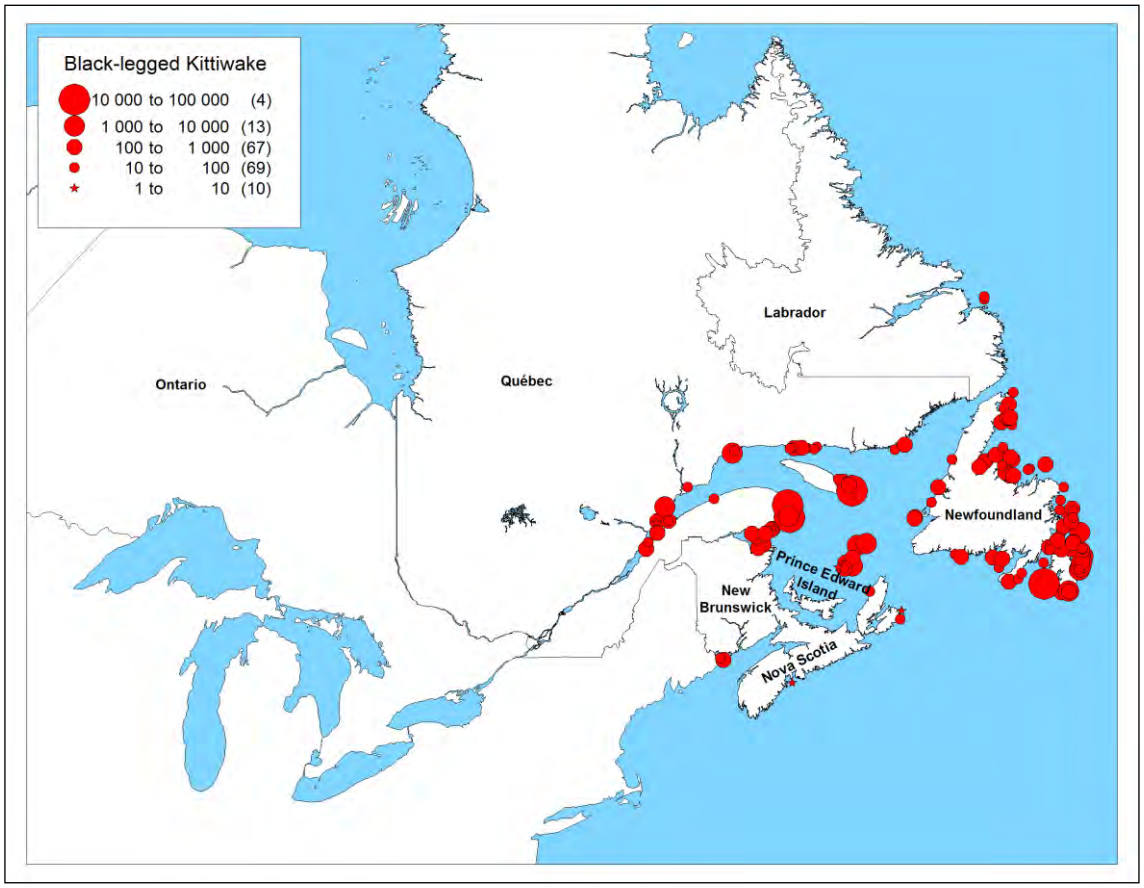


Figure 14

Proportion (%) of the total breeding population estimate of the Black-legged Kittiwake in eastern Canada, by province (A) and waterbody (B)

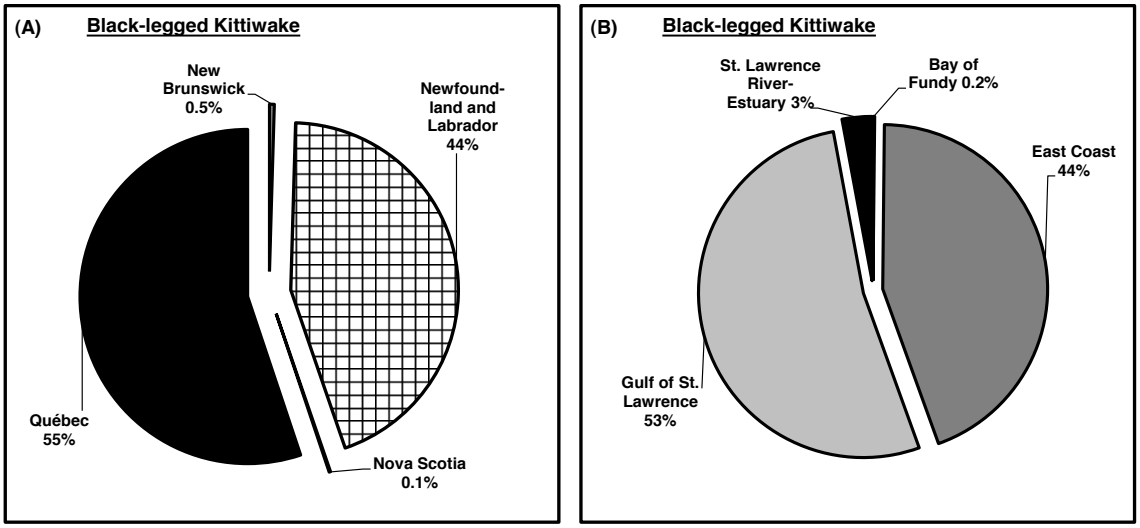
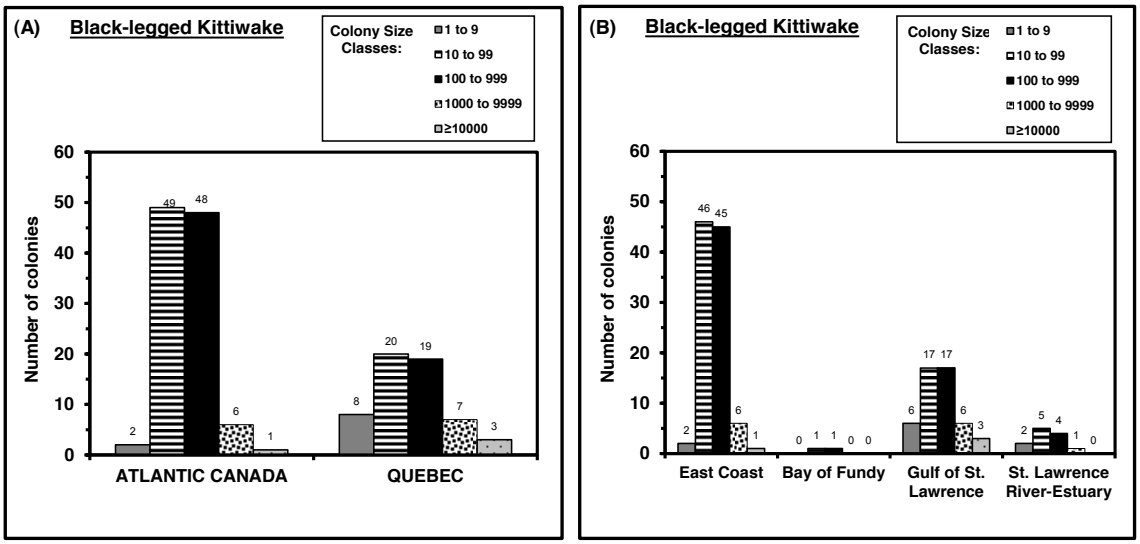


Figure 15

Frequency of colony size classes (number of pairs) of the Black-legged Kittiwake in eastern Canada, by geographic region (A) and waterbody (B)



4.6 Other gull species

In coastal eastern Canada, there are confirmed breeding records for the Black-headed Gull, Little Gull, Laughing Gull, and Glaucous Gull. The Bonaparte's Gull *Larus philadelphia* is another species that nests in Ontario and Québec but it is restricted to boreal and subarctic regions, in particular the vast northern (inland) peatlands in these two provinces (Burger and Gochfeld 2002), and will not be considered here.

4.6.1 Black-headed Gull

The Black-headed Gull, an European gull, was first confirmed breeding in North America (with the observation of juveniles) at Stephenville Crossing in western Newfoundland in 1977 (Finch 1978), and over the next 10 years it was confirmed breeding at a number of sites in the province (Montevecchi et al. 1987). But the first nest of the species in North America was actually found in Québec, in 1981 on Îles-de-la-Madeleine (Aubry 1984). At present, Québec has a single active breeding colony, located within the Pointe de l'Est National Wildlife Area on Îles-de-la-Madeleine (Figure 16). In 2007 there were 17 breeding pairs in this protected area (Rail 2009). Also in the Gulf of St. Lawrence, this species has nested in the Mingan Archipelago National Park Reserve, Québec, with the most recent nesting record (n=1) from 1998 (Roberge 2004), and at Stephenville Crossing, Newfoundland, where in 2002 16 nests were counted (Figure 16); the latter colony has apparently been active every year since (CWS, unpubl. data). In 2002, a breeding pair was found on Edwards Island, in Lake Melville, near North West River, Labrador, and represents the first breeding record for Labrador (Chaulk et al. 2004). There are no records from Ontario or the Maritime Provinces.

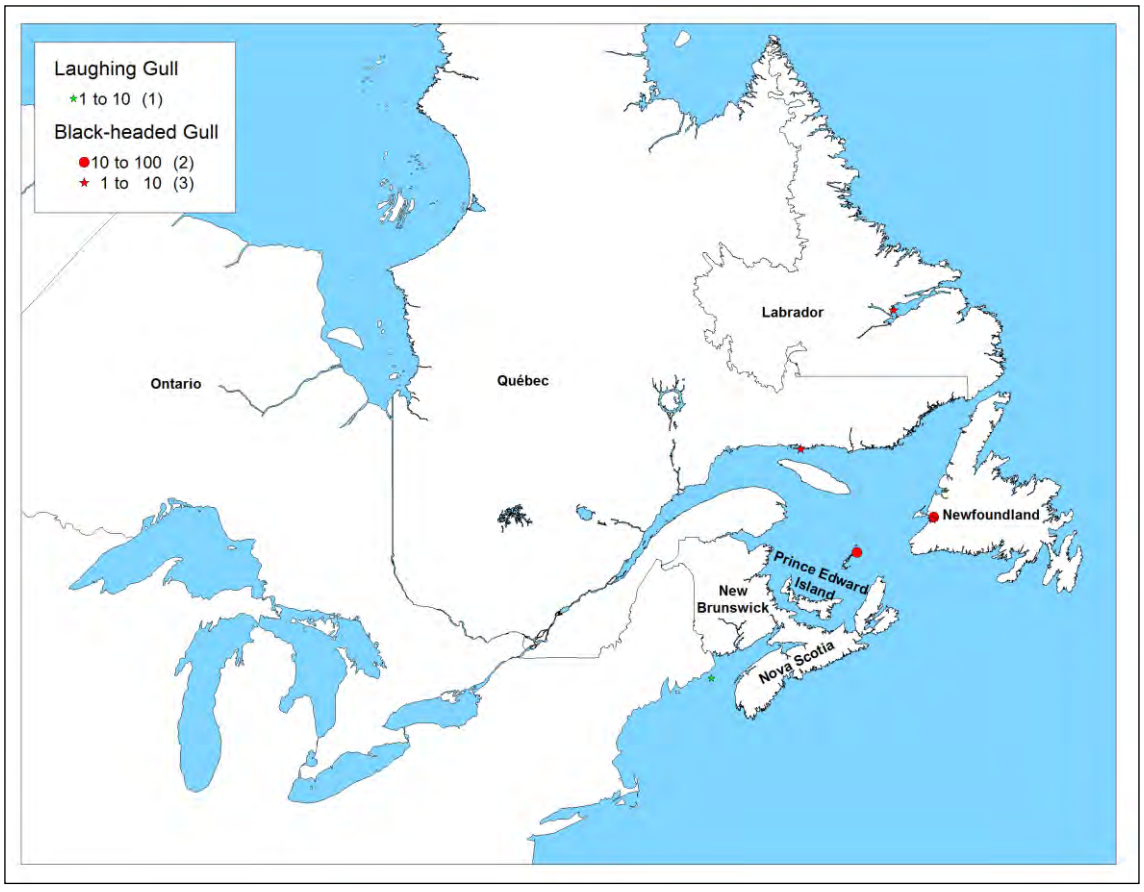
4.6.2 Little Gull

This, the smallest gull in the world, is an Eurasian species (Ewins and Weseloh 1999), with North American breeding records dating from 1962 when nesting was first confirmed near Oshawa, Ontario (Scott 1963). In Ontario it is a sporadic breeder, having bred at Oshawa, Whitby, Bassett Island, and North Limestone Island on Georgian Bay (Weseloh 1994). The latter site appears to be the site used most often and consistently, having nested there for 9 of 13 years between 1979 and 1991, the last time in 1989 (Weseloh 2007b). There is one confirmed breeding record from Québec, and that was of one pair at the Lachine Rapids, near Montreal, from 1982 to 1986 (Bannon and Robert 1996). There are no breeding records from Atlantic Canada.

4.6.3 Laughing Gull

This is a small black-headed gull that nests primarily along the coasts from northern South America to Maine (Burger 1996). In Canada it is considered an irregular breeder in the Maritime Provinces (Erskine 1992) and a visitor to both Québec (Gauthier and Aubry 1996) and Ontario (Goodwin 1982). In Nova Scotia, in the early 1940s there was a breeding colony of about 25 pairs on Bird Islands off Harrigan Cove, Halifax County, that was active for a number of years (Tufts 1961), and a pair successfully nested on Sable Island in 2001 (Taylor et al. 2002). This species has also nested sporadically on Machias Seal Island in the Bay of Fundy, New Brunswick (Erskine 1992) (Figure 16), including as recently as 2000 (CWS, unpubl. data).

Figure 16
Distribution of Black-headed Gull and Laughing Gull breeding colonies (number of pairs) in eastern Canada (number of colonies in parentheses)



4.6.4 Glaucous Gull

This gull, nearly as large as the Great Black-backed Gull, has a circumpolar arctic distribution, and within the area covered by this report it nests only along the coast of Labrador (Godfrey 1986, Gilchrist 2001) (Figure 17). The most recent comprehensive survey estimates for Labrador are from 1978. Surveys that year counted 3285 pairs at 77 colonies, for an average colony size of 43 pairs (SD=59); colonies ranged in size from 3 to 371 pairs. Of the 77 colonies, only 6 contained 100 or more pairs: White Bear Island (371 pairs), Ukallik Island (318), Saddle Island (138), Cape Harringan Island (114), Kiuvik Island (114), and Mikak Island (106). The majority of colonies (74%; 57 of 77) contained 10–99 pairs, while only 14 (18%) had less than 10 pairs.

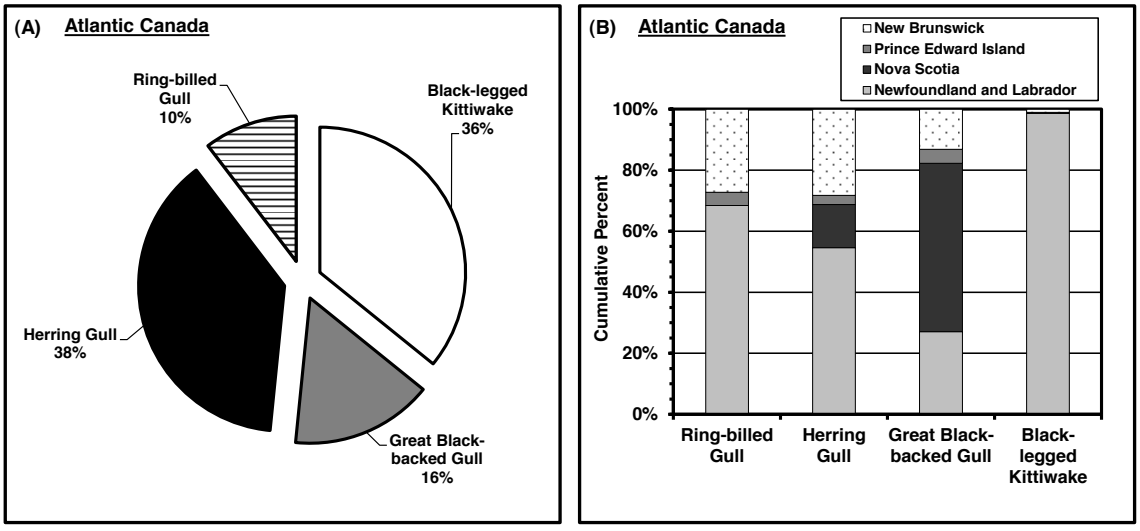
Figure 17
Distribution of Glaucous Gull breeding colonies (number of pairs) in eastern Canada (Number of colonies in parentheses)

5 Analysis of population size and trends by geographic region (province)

5.1 Atlantic Canada

There are approximately 156,000 breeding pairs (312,000 individuals) of gulls in Atlantic Canada, with the Herring Gull and Black-legged Kittiwake comprising nearly three-quarters (74%) of this total (Table 1; Figure 18A). Furthermore, this region harbours 79% (24,410 of 30,980 pairs), 46% (58,980 of 128,705 pairs), and 45% (55,540 of 123,760 pairs), respectively, of coastal eastern Canada's total population of Great Black-backed Gulls, Herring Gulls, and Black-legged Kittiwakes. However, only 3% (16,050 of 505,558 pairs) of the total Ring-billed Gull population breeds in Atlantic Canada; this is not unexpected as the first Maritime Ring-billed Gull colonies were only established in the mid-1960s (Lock 1988).

Figure 18
Proportion (%) of the total breeding population estimate of four gull species in Atlantic Canada, by species (A) and province (B)



Reflecting its size and length of coastline, Newfoundland and Labrador has 68% (105,352 pairs) of all breeding gulls (all 4 species) in Atlantic Canada, followed by New Brunswick (16%; 24,799 pairs), Nova Scotia (14%; 22,004 pairs), and Prince Edward Island (2%; 3596 pairs) (Table 1). Although similar numbers of gulls breed in New Brunswick and Nova Scotia, 24,799 pairs and 22,004 pairs respectively, the species composition of the two provinces differ considerably (Figure 18B). In New Brunswick, 67% of all nesting gulls are Herring Gulls (n=16,639 pairs) whereas 61% of Nova Scotia's gull population are Great Black-backed Gulls (n=13,479 pairs). On Prince Edward Island, these two species comprise 81% of its total gull population (3596 pairs), with 1795 and 1110 pairs of Herring and Great Black-backed Gulls, respectively (Table 1).

5.1.1 Newfoundland and Labrador

The coast of insular Newfoundland, with the exception of Belle Isle and Seabird Ecological Reserves at Witless Bay, Cape St. Mary's, Funk Island, and Baccalieu Island, was systematically surveyed in 2000–2002 (Boyne et al. 2011) and combining results from that survey and other published or unpublished data we obtain an approximate gull population for Newfoundland of 104,000 pairs (Table 1). The estimate for Labrador is only 1500 pairs, but this is almost certainly biased low as there has been no systematic survey of its coast.

Of the six provinces covered by this report, Newfoundland and Labrador has the second largest population of Herring Gulls, Great Black-backed Gulls, and Black-legged Kittiwakes, and the third largest population of Ring-billed Gulls (Table1). Black-legged Kittiwakes are the most abundant species, accounting for half (52%) of the province's total gull population (Figure 19A).

Of the province's 12 gull colonies with 1000 or more pairs (Table 4; Figure 19B), 8 are located on the Avalon Peninsula, including Gull Island and Great Island—part of the Witless Bay Islands Seabird Ecological Reserve—that each harbours over a thousand pairs of both Herring Gulls and Black-legged Kittiwakes. For the two large *Larus* gulls, Herring Gull and Great Black-backed Gull, most colonies in the province consisted of <100 pairs (64% and 96%, respectively) while for the Ring-billed Gull and the Black-legged Kittiwake over half of all colonies had ≥100 pairs (63% and 54%, respectively) (Figure 19B).

Table 4

Estimated number of Ring-billed Gull, Herring Gull, Great Black-backed Gull, and Black-legged Kittiwake pairs in the principal gull colonies[1] in Newfoundland, 2000–2006

Colony[2]	Ring-billed Gull	Herring Gull	Great Black-backed Gull	Black-legged Kittiwake
Baccalieu Island	[3]	.	.	6456
Berry Head (NDB)	375	.	.	.
Big Cove (Port-aux-Port)	.	.	.	500
Brunette Island,N of Harbour Breton	.	125	125	.
Cape Pine Head	.	.	.	575
Cape St. Mary's	.	1	1	10000
Carbonear Island	.	1556	63	.
Church Cove	.	.	.	500
Crawley Island	992	.	.	.
Deadmans Bay	.	.	.	2866
Devil Brook Island	.	25	125	.
Drop Cove	.	.	.	888
Duck Island, Port-aux-Basques	.	375	.	.
Duck Islands, south (NDB)	.	375	25	25
Duck Island, S (PB)	1010	.	.	.
East Grassy Island (NDB)	375	.	.	.
Flat Island (PB)	.	500	.	.
Freshwater Bay	.	.	.	820
Goose Island, S (PB)	291	153	5	929
Governors Island, Bay of Islands	.	375	25	.
Grassy Island, Baie Verte Peninsula	.	.	125	25
Great Colinet Island, South Point	.	375	25	.
Great Island (WB)	.	1640	28	8524
Green Island, Green Island Cove	.	125	125	.
Gull Island (WB)	.	2698	88	5351
Harbour Grace Island	.	375	.	500
Hiscock Rocks	.	500	.	.
Hopeall Island	.	125	125	83
James Island	.	125	125	.
Little Bald Head	.	.	.	1171
Little Bell Island	.	475	25	.
Little Fox Island	.	375	125	.
Little Green Island, S	500	500	.	.
Morgan's Island	500	500	.	.
Pass Island	.	375	.	125
Perlican Island	.	500	25	.
Red Rocks	.	.	.	524
Rouge Island	.	125	125	.
Sandy Point	605	.	.	.
Savage Island	.	25	125	.
Seals Nest Islets	.	25	125	.
Shag Island, N of Port-aux-Port Bay	.	125	125	25
Ship Island	.	375	.	25
The Drook/Freshwater Bay	.	.	.	3724
The Rookery	.	.	.	500
Tin Pot Island, W	.	25	125	375
Tinkershare Island	.	375	25	.
Turr Islands, east	.	.	125	.
Turr Islands, west	125	125	.	.
Verge Island	.	375	.	.
Woody Island (NDB)	.	375	.	.

[1] Colonies with ≥350 pairs of either Ring-billed or Herring Gulls, or ≥125 pairs of Great Black-backed Gulls, or ≥500 pairs of Black-legged Kittiwakes. Cape St. Mary's colony census estimate from 1979.

[2] In parentheses: NDB=Notre Dame Bay; PB=Placentia Bay; WB=Witless Bay.

[3] A "." indicates the species was not nesting at this colony during this period.

Figure 19

In Newfoundland and Labrador, the proportion (%) of each gull species of the province's total breeding gull population (A) and the frequency of colony size classes (number of pairs) by species (B)

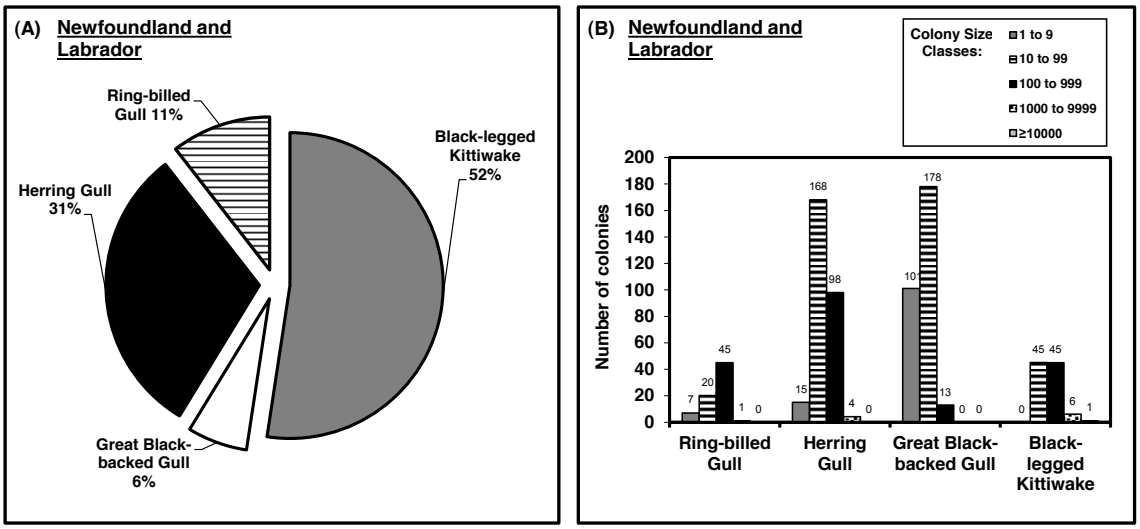
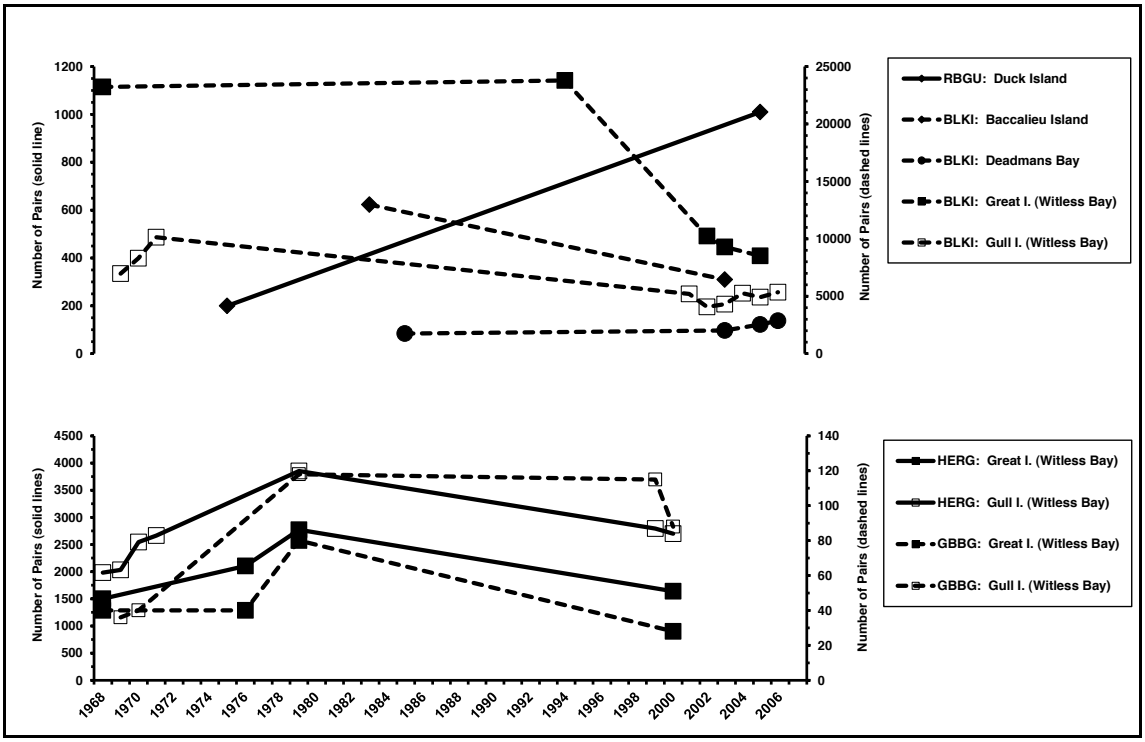


Figure 20

Population trends of Ring-billed Gull (RBGU), Black-legged Kittiwake (BLKI), Herring Gull (HERG), and Great Black-backed Gull (GBBG) colonies in Newfoundland



There are insufficient data to compute province-wide trends for any species, nevertheless there are good census data dating back to the 1970s and 1980s for a number of colonies. For the Ring-billed Gull, the majority of colonies have increased; there is one colony with data from 1975, Duck Island, off the south coast of the Burin Peninsula, and this colony increased five-fold from 200 pairs to 1010 pairs in 2005 (Table 5; Figure 20). However, a few colonies experienced a decline—one example is the colony at Riverhead, in St. Mary's Bay, which declined from 222 pairs in 2001 to zero pairs in 2006 (likely due to disturbance and predation). Probably the best index of population trend for this species in Newfoundland is reflected in the number of colonies. In the 1940s there was only one known colony, by the 1970s and 1980s there were 16 documented colonies (Lock 1988), and in the 2000s there were 70 known colonies (Boyne et al. 2011; CWS, unpubl. data).

The two most important Herring Gull colonies in the province are Great Island and Gull Island, in Witless Bay, and both nearly doubled in size between 1968 and 1979 but then declined between 1979 and 2000—Great Island by 41% and Gull Island by 30% (see Table 1 in Robertson et al. 2001 for full details). Nevertheless, both colonies in 2000 had more pairs than they had in 1968 (Table 5; Figure 20).

Compared with the other three gull species, Great Black-backed Gull colonies are small, with the largest containing only about 250 pairs. Data are not available for trend analyses of these larger colonies, but there are data from Funk Island and Witless Bay in Newfoundland and the Gannet Islands in Labrador. Breeding numbers on Funk Island increased 35-fold between 1956 and 1987 (Montevecchi and Tuck 1987), while at Witless Bay the number of pairs nesting on Great Island and Gull Island increased considerably between the late 1960s and 1979, but then declined between 1979 and 2000 (Table 5; Figure 20). In Labrador, the number of pairs on the Gannet Clusters declined from 100 pairs in 1983 to only 25 in 1999, while the small population on Outer Gannet Island remained unchanged at 10 pairs (Table 5). At the Gannet Islands, some gulls were shot and poisoned in the early 1980s to reduce predation on other seabird species, so part of the decline may be due to culling. However, similar declines were seen in the small seabird colonies to the north in Groswater Bay (62–75 pairs in 1978, 29 pairs in 2002, Robertson et al. 2002).

Newfoundland has the largest population of Black-legged Kittiwakes of any coastal region with 54,690 pairs, representing 44% of eastern Canada's total kittiwake population (Table 1). Within this region, over nearly two-thirds (61%) of all kittiwakes breed in five large colonies: Cape St. Mary's, Great Island and Gull Island in Witless Bay, Baccalieu Island, and Deadmans Bay (Table 4). The population at the latter two colonies show very different trends from the mid-1980s to mid-2000s; Baccalieu Island

Table 5

Estimated number of Ring-billed Gull, Herring Gull, Great Black-backed Gull, and Black-legged Kittiwake pairs from three census periods (C1, C2, C3), and compound annual growth rates (CAGR), in Newfoundland (NF) and Labrador (LB) gull colonies

Species —		C1		C2		C3		CAGR	CAGR
Region	Colony[1]	Year	No. Pairs	Year	No. Pairs	Year	No. Pairs	C1 to C2	C2 to C3
Ring-billed Gull —									
NF	Death's Head	.[2]	.	2001	0	2006	29	.	
	Duck Island, S (PB)	.	.	1975	200	2005	1010	.	5.5%
	Goose Island, S (PB)	.	.	2000	0	2006	291	.	
	New Bridge	.	.	2003	130	2006	114	.	-4.3%
	O'Donnells	.	.	2003	111	2006	199	.	21.5%
	Riverhead	.	.	2001	222	2006	0	.	-100.0%
Herring Gull —									
NF	Great Island (WB)	1968	1500	1979	2771	2000	1640	5.7%	-2.5%
	Gull Island (WB)	1968	1983	1979	3852	2000	2698	6.2%	-1.7%
	Pee Pee Island (WB)	.	.	1984	75	2000	134	.	3.7%
Great Black-backed Gull —									
LB	Gannet Clusters	.	.	1983	100	1999	25	.	-8.3%
	Outer Gannet Island	.	.	1983	10	1999	10	.	0.0%
NF	Great Island (WB)	1968	40	1979	80	2000	28	6.5%	-4.9%
	Gull Island (WB)	1969	36	1979	118	2000	88	12.6%	-1.4%
Black-legged Kittiwake —									
LB	Gannet Clusters	1972	0	1985	58	1999	54	.	-0.5%
	Outer Gannet Island	1972	16	1985	40	1999	49	7.3%	1.5%
NF	Baccalieu Island	.	.	1983	12975	2003	6456	.	-3.4%
	Cape Pine Head	.	.	1985	100	2005	575	.	9.1%
	Deadmans Bay	.	.	1985	1375	2006	2866	.	2.4%
	Freshwater Bay	.	.	1985	120	2006	820	.	9.6%
	Great Island (WB)	1968	23229	1994	23787	2005	8524	0.1%	-8.9%
	Gull Island (WB)	1969	6977	2001	5204	2006	5351	-0.9%	0.6%
	Western Head	.	.	1980	514	1985	1065	.	15.7%

[1] In parentheses: PB=Placentia Bay; WB=Witless Bay.
[2] A "." indicates no census data available.

declined by 50% while Deadmans Bay increased by 64% (Table 5; Figure 20). It must be noted that the largest colony, Cape St. Mary's, has not been censused since 1979. For Great Island and Gull Island, the number of breeding pairs declined by 3% and 23%, respectively, between the late 1960s and mid-2000s. On Great Island the size of the breeding population was similar in 1968 and 1994, but since then it has declined considerably—61% between 1994 and 2003 and 9% between 2003 and 2005 (Table 5; see also Robertson et al. 2004). Kittiwakes have only recently expanded their breeding range to Labrador, with the first breeding record dating from 1972 when 16 nests were found on Outer Gannet (Nettleship and Lock 1974). By the early 1980s, there were 40-57 nests at this colony and 52-63 on the Gannet Clusters. Up to 1999, these colonies have remained relatively stable in size (Table 5; see also Robertson and Elliot 2002).

5.1.2 Nova Scotia

Gull censuses in the province in 2002 and 2004 counted 13,479 pairs of Great Black-backed Gulls, 8353 pairs of Herring Gulls, and 172 pairs of Black-legged Kittiwakes; currently Nova Scotia is the only Canadian province without any breeding Ring-billed Gulls (Table 1; Figure 21). The population of Great Black-backed Gulls is the largest in Canada, and accounts for 44% of the species' total population in eastern Canada (Figure 11A). The two largest colonies of this species in Canada are located here, at Boot Island in the Bay of Fundy (753 pairs in 2002) and on Outer Island (Shelburne County) along the East Coast (628 pairs in 2002) (Table 6).

The East Coast region (i.e., Atlantic coast) harbours the bulk of breeding gulls in the province with 18,236 pairs, representing for the Herring Gull and Great Black-backed Gull over 80% of the province's population of each species and approximately 50% of the Black-legged Kittiwake's population in the province (Table 1; Figure 22A). For the latter species, in the last census, two sites had one pair while only two sites had more than a single pair—an islet south of Baleine along the East Coast had 80 pairs (in 2004) and Gros Cap, on Cheticamp Island in the Gulf of St. Lawrence, had 90 pairs (in 2004). For the two *Larus* species, 90% and 89% of Great Black-backed Gull and Herring Gull colonies, respectively, are found on the East Coast (Table 3). Of the province's 60 large gull colonies, that is 100 or more pairs of Herring Gulls and/or Great Black-backed Gulls, 49 are found along the East Coast, 8 in the Bay of Fundy, and 3 in the Gulf of St. Lawrence. In Nova Scotia, the average colony size for the Herring Gull and the Great Black-backed Gull was 91 pairs (n=92 colonies) and 63 pairs (n=215 colonies), respectively (Table 3). Neither of these two species had colonies of 1000 or more pairs, and only 29% (27 of 92) and 19% (41 of 215) of all Herring Gull and Great Black-backed Gull colonies, respectively, contained 100 or more pairs (Figure 22B).

Figure 21

In Nova Scotia, the proportion (%) of each gull species of the province's total breeding gull population (A) and the number of breeding pairs of each species by waterbody (B)

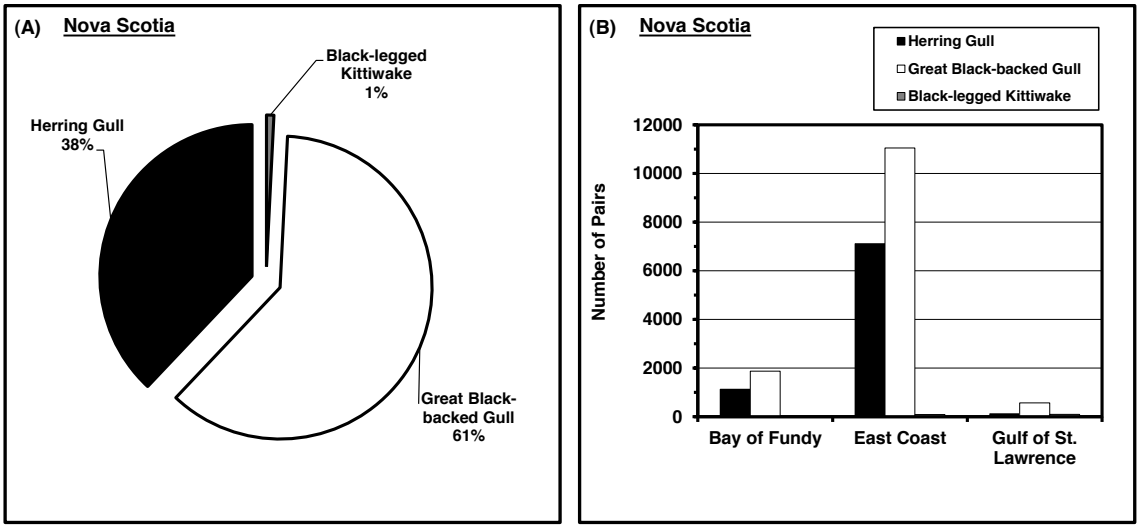


Figure 22

In Nova Scotia, for each gull species the proportion (%) of its total breeding population by waterbody (A) and the frequency of colony size classes (number of pairs) by species (B)

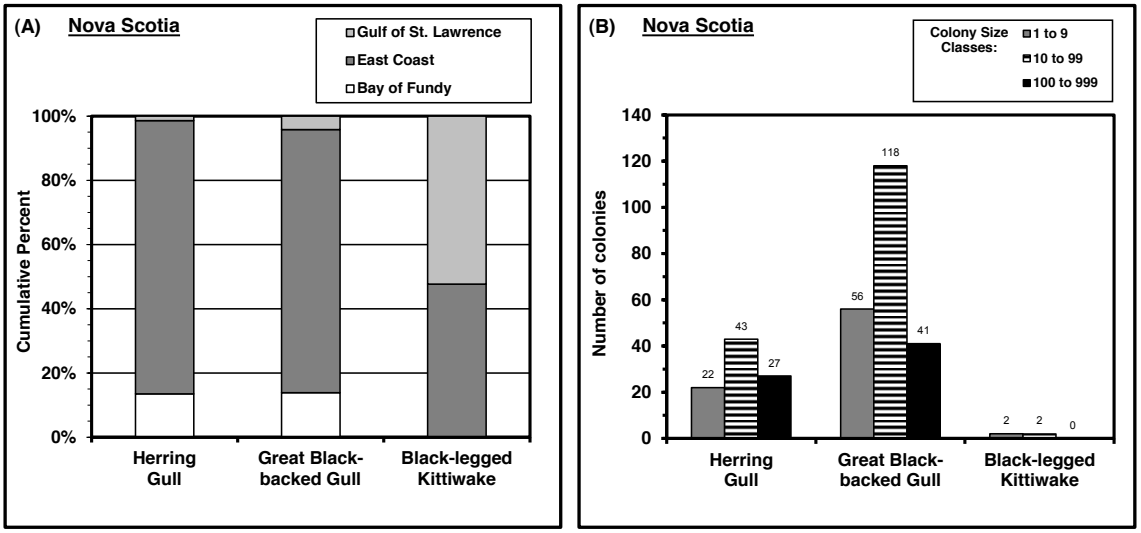


Table 6

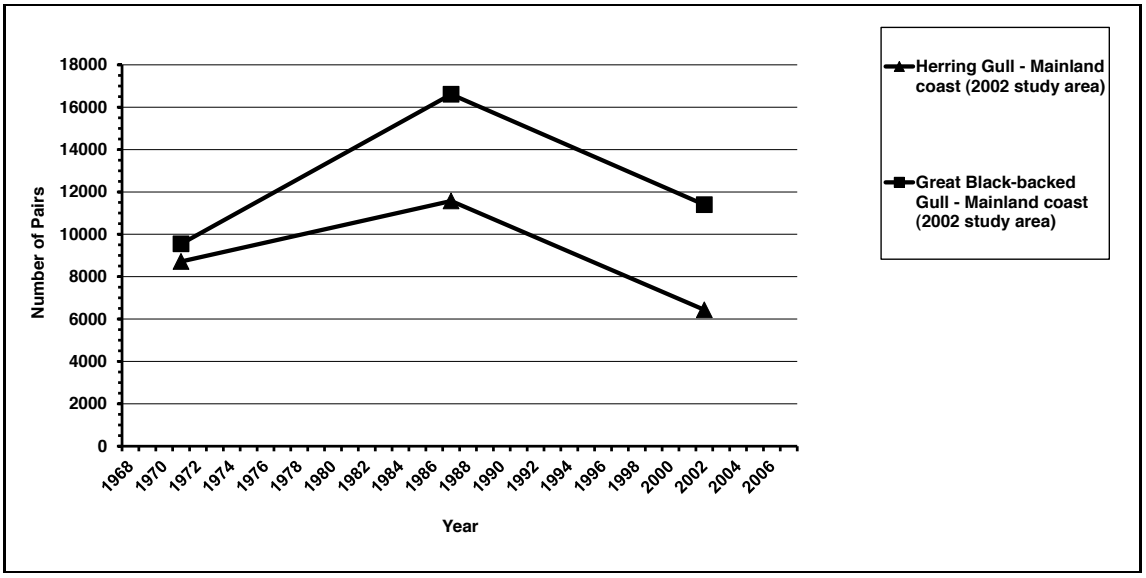
Estimated number of Herring Gull and Great Black-backed Gull pairs from two census periods (C1: 1987; C2: 2002–2004) and percent change between censuses in the principal gull colonies[1] in Nova Scotia

	Herring Gull (HERG)			Great Black-backed Gull (GBBG)			% change	
	C1	C2		C1	C2		C1 to C2[4]	
Colony[2]	1987[3]	2002	2004	1987[3]	2002	2004	HERG	GBBG
Bear Island	68	71	.[5]	490	283	.	4	-42
Bird Islands, Ciboux	573	.	0	1983	.	0	-100	-100
Bird Islands, Hertford	459	.	0	1618	.	0	-100	-100
Blanche Island	615	0	.	1258	367	.	-100	-71
Boot Island	621	0	.	1092	753	.	-100	-31
Brick Kiln Island	7	.	0	55	.	400	-100	634
Brier Island	4235	.[6]	.	313	.[6]	.	.	.
Canoe Island	124	301	.	32	13	.	-100	-59
Chockle Cap	39	193	350	131	83	30	804	-77
Devils Island	.	707	.	.	79	.	.	.
Flat Island, Mahone Bay	344	6	.	53	113	.	-98	114
Green Island (Yarmouth Co.)	23	357	.	24	115	.	1458	385
Grey Island	370	393	.	427	262	.	6	-39
Hay Island	171	.	0	1278	.	1	-100	-100
Hopson Island	82	0	.	171	105	270	-100	58
Indian Island (SW)	412	22	.	105	63	350	-95	233
Ingonish Island	398	.	0	938	.	0	-100	-100
Lears Island	152	26	.	570	380	.	-83	-33
Marks Island	5	550	.	3	3	.	10900	0
Outer Island (Shelburne Co.)	774	93	.	766	628	.	-88	-18
Pearl Island	153	52	.	152	341	.	-66	124
Pennant Island	37	0	.	208	262	210	-100	1
Pinnacle Island	201	.	180	215	.	180	-11	-16
Pumpkin Isl. (Yarmouth Co.)	934	147	.	32	16	.	-84	-49
Ram Island (near Lockeport)	145	0	.	496	367	.	-100	-26
Ram Island, Little River Hbr	43	262	.	117	262	.	514	124
Reef Island	144	472	.	138	39	.	228	-72
St. John's Island	882	114	.	555	384	.	-87	-31
Wedge Island (Halifax Co.)	42	100	125	28	31	15	497	-46
West Ironbound Island	576	0	0	257	131	0	-100	-100
MAINLAND (2002 survey area)[7]	11569	6434		16608	11393		-44	-31
							(-3.8)[8]	(-2.5)
NOVA SCOTIA (province-wide)[9]	22464	11461		28274	18843		-49	-33
							(-4.4)	(-2.7)

[1] Includes all colonies with ≥125 pairs of either Herring or Great Black-backed Gulls in the 2002 or 2004 census.
[2] Colonies in italics are located in the Bay of Fundy, while all other colonies are found along Nova Scotia's East Coast region.
[3] Data from A.R. Lock (CWS, unpublished) were corrected using the ratio of 1.266 territorial gulls counted on photos to number of nests counted (i.e., number of individuals in Lock divided by 1.266).
[4] Percent change in number of breeding pairs between 1987 and 2002 (or 2004, if available).
[5] A "." indicates no census data available.
[6] This island was not surveyed in 2002 due to necessity of returning to airport because of low fuel.
[7] The 2002 estimates are Observer #1 estimate from aerial survey multiplied by a correction factor of 1.31 (see Boyne and Beukens 2004 for details).
[8] Percent compound annual growth rate (CAGR) in parentheses.
[9] From Boyne and Beukens 2004; 2002 population size are midpoint of estimates (Herring Gull: 10,548–12,373 pairs; Great Black-backed Gull: 18,376–19,310 pairs).

For Nova Scotia there are excellent trend data available for the Herring Gull and Great Black-backed Gull, over a period of about 30 years beginning in the early 1970s. Most of the province's mainland coastline (but excluding Cape Breton Island and also Brier Island in the Bay of Fundy) has been surveyed three times: in 1971, 1987, and 2002. In 1971 there were 8720 and 9547 pairs of Herring Gulls and Great Black-backed Gulls, respectively (Figure 23). By 1987 their respective populations had increased by 33% (to 11,569 Herring Gull pairs) and 74% (to 16,608 Great Black-backed Gull pairs), but between 1987 and 2002 the population of each species declined down to close to the 1971 level—6434 Herring Gull pairs (95% CI: 5844–6970) (-26% change from 1971) and 11,393 Great Black-backed Gull pairs (95% CI: 10,476–12,342) (+19%) (Table 6; Figure 23) (see also Boyne and Beukens 2004).

Figure 23
Population trends of the Herring Gull and Great Black-backed Gull in Nova Scotia



In 1987, possibly the largest Great Black-backed Gull colonies ever recorded were at the two Bird Islands, Ciboux and Hertford, with 1983 pairs and 1618 pairs counted, respectively (Table 6). Together they accounted for 22% of the total Great Black-backed Gull population along the mainland coastline that year. In 2004, unfortunately, these two colonies had ceased to exist and their disappearance account for a good part of this species' decline between 1987 and 2004. A similar decline occurred at Hay Island, which in 1987 had 1278 pairs but in 2004 there was only a single pair (Table 6). Elsewhere, among the larger Great Black-backed Gull colonies some remained relatively unchanged in size between 1987 and 2002–2004 (e.g., Pennant Island) while others showed strong increases (e.g., Flat Island in Mahone Bay, Green Island in Yarmouth County, and Ram Island in Little River Harbour) (see Table 6). For all of

Nova Scotia, the province-wide population of Herring Gulls and Great Black-backed Gulls was estimated at 14,200 and 15,300 pairs, respectively, in 1971, and at 22,464 and 28,274 pairs, respectively, in 1987. The whole province was not surveyed in 2002, but by extrapolating the mainland census results there were an estimated 11,461 Herring Gull pairs (midpoint of estimate range 10,548-12,373 pairs) and 18,843 Great Black-backed Gull pairs (estimate range 18,376-19,310) breeding in the province in 2002 (see Boyne and Beukens 2004 for details). The provincial population of Herring Gulls increased between 1971 and 1987 by 58% and then declined 49% by 2002, while the Great Black-backed Gull population increased by 85% between 1971 and 1987 and then declined 33% by 2002 (see Table 6).

5.1.3 Prince Edward Island

The 2004 survey of Prince Edward Island's coastline produced an estimate for the province of 3596 breeding pairs, with 691 pairs of Ring-billed Gulls in 3 colonies, 1795 pairs of Herring Gulls (representing 50% of the province's total breeding gull population [Figure 24A]) at 8 colonies, and 1110 pairs of Great Black-backed Gulls at 14 sites (Tables 1, 7; see also Boyne and McKnight 2005). The Black-legged Kittiwake does not breed in the province. This province lies completely within the Gulf of St. Lawrence, and its ratio of Herring Gull to Great Black-backed Gull pairs (1.6:1) is similar to the Gulf of St. Lawrence coastline of New Brunswick (2.3) but higher than for Nova Scotia (0.2) and Îles-de-la-Madeleine (0.7). The Herring Gull colony at Indian Point Sand Hills West is the Maritime's second largest and the fifth largest within the entire Gulf of St. Lawrence in Atlantic Canada and Québec. Colonies of this species ranged in size from 2 to 855 pairs, with an average of 224 pairs per colony (Table 3). Interestingly, of the 8 sites with nesting Herring Gulls in 2004, 3 had fewer than 10 pairs while the remaining 5 had 100 or more pairs (Table 7). For the Great Black-backed Gull, of the 14 sites in the province where they nested in 2004, nine had more than two pairs, and of these, eight were active in 1986 but only two were active in 1975 (Table 7). In 2004, nearly two-thirds (66%) of all breeding pairs of this species were found in colonies situated in Murray Harbour (Poverty Beach and Cherry Island) in the south-east corner of the province or in Alberton Harbour (Bernard, Gillis, Tern, and Wagners Islands) on the north west side of the Island. Colonies of this gull ranged in size from 1 to 435 pairs, with 79 pairs being the average (Table 3). The largest colony was located at Poverty Beach and is Atlantic Canada's third largest for this species, after Boot Island and Outer Island in Nova Scotia (Tables 6, 7). As in Nova Scotia, in Prince Edward Island there were not any Herring Gull or Great Black-backed Gull colonies with 1000 or more pairs (Figure 24B). For both the Herring Gull and the Great Black-backed Gull, populations in this province grew strongly (>10% per year) between

Table 7

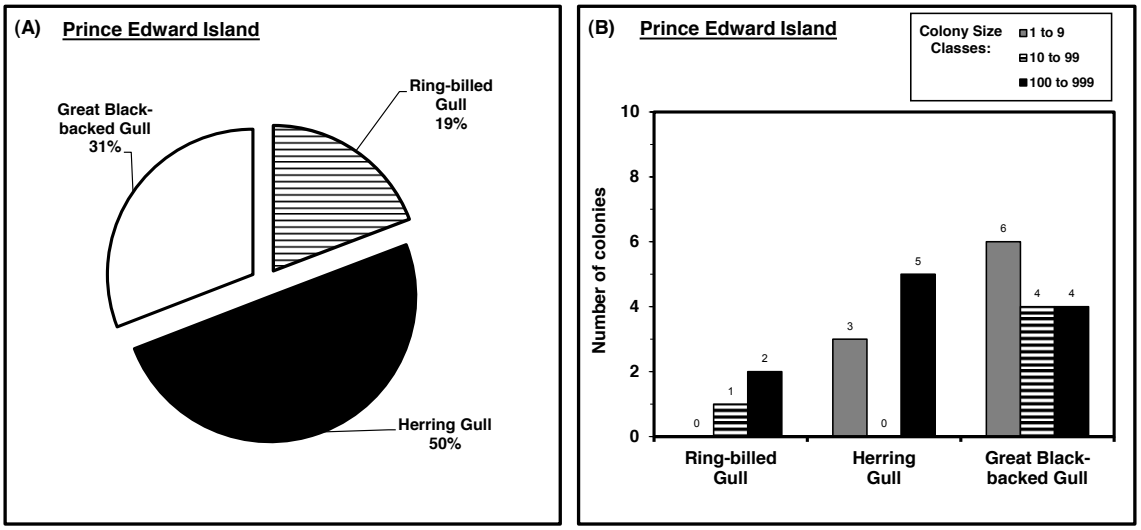
Estimated number of Ring-billed Gull, Herring Gull, and Great Black-backed Gull pairs from three census periods (C1: 1975; C2: 1986; C3: 2004) in all gull colonies in Prince Edward Island

	Ring-billed Gull			Herring Gull			Great Black-backed Gull		
	C1	C2	C3	C1	C2	C3	C1	C2	C3
Colony	1975[1]	1986	2004	1975	1986	2004	1975	1986	2004
Alberton Harbour Islands	.[2]	.	.	.	.	.	50	.	.
Bernards Island	.	.	.	.	.	4	.	149	114
Bird Island	.	.	69	.	4	118	.	6	4
Cascumpec Sand Hills	.	.	.	.	1412	2	.	157	.
Cherry Island	.	.	.	70	766	177	40	327	19
Christie Island, Pownal Bay	.	.	.	.	.	.	.	1	.
Conway Sand Hills	.	.	.	.	46	.	.	2	.
Gillis Island	.	.	.	.	.	.	.	.	29
Gordons Island	.	.	.	.	2	.	.	.	.
Gull Island (Sandy Island)	.	.	.	.	.	.	.	90	.
Hillsborough Bridge	.	.	.	.	.	.	.	2	.
Indian Point Sand Hills East	.	116	.	.	.	.	.	.	.
Indian Point Sand Hills West	.	.	522	.	1263	855	.	146	198
Kildare Sand Hills	.	.	.	.	.	.	.	1	.
Little Courtin Island	.	.	.	300	1430	296	200	571	168
MacPhee Beach Island	.	.	.	.	.	.	.	.	1
Nail Pond	.	.	.	.	.	.	.	1	.
Panmure Island	.	.	.	.	.	.	.	.	2
Poverty Beach	.	114	100	.	2200	339	.	531	435
Pownal Bay, unis in	.	.	.	.	.	.	20	1	.
Ram Island (Malpeque Bay)	.	.	.	200	25	.	100	300	.
Sable Point Island (Murray Harbour)	5	.	.	125	.	.	200	.	.
Sturgeon Bay	.	.	.	.	.	.	.	.	1
Tern Island	.	.	.	.	.	.	.	11	75
Thornton Point	.	.	.	.	.	.	.	.	2
Wagners Island	.	.	.	.	.	4	.	30	61
Unnamed, East of Poverty Beach (mouth of Murray Harbour)	.	.	.	.	.	.	.	.	1
Grand Total	5	230	691	820	7148	1795	610	2326	1110
Compound annual growth rate (CAGR)		41.6%	6.3%		21.8%	-7.4%		12.9%	-4.0%

[1] 1975 data from G. Hogan, PEI Fish and Wildlife Division; 1986 data from Lock 1987; 2004 data see Boyne and McKnight 2005.

[2] A "." indicates no census data available.

Figure 24
In Prince Edward Island, the proportion (%) of each gull species of the province's total breeding gull population (A) and the frequency of colony size classes (number of pairs) by species (B)



1975 and 1986 but then declined in the 20-year interval until the next census in 2004 (Table 7; Figure 25). Nevertheless, in 2004 the population of both species was nearly double their level of thirty years earlier in 1975—82% higher for the Great Black-backed Gull and 119% higher for the Herring Gull. As in New Brunswick, the population of Ring-billed Gulls in this province is growing. This species is new to the Maritimes, with breeding confirmed for the first time in 1965 in New Brunswick and in 1974 in Prince Edward Island (Lock 1988), although it is still absent from Nova Scotia. On Prince Edward Island the population has grown very rapidly, from 5 pairs in 1975 to 230 pairs in 1986 and to 691 pairs in 2001 (Table 7).

5.1.4 New Brunswick

During the censuses of New Brunswick's gull colonies, 24,799 pairs of gulls were counted, specifically 16,639 pairs of Herring Gulls, 4373 pairs of Ring-billed Gulls, 3212 pairs of Great Black-backed Gulls, and 575 pairs of Black-legged Kittiwakes (Table 1). The total gull population is similar in size to neighbouring Nova Scotia (22,004 pairs), however, the species composition is quite different between these two maritime provinces. In New Brunswick, two-thirds (67%) of all nesting gulls are Herring Gulls (Table 1; Figure 26A), while in Nova Scotia the larger Great Black-backed Gull is the most abundant gull (61% of total gull population). All four species breed along both of New Brunswick's coastal regions, that is, the Bay of Fundy and Gulf of St. Lawrence, although the Ring-billed Gull has only recently been confirmed nesting in the Bay of Fundy, on Manawagonish Island (McAlpine et al. 2005) (Table 8).

Figure 25

Population trends of the Herring Gull (HERG), Great Black-backed Gull (GBBG), and Ring-billed Gull (RBGU) in Prince Edward Island

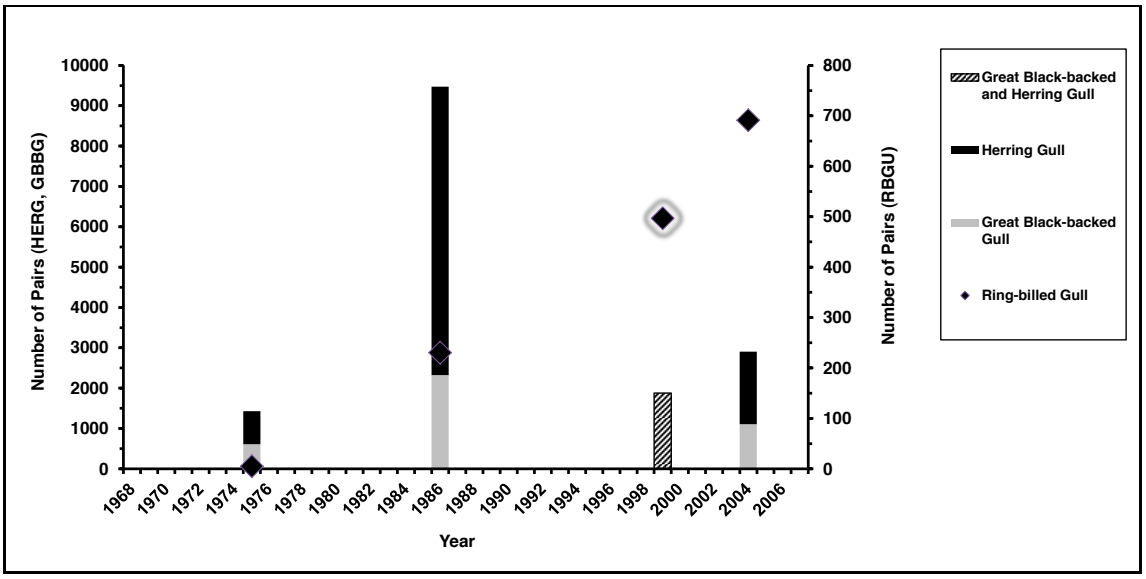
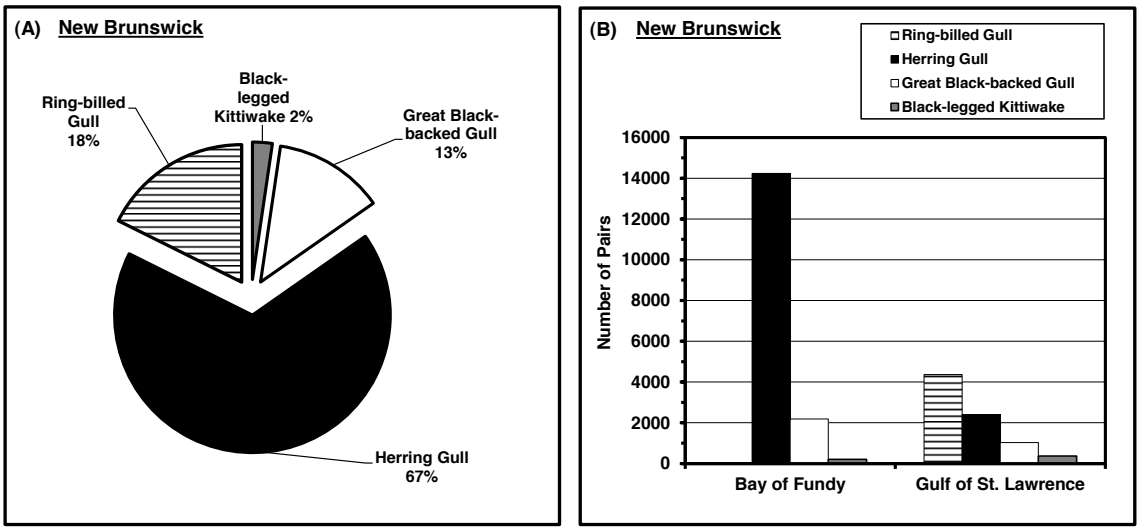


Figure 26

In New Brunswick, the proportion (%) of each gull species of the province's total breeding gull population (A) and the number of breeding pairs by waterbody (B)



The Bay of Fundy harbours 86% (14,233 of 16,639) and 68% (2187 of 2313) of all Herring and Great Black-backed Gull pairs, respectively, in the province, but <1% (6 of 4373) and 35% (202 of 581) of the province's population of Ring-billed Gulls and Black-legged Kittiwakes (Tables 1, 8; Figures 26B, 27A). For the Herring Gull and Great Black-backed Gull, the censuses of this coastline counted 1656 and 459 pairs, respectively, in the Campobello region (in 1998) and 737 and 1125 pairs along the coastline from St. Stephens to St. John (in 1998) (Mawhinney et al. 1999), 11,809 and 602 pairs in the Grand Manan Archipelago (in 2001), and 31 pairs and 1 pair on Grindstone Island in Chignecto Bay (in 1998) (see Table 8 for all colonies with ≥100 pairs of one or both of these two species).

The Ring-billed Gull is a relatively newcomer to the Maritime Provinces, with the first recorded nesting dating from 1965 when 9 nests were found at Bathurst Harbour in New Brunswick. In 1986, a Maritime-wide census counted a total of 1434 nests at 5 sites in New Brunswick, all located along the Gulf of St. Lawrence (Lock 1988). The 2000 and 2005 censuses of this coastline obtained estimates of 3544 nests at 6 colonies and 4367 nests at 2 colonies, respectively (Table 8; see also Table 4 in Boyne et al. 2006). The two colonies in 2005, Tern Island and Tracadie Bay, were the largest in all of Atlantic Canada and, along with a small colony at Manawagonish Island (6 pairs in 2004), are the only active colonies of this species in the province. New Brunswick's Ring-billed Gull population, therefore, grew at an annual rate of 6.5% between 1986 and 2000 and 4.2% between 2000 and 2005.

The Black-legged Kittiwake is also a recent addition to New Brunswick's breeding avifauna. The first colony was found in 1992 on South Wolf Island in the Bay of Fundy and it had 12 breeding pairs (Kehoe 1994). Up until the last complete census of the Bay of Fundy in 1999, kittiwakes had nested every year on this island, with 134 nests counted in 1999 (Kehoe and Diamond 2001) (Table 8). In 1998, they also began nesting on Whitehorse Island, and in a census of the island in 2002, 68 nests were counted there. The species has also expanded its provincial range to the Gulf of St. Lawrence, where in 2005 a total of 373 pairs was counted at 3 colonies (Tables 1, 8). From the census data, the average colony size for all of New Brunswick kittiwake colonies was 115 pairs (n=5 colonies) (Table 2).

As of 2007, this province has eastern Canada's second largest, and Atlantic Canada's largest, Herring Gull colony. It is found on Kent Island in the Grand Manan Archipelago (GMA) in the Bay of Fundy; in a 2001 census, 5926 breeding pairs were counted (Ronconi and Wong 2003). New Brunswick has two additional large Herring Gull colonies (≥1000 pairs), and both are part of the GMA, Great Duck Island (1910 pairs in 2001) and Outer Wood Island (1404 pairs in 2001) (see Ronconi and

Table 8

Estimated number of Ring-billed Gull, Herring Gull, Great Black-backed Gull, and Black-legged Kittiwake pairs in the principal gull colonies[1] in the Bay of Fundy and Gulf of St. Lawrence (census year in parentheses) in New Brunswick, 1998–2005

Region — Colony	Ring-billed Gull	Herring Gull	Great Black-backed Gull	Black-legged Kittiwake
Bay of Fundy (1998) —				
Dicks	.[2]	173	39	.
Flatpot	.	426	41	.
Gooseberry Island	.	0	119	.
Hog	.	0	137	.
Hospital-1	.	116	165	.
Hospital-2	.	365	76	.
Manawagonish Island	6[3]	33	268	.
New River	.	178	72	.
Sandy	.	361	9	.
SE Salkeld	.	59	122	.
Salkeld, NW	.	14	116	.
South Wolf	.	173	99	134[4]
Whitehorse Island	.	.	.	68[5]
Bay of Fundy: Grand Manan Archipelago (2001) —				
Great Duck Island	.	1910	285	.
Hay Island	.	573	18	.
Kent Island	.	5926	23	.
Long Island	.	118	13	.
North Green Island	.	259	86	.
Outer Wood Island	.	1404	14	.
Sheep Island	.	442	55	.
South Green Island	.	144	34	.
Western Green Island	.	192	4	.
Wood Island	.	587	0	.
Gulf of St. Lawrence (2005) —				
Bathurst Harbour Island[6]	.	254	94	.
Cap Pele	.	.	.	166
Egg Island	.	52	142	.
Fox Dens Beach	262[7]	937	175	.
Grindstone Point	.	.	.	59
Maisonnette Dune	268[7]	198	37	.
Pokeshaw Island	.	0	3	0[8]
Neguac Bar	.	592	101	.
New Bandon	.	.	.	148
Tern Island, Tabusintac	2138	0	12	.
Tracadie	.	304	46	.
Tracadie Bay	2229	0	58	.
Unnamed island west of Tracadie S. Beach	.	29	155	.

[1] All Ring-billed Gull and Black-legged Kittiwake colonies in addition to all colonies with ≥100 pairs of either Herring or Great Black-backed Gulls.

[2] A "." indicates the species was not nesting at this colony during this census.

[3] Censused in 2004.

[4] Censused in 1999.

[5] Censused in 2002.

[6] Includes Bathurst Harbour Island 2 and Bathurst Harbour Island 3.

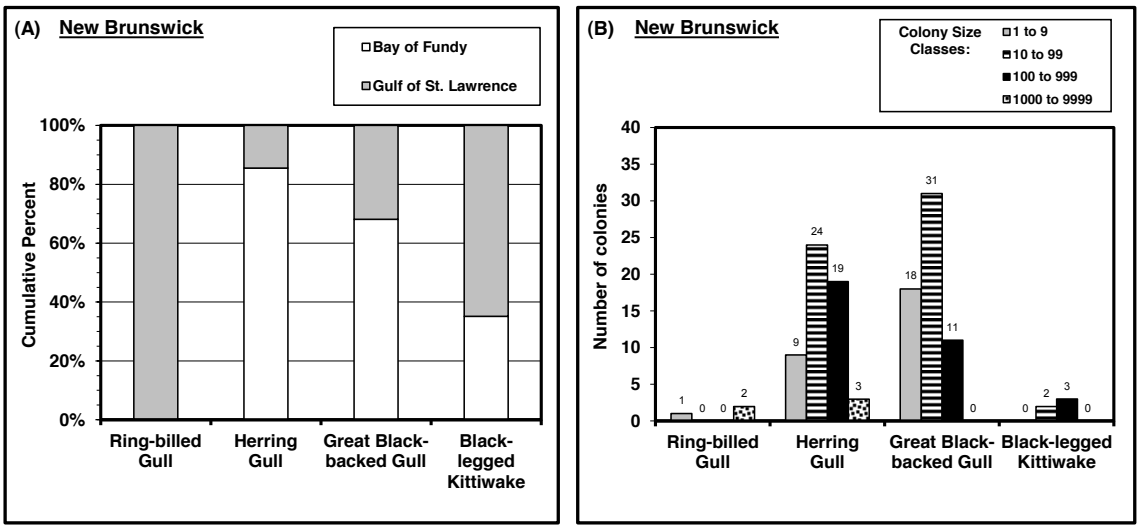
[7] Censused in 2000 and inactive (0 pairs) in 2005.

[8] Initially 6 pairs of Black-legged Kittiwakes (Boyne et al. 2006) but a re-examination of the aerial photographs showed that these individuals were roosting Herring Gulls (see Davis et al. 2011).

Wong 2003). Great Duck Island has also New Brunswick's largest Great Black-backed Gull colony, with 285 pairs in 2005. The majority of Herring Gull (60%; 33 of 55 colonies) and Great Black-backed Gull (82%; 49 of 60) colonies had fewer than 100 breeding pairs (Figure 27B). The average colony size, among all of New Brunswick colonies, was 303 pairs for the Herring Gull (n=55 colonies) and 54 pairs (n=60 colonies) for the Great Black-backed Gull (Table 3).

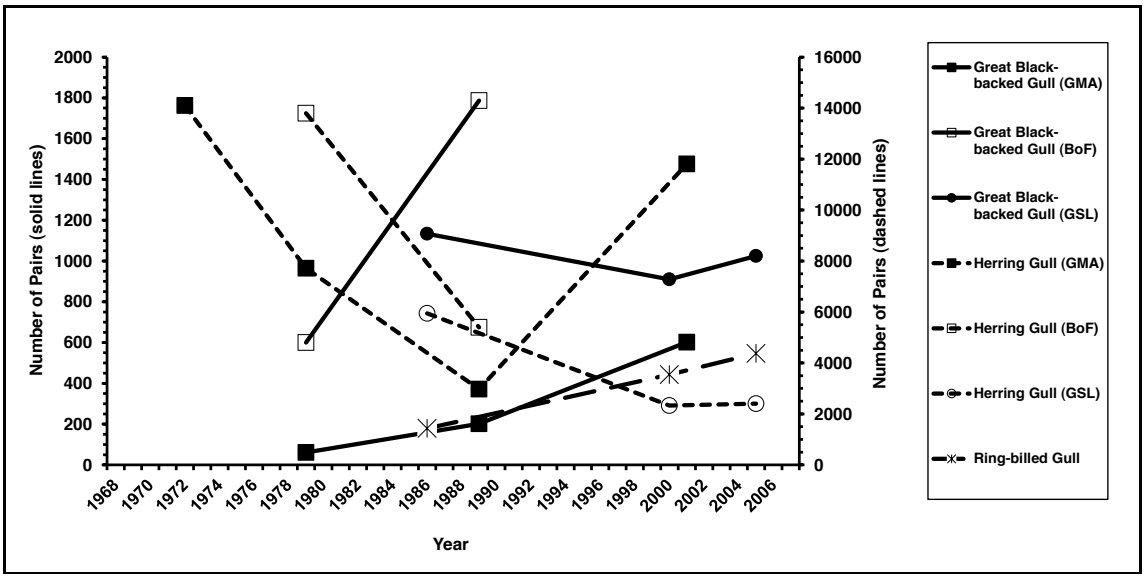
Figure 27

In New Brunswick, for each gull species the proportion (%) of its total breeding population by waterbody (A) and the frequency of colony size classes (number of pairs) by species (B)



Gull colonies along New Brunswick's two main coastal regions have been censused three times: the Bay of Fundy in 1979, 1998, and 2001, although in 2001 only the Grand Manan Archipelago (GMA) was censused, and the Gulf of St. Lawrence in 1986, 2000, and 2005 (Figure 28). For the Bay of Fundy, the size of the Great Black-backed Gull population was 600 pairs in 1979 (A.R. Lock, CWS unpublished data) and 1787 pairs in 1998, an increase of 198% (or 5.9% annually). The Herring Gull population in this region showed the opposite trend, that is the population decreased by 61% (or -4.8% annually) from 13,800 pairs in 1979 to 5399 pairs in 1998 (A.R. Lock, CWS unpublished data; Mawhinney et al. 1999). For the Grand Manan Archipelago (GMA), there are population estimates for the Great Black-backed Gull and Herring Gull from 1965, 1972 (Drury 1973, 1974), 1979 (Lock 1982), 1998 (Mawhinney et al. 1999), and 2001 (Ronconi and Wong 2003). Up until the 2001 census, the population of Great Black-backed Gulls in the GMA was fairly stable, with an estimated 100 pairs, 60 pairs, 61 pairs, and 202 pairs breeding in 1965, 1972, 1979, and 1998, respectively. In 2001 a census recorded nearly three times as many pairs, 602 (Figure 28). In 1965 there were an estimated 11,900 Herring Gull pairs in the GMA, and nearly four decades

Figure 28
Population trends of the Ring-billed Gull in New Brunswick and of the Herring Gull and Great Black-backed Gull in the Grand Manan Archipelago (GMA) in the Bay of Fundy and along the entire Bay of Fundy (BoF) and Gulf of St. Lawrence (GSL), New Brunswick



later, in 2001, the size of the population was almost identical, 11,809 pairs. However, there were considerable differences among the intervening census estimates: 14,100 pairs in 1972, 7717 pairs in 1979, and 2975 pairs in 1998. It should be noted, however, that there were differences in methodologies used among the censuses. In 1979 about half of colony estimates, including the important Kent Island colony, were obtained from ground counts and half from an aerial survey, in 1998 an aerial survey was conducted (entire GMA), and in 2001 a ground survey was conducted of all colonies (see Ronconi and Wong 2003 for further details). For the Herring Gull along the Gulf of St. Lawrence, numbers fell between 1986 and 2000, from 5950 pairs to 2330 pairs, and then increased, albeit only slightly, up to 2406 pairs in 2005. The Great Black-backed Gull showed a similar trend in this region; its numbers declined from 1134 pairs in 1986 to 910 pairs in 2000 and then it increased slightly to 1025 pairs in 2005 (see Boyne and Beukens 2004 and Boyne et al. 2006 for further details). In summary, for the Great Black-backed Gull, the Bay of Fundy population nearly tripled in size between 1979 and 1998 while in the Gulf of St. Lawrence, the population declined by 10% between 1986 and 2005. The Herring Gull numbers declined by 61% and 60% in the Bay of Fundy (1979–1998) and Gulf of St. Lawrence (1986–2005), respectively. One of Canada's longest trend series for a gull species exists for the Herring Gull population on Kent Island (GMA), with data from 1940 to 2001. This island's population reached a record high of 25,000 pairs in 1945, but then each successive census reported a decrease until it reached its lowest levels in 1998 with only 940 pairs. Fortunately, the 2001 census showed a rebound in numbers, with the highest number of breeding pairs (5926)

recorded since 1972 (see Cannell and Maddox 1983, Hébert 1989, and Ronconi and Wong 2003 for additional details).

5.2 Québec—St. Lawrence system

The shoreline and islands of the St. Lawrence River, Estuary, and Gulf in southern Québec are home to approximately 215,000 breeding pairs of gulls, representing 27% of eastern Canada's total gull population. For the Ring-billed, Herring, and Great Black-backed Gulls, approximately a fifth of each species' total population (in eastern Canada) breeds in Québec, specifically 22% (109,345 pairs), 24% (30,944 pairs), and 21% (6534 pairs), respectively, while over half (55%) (68,220 pairs) of all Black-legged Kittiwakes are found there. Of Québec's total larid population, half is comprised of one species only, the Ring-billed Gull (Figure 29A), and 91% of those nest along the St. Lawrence River and Estuary (Table 1; Figure 29B). The Herring Gull and the Great Black-backed Gull are found in similar proportions among Québec's five main coastal regions (Figure 30A). Furthermore, the population of each species has an almost 60% to 40% split between the Gulf of St. Lawrence and the St. Lawrence River and Estuary. Within the Gulf, over two-thirds (69%) of Herring Gulls breed along the North Shore and, fortunately for this species, 95% of these birds are in areas with federal government protection, specifically the Migratory Bird Sanctuaries (MBS) of the Canadian Wildlife Service (2957 pairs) and the Mingan Archipelago National Park Reserve of Canada (9368 pairs; excluding the two MBS located within).

Figure 29

In Québec, the proportion (%) of each gull species of the province's total breeding gull population (A) and the number of breeding pairs of each species in each of the province's main coastal regions (B)

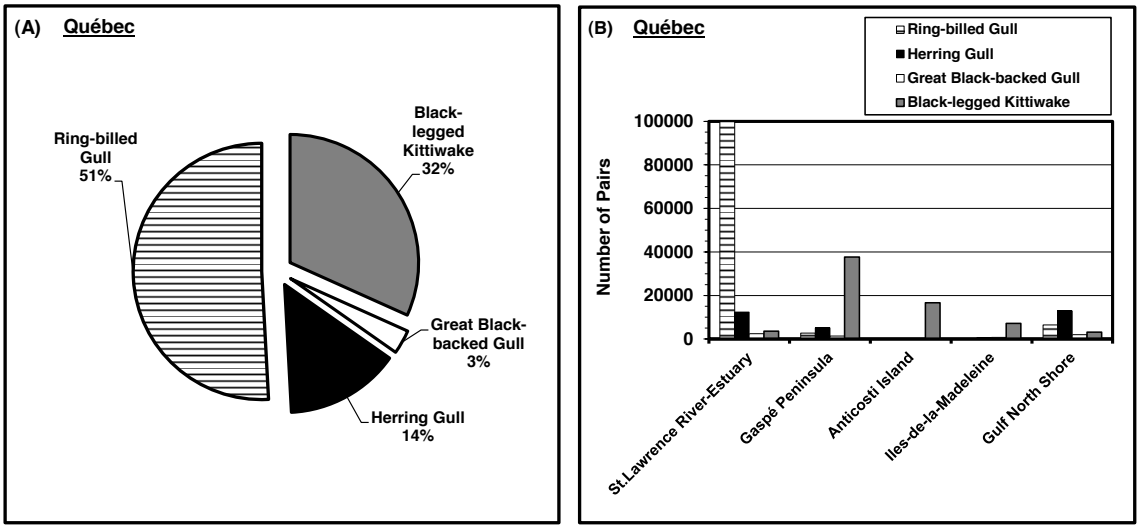
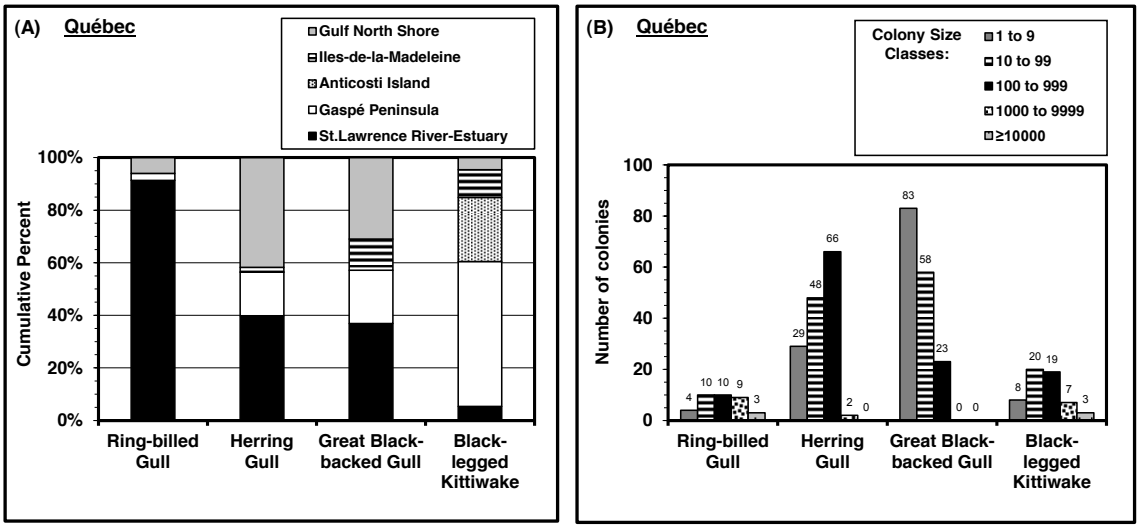


Figure 30
In Québec, for each gull species the proportion (%) of its total breeding population by region (A) and the frequency of colony size classes (number of pairs) by species (B)



For the Great Black-backed Gull's population in the Gulf, about half (49%) nest along the North Shore and the other half on the Gaspé Peninsula and Îles-de-la-Madeleine. Anticosti Island, also located in the Gulf, has a very small population of Herring Gulls (20 pairs) and no Great Black-backed Gulls nor Ring-billed Gulls. This island, however, has eastern Canada's third largest regional population of Black-legged Kittiwakes with 16,642 pairs; only Newfoundland and Québec's Gaspé Peninsula have larger populations (Table 1). Together Anticosti Island and the Gaspé Peninsula harbour 80% of Québec's total kittiwake breeding population.

5.2.1 Ring-billed Gull

Although the Ring-billed Gull is Québec's most abundant gull, it has the fewest colonies with only 36. A third of them (12 of 36), however, have 1000 or more pairs (Figure 30B; Tables 9, 10). There are slightly fewer colonies of this species in the River and Estuary sections (n=16) of the St. Lawrence as compared to the Gulf (n=20), however, colonies were on average over 10 times larger in the River and Estuary (6247 pairs) than in the Gulf (470 pairs) (Table 2). The largest colony of any larid in eastern Canada is a Ring-billed Gull colony located on Île Deslauriers, a small island in the St. Lawrence River located just east of Montreal (Table 10). Nearly the whole island is taken up by nesting Ring-billed Gulls; since 1991 this colony has been relatively stable with a population between 47,000 and 52,000 pairs (Figure 31). In 2006 this colony had 51,000 pairs, representing nearly half of Québec's total Ring-billed Gull population.

Table 9

Estimated number of Ring-billed Gull, Herring Gull, Great Black-backed Gull, and Black-legged Kittiwake pairs in the principal gull colonies[1] in the Gulf of St. Lawrence, Québec, 1996–2007

Region — Colony	Year censused	Ring-billed Gull	Herring Gull	Great Black-backed Gull	Black-legged Kittiwake
Gaspé Peninsula —					
Anse à Beaufils (Cap d'Espoir-Percé)	2002	.[2]	125	4	.
Anse à Pierre Loiselle	2002	.	.	.	263
Cap d'Espoir	2002	.	13	2	2542
Île Bonaventure	2002	.	57	10	18550
Île Taylor	2002	.	351	124	.
Îles Mahy	2002	.	561	289	.
Les Trois Soeurs	2002	.	33	.	413
Marais de Paspébiac	2002	.	390	33	.
New Richmond to Bonaventure	2002	.	902	13	83
Pointe de Sandy Beach	2002	1172[3]	429	151	.
Presqu'île de Forillon	2002	.	114	9	13411
Rocher Percé	2002	.	164	157	1094
Ruisseau Leblanc	2002	.	.	.	572
Saint-Godefroi	2002	.	.	.	288
Saint-Omer	2002	1663	703	104	.
North Shore —					
Cayes à Meck	1999	630	1	.	.
Île à Calculot	1998	3745	6	16	.
Île à la Chasse	1998	572	3	30	.
Île aux Goélands (Mingan)	1998	.	1292	113	.
Île du Corossol	2005	.	639	329	1659
Île Nue de Mingan	1996	5	6900[4]	219[4]	92
Refuge de baie des Loups	2005	.	263	119	.
Refuge de Betchouane	2005	.	502	78	73
Refuge de Saint-Augustin	2005	275	551	43	.
Refuge de Watshishou	2005	27	416	88	.
Refuge des îles aux Perroquets	2005	621	85	53	7
Refuge des îles Sainte-Marie	2005	.	103	85	258
Anticosti Island —					
Cap Tunnel	2004	.	.	.	420
Falaise aux Goélands	2004	.	.	.	15870
Pointe du Renard	2004	.	3	.	304
Îles-de-la-Madeleine —					
Île Brion	2007	.	.	1	1890
Île d'Entrée	2007	.	4	1	2307
Île Shag	2007	.	4	14	355
Île du Chenal (Grande-Entrée lagoon)	2007	.	196	549	.
Le Cap du Sud-Ouest	2007	.	8	2	511
Rocher aux Oiseaux	2007	.	.	2	1889

[1] Colonies with ≥125 pairs of Ring-billed Gulls, Herring Gulls, Great Black-backed Gulls, or Black-legged Kittiwakes.
[2] A "." indicates the species was not nesting at this colony during this census.
[3] Censused in 2004.
[4] A census in 2008 by Parks Canada personnel found 0 pairs.

Table 10

Estimated number of Ring-billed Gull, Herring Gull, Great Black-backed Gull, and Black-legged Kittiwake pairs in the principal gull colonies[1] in the St. Lawrence River and Estuary, Québec, 2001–2007

Colony	Year censused	Ring-billed Gull	Herring Gull	Great Black-backed Gull	Black-legged Kittiwake
Barrage de Beauharnois	2006	10016	.[2]	.	.
Battures aux Loups Marins	2006	2359	493	55	.
Île à Durand	2006	430	226	2	.
Île aux Pommes	2001	.	385	286	125
Île Bicquette	2007	.	482	259	350
Île Brûlée	2006	60	284	24	.
Île de Bellechasse	2006	374	337	10	.
Île de la Corneille	2006	.	278	11	.
Île de la Couvée	2006	9293	.	1	.
Île Deslauriers	2006	51000	11[3]	3[3]	.
Île du Moulin	2007	1375	.	.	.
Île Laval	2006	500	278	45	2555
Île Patience	2006	.	529	11	.
Île Rouge	2006	2363	722	122	.
Îles Brothers	2006	.	516	7	.
Îlet à Lefebvre	2006	13409	.	.	.
Îlet aux Alouettes	2001	.	385	82	.
La Grande Île	2006	.	453	21	.
Le Gros Pèlerin	2006	.	790	7	84
Le Gros Pot	2006	.	337	17	.
Le Pèlerin du Jardin	2006	.	363	23	.
Le Pilier de Pierre	2006	7255	104	15	.
Le Pot du Phare	2006	.	606	25	.
Les Rochers	2006	.	271	87	.
Les Trois Soeurs (Ragueneau)	2006	.	384	43	.
Terrain du Versant-Nord	2007	500	.	.	.
Trois-Rivières	2006	1000	.	.	.

[1] Colonies with ≥125 pairs of Ring-billed Gulls, Herring Gulls, Great Black-backed Gulls, or Black-legged Kittiwakes.
[2] A "." indicates the species was not nesting at this colony during this census.
[3] Censused in 2008.

Of the 16 colonies along the St. Lawrence River and Estuary, 14 had ≥60 pairs (Table 10) while the other two were very small in size (5 pairs at Îles Mud Pie in 2007 and 10 pairs at Îlets du lac St-Pierre in 2006). Furthermore, 7 of the 16 colonies have been active in each year that a triennial survey has been conducted since its inception in the early 1990s (P. Brousseau, CWS, pers. comm.; Figure 31), and in each survey-year these 7 colonies comprised 72–93% of all Ring-billed Gulls in the St. Lawrence River and Estuary. There is no clear trend among these colonies: 4 have been slowly but consistently increasing in size since 1991 while two have been decreasing (Figure 31). Since the start of these triennial surveys, the overall population of Ring-billed Gulls in Québec has declined from 125,000 pairs in 1990–1991 to 100,000 pairs in 2006, which corresponds to an annual rate of decline of 1.5%. While this decline occurred in the St. Lawrence River and Estuary, the smaller populations on the Gaspé Peninsula and Migratory Bird Sanctuaries along the Gulf North Shore have been increasing (Figure 32) (see also Rail and Cotter 2007, Cotter and Rail 2007). It must be noted, however, that the decline in the St. Lawrence River and Estuary is attributable to a control program in the 1990s at a single colony in Québec City. That single colony was estimated at 21,714 pairs in 1991 and by 1998 it had ceased to exist. Excluding this colony, the population in this region was stable, fluctuating by only ±5% of 103,000 pairs between 1991 and 2006.

Figure 31

Triennial survey estimates of breeding Ring-billed Gulls at seven colonies along the St. Lawrence River and Estuary, Québec, 1991–2006 (an "*" indicates survey carried out over two years)

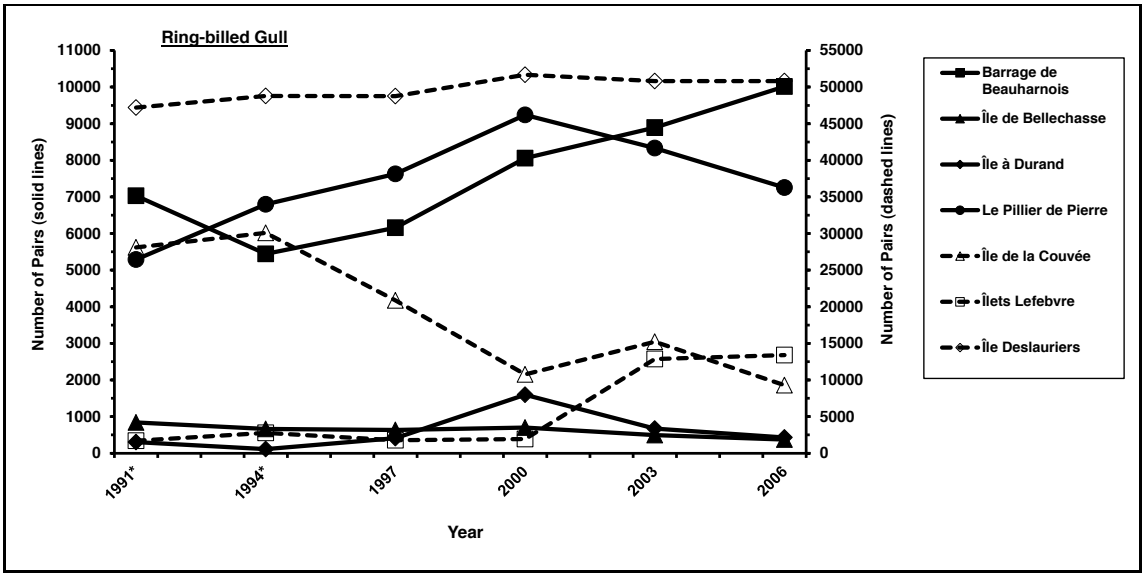
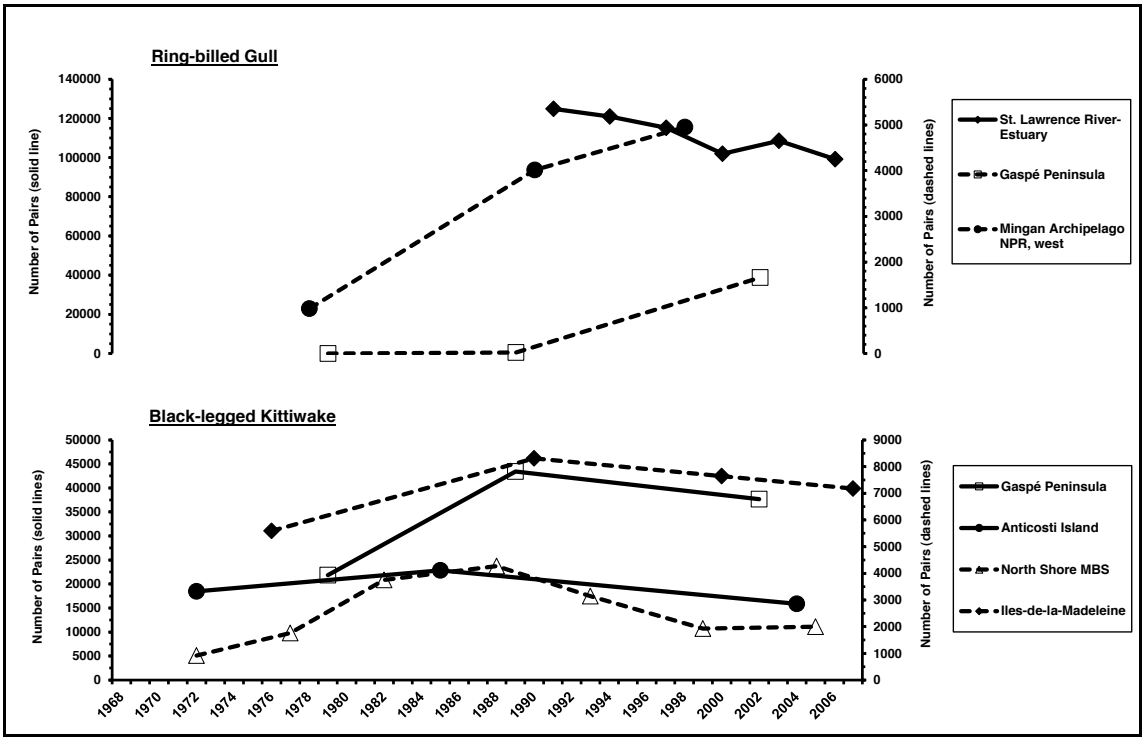


Figure 32
Population trends of the Ring-billed Gull and Black-legged Kittiwake in Québec

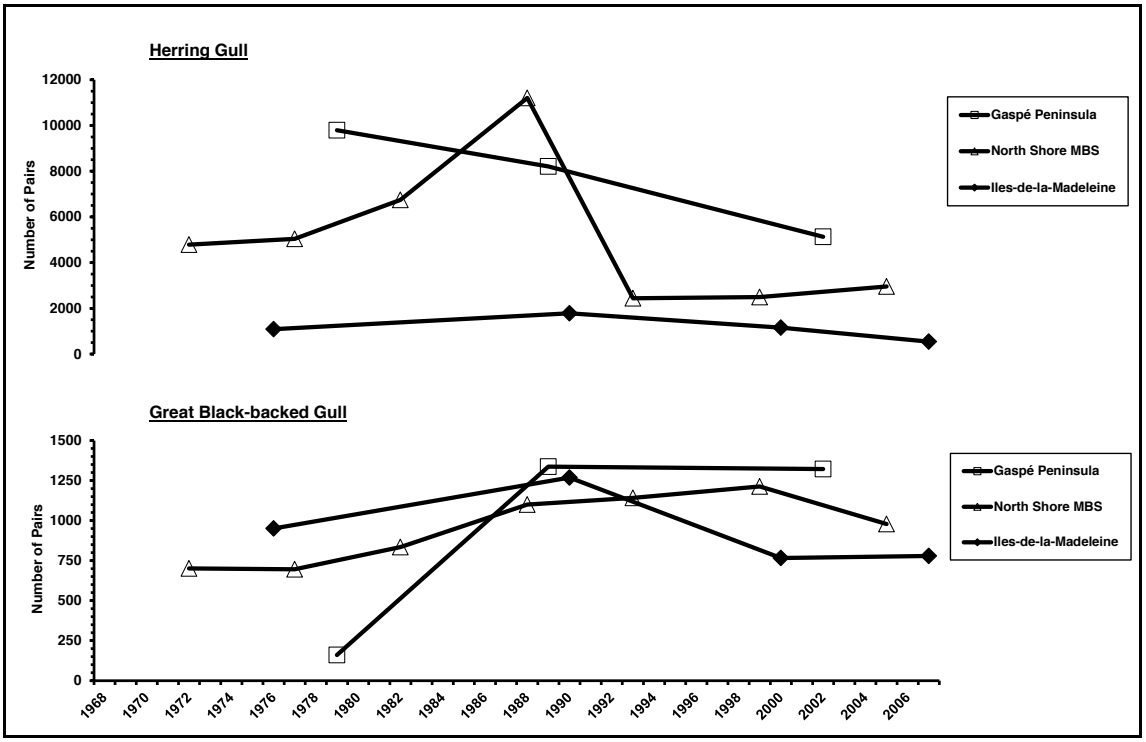


5.2.2 Herring Gull

There are approximately 31,000 pairs of Herring Gulls breeding in southern Québec, and of all gull species it is the most widely distributed in the province. There is also no single geographic region that harbours more than half of the total population; there are approximately 12,300 pairs nesting along the St. Lawrence River and Estuary in 57 colonies and 18,600 pairs in 88 colonies in the Gulf of St. Lawrence (Tables 1, 3). On average, colonies in these two regions are similar in size, with means of 216 and 212 pairs for the River and Estuary and the Gulf, respectively. In the Gulf, 69% of all pairs are found along the North Shore (12,924 pairs), 28% (5134 pairs) on the Gaspé Peninsula, and 3% (545 pairs) on Îles-de-la-Madeleine (Table 1). Of all colonies in Québec, about half (47%; 68 of 145) have ≥100 breeding pairs (Figure 30B), including two very large colonies with ≥1000 pairs: Île aux Goélands (1292 pairs) and Île Nue de Mingan (6900 pairs) (Table 9). Both of these are located within the Mingan Archipelago National Park Reserve of Canada along the Gulf North Shore. [Note: the Île Nue de Mingan colony is no longer active; a 2008 census found 0 nests (Yann Troutet, Parks Canada, pers. comm.)].

Iles-de-la-Madeleine, Gaspé Peninsula, and the Migratory Bird Sanctuaries along the Gulf North Shore each have population estimates for the Herring Gull dating back to the 1970s (Figure 33). Of all seabird species nesting on the Gaspé Peninsula, the Herring Gull is the only species to have declined between the 1979 and 1989 surveys (-1.8% annually) and again between the 1989 and 2002 surveys (-3.5% annually) (see Cotter and Rail 2007). This decline is attributable to a decline in colony size as opposed to a decline in the number of colonies; during the 2002 survey, 21 of 29 colonies had fewer pairs than in 1989 (Cotter and Rail 2007). Surveys of the Gulf North Shore Migratory Bird Sanctuaries in 1988 (Chapdelaine and Brousseau 1991) and of Îles-de-la-Madeleine in 1990 (Bourque and Richard 1992) showed higher numbers of Herring Gulls in both regions than surveys in the mid-70s. However, the Îles-de-la-Madeleine surveys in 2000 and 2007 showed declines (Rail 2009). In the North Shore Migratory Bird Sanctuaries, there was a 78% decline in the size of the population in just 5 years between 1988 and 1993. Since then the population has stabilized, with the 2005 survey finding 21% more Herring Gulls than in 1993. For all three regions, recent complete regional surveys have yielded population estimates lower than estimates from the 1970s. Combined, these regions today (2002–2007) have 59% fewer Herring Gull pairs than in 1988–1990 and 46% fewer pairs than in 1976–1979.

Figure 33
Population trends of the Herring Gull and Great Black-backed Gull in Québec



5.2.3 Great Black-backed Gull

In southern Québec, there are approximately 6500 breeding pairs of Great Black-backed Gulls. It is Québec's least abundant of the four main larid species, accounting for only 3% of the province's total gull population of nearly 215,000 pairs. Presently this species is completely absent from Anticosti Island, and in other regions it is the least common species, with the exception of Îles-de-la-Madeleine where the Herring Gull is less abundant and the Ring-billed Gull is absent (Table 1). In recent censuses, the Great Black-backed Gull was found nesting at 105 sites in the Gulf of St. Lawrence and at 59 sites in the St. Lawrence River and Estuary. Mean colony size for these two areas was similar, 39 and 41 pairs for the Gulf and the River and Estuary regions, respectively (Table 3). Only 14% (23 of 164) of colonies contained ≥100 pairs (Figure 30B) with the largest, Île du Chenal, having 549 pairs. This colony is found on Îles-de-la-Madeleine in the Grande-Entrée lagoon (Table 9). As with the Herring Gull, Îles-de-la-Madeleine, Gaspé Peninsula, and the Migratory Bird Sanctuaries along the Gulf North Shore have census data for the Great Black-backed Gull dating from the 1970s (Figure 33). From the 1970s to the late 1980s, populations increased in all three regions, in particular on the Gaspé Peninsula (23.7% annually; Cotter and Rail 2007). In the past 15 years or so, populations have remained relatively stable on the Gaspé Peninsula and in the North Shore Migratory Bird Sanctuaries, while they've declined to levels lower than in the mid-1970s on Îles-de-la-Madeleine. Combined, these regions today (2002–2007) have 17% fewer Great Black-backed Gull pairs than in 1988–1990 but 70% more pairs than in 1976–1979.

5.2.4 Black-legged Kittiwake

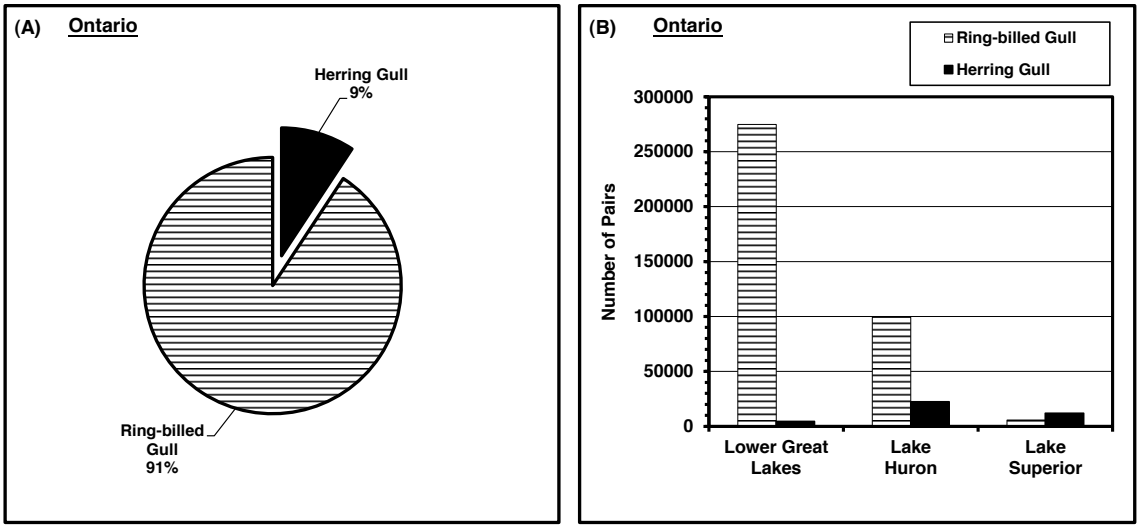
The Black-legged Kittiwake is the second most common larid in Québec, with approximately 68,000 pairs counted in recent censuses. Whereas 91% of Ring-billed Gulls in the province nest along the St. Lawrence River and Estuary, 95% of the province's kittiwakes nest along the Gulf of St. Lawrence. Although each of Québec's five coastal regions has breeding populations of Black-legged Kittiwakes, the Gaspé Peninsula (37,649 pairs in 2002) and Anticosti Island (16,642 pairs) together account for 80% (Table 1; Figure 30A). Of all colonies in Québec, about half (29 of 57 colonies) have 100 or more breeding pairs (Figure 30B), including three very large colonies with ≥10,000 pairs: Presqu'Île de Forillon and Bonaventure Island on the Gaspé Peninsula and Falaise aux Goélands on Anticosti Island (Table 9). These 3 colonies are the largest in all of eastern Canada and account for 70% and 39% of Québec's and eastern Canada's total kittiwake population, respectively. Overall, colonies are much larger in the Gulf than in the River and Estuary—mean colony size was 1436 pairs (n=45 colonies) in the Gulf and 301 pairs in the River and Estuary (n=12 colonies)

(Table 2). Trends from four regions in Québec that have been censused since the 1970s show that, for each region, Black-legged Kittiwake numbers initially increased (i.e., from surveys in the 1970s to surveys in the late-1980s/early 1990s) (see also Chapdelaine and Brousseau 1989) and then decreased to this decade to close to 1970s levels (Figure 32).

5.3 Ontario—Great Lakes system

Combining all four larid species in eastern Canada, slightly over half (53%) nest in Ontario. One species, the Ring-billed Gull, however accounts for 91% of Ontario's total breeding gull population of 418,980 pairs, with an estimated 380,163 pairs nesting in 1999–2000 (Table 1; Figure 34A). Ontario's Great Lakes population of Ring-billed Gulls represent nearly half (48%) of all gulls in eastern Canada. Ontario also has a sizable population of Herring Gulls with 38,781 pairs, which is slightly larger than Québec's and Newfoundland and Labrador's (Table 1). On the Great Lakes system, these two species usually nest alongside each other (Weseloh 2007c). The Great Black-backed Gull occurs in very low numbers in Ontario (36 pairs in 1999–2000), and the Black-legged Kittiwake is completely absent from the province.

Figure 34
In Ontario, the proportion (%) of each gull species of the province's total breeding gull population (A) and the number of breeding pairs of each species by waterbody (B)

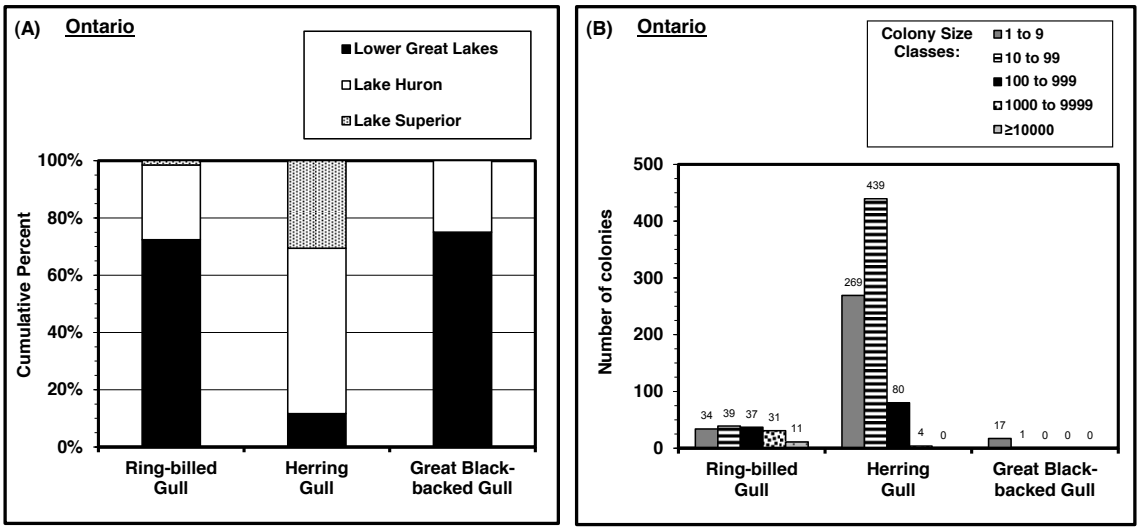


During the 1999–2000 census of the Great Lakes and associated waterways, the Lower Great Lakes system (encompassing Lakes Erie and Ontario as well the Detroit, Niagara, and St. Lawrence Rivers) harboured 72% (274,925 pairs) of Ontario's Great Lakes Ring-billed Gulls, while Lake Huron (including Georgian Bay and the North Channel)

accounted for 26% and Lake Superior only 2% (Figures 34B, 35A). For the Herring Gull, however, Lake Huron is the most important waterbody with 58% (22,389 pairs) of the total population, while Lake Superior and the Lower Great Lakes system each encompassing approximately 31% and 12%, respectively (see also Morris et al. 2003, 2009). While the Ring-billed Gull has recently extended its range eastward into the Maritimes, the Great Black-backed Gull has only recently expanded westward into Ontario. The first record of nesting in this province was in 1954 (Krug 1956 cf. Weseloh 2007a), and since then the species has slowly expanded and increased its numbers. This is exemplified from the number of atlas squares in which it was recorded in the first and second atlases of the province. The first, conducted from 1981 to 1985, recorded the species in 15 atlas squares (Blokpoel 1987) while during the second, conducted from 2001 to 2005, it was found in 38 squares (Weseloh 2007a). Unfortunately in 2004–2006 there was a die-off of Great Black-backed Gulls in the Great Lakes due to an outbreak of Type E botulism, and in 2007 the number of breeding pairs was likely considerably lower than the 36 pairs counted in 1999–2000 (Weseloh 2007a). In the 1999–2000 census, only 3 sites (all in Lake Ontario) had >2 nesting pairs: Pigeon Island (11 pairs), Scotch Bonnet Island (5 pairs), and Gull Island (3 pairs).

Figure 35

In Ontario, for each gull species the proportion (%) of its total breeding population by region (A) and the frequency of colony size classes (number of pairs) by species (B)



5.3.1 Ring-billed Gull

In the Great Lakes system, 60% (227,622 of 380,163 pairs) of all Ring-billed Gulls breed in five areas of the Lower Great Lakes: Tommy Thomson Park, Presqu'ile Provincial Park, Fighting Island, Port Colborne, and Hamilton Harbour (Table 11).

Table 11

Estimated number of Ring-billed Gull and Herring Gull pairs in the principal gull colonies[1] in Ontario, 1999–2000

Waterbody	Colony	Ring-billed Gull	Herring Gull
Lake Superior	Buck Island	.[2]	305
	Granite Island	4234	195
	Hare Island	.	261
	Island W of Chene Island[3]	2	407
Lake Huron	North Channel		
	Batture Island	6741	86
	Egg Island	6638	79
	Elm Island	5083	37
	Gertrude Island	9586	154
	Mouse Island	11	440
	Susanne Island	2838	22
	Georgian Bay		
	Barrier Island	1322	1064
	Cherry Island	2863	42
	Island 0.5 km SE of Eshpabekong I.	7289	7
	N island of South Limestone Islands	6489	27
	North Island	.	253
	Nottawasaga Island	1741	2380
	Papoose Island	10578	132
	Snake Island and NW shoal	116	373
	Main Body		
	Basswood Island (Deadman's Island)	.	274
	Chantry Island	7440	3457
	Island NW of Burke Island	.	357
	Mad Reef	3667	196
	McCallum Island	2788	107
	W island of the Argyle Islands	7624	122
Lower Great Lakes	Detroit River		
	S end of Fighting Island	45510	206
	Lake Erie		
	East Sister Island	.	425
	Middle Island	.	1067
	Middle Sister Island	.	511
	Mohawk Island	2382	253
	Port Colborne[4]	41370	233
	Lake Ontario		
	Hamilton Harbour[5]	23590	113
	Presqu'ile Provincial Park[6]	57699	213
	St. Mary's Cement, Bowmanville	13710	11
	Tommy Thomson Park[7]	59453	111
	St. Lawrence River		
	Bergin Island	4209	3
	Island S of 31G006 (E of Strachan I)	9541	37
	McNair Island	6831	4
	Strachan Island	4190	10

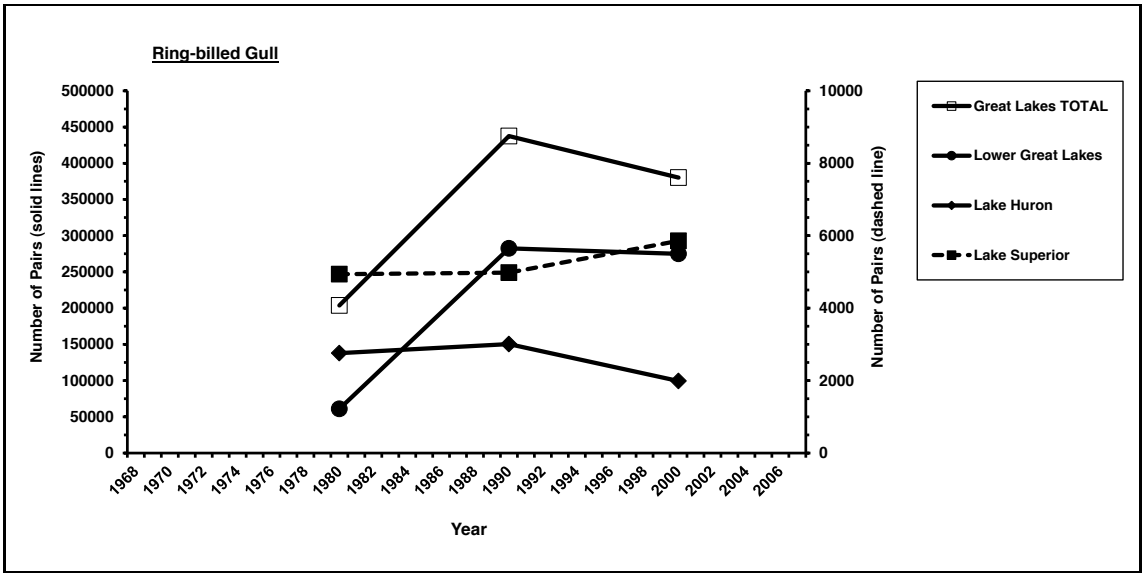
[1] Colonies with ≥1250 pairs of Ring-billed Gulls or ≥125 pairs of Herring Gulls.
[2] A "." indicates the species was not nesting at this colony during this census.
[3] In the extreme eastern end of Lake Superior at Sault Ste. Marie, Ontario.
[4] Includes mainland and breakwall sub-colonies.
[5] Includes the following subcolonies: Eastport piers 26 & 27; Windermere Basin; North, Centre and South islands.
[6] Includes Gull and High Bluff Islands.
[7] Toronto Harbour–includes the following sub-colonies: peninsulas A, B, and C, Endykement and Endykement Tip.

The Tommy Thomson Park is located on the City of Toronto waterfront, and in 1999 had 59,453 pairs nesting in a number of sub-colonies (3 subcolonies had ≥10,000 pairs). This park is located on a man-made peninsula, known as the Leslie Street Spit, which extends five km into Lake Ontario and is over 500 hectares in size. Presqu'ile Provincial Park had 57,699 pairs in two colonies, one on Gull Island (38,981 pairs) and one on High Bluff Island (18,718 pairs). Fighting Island, located in the Detroit River, is the largest single colony in Ontario, with 45,510 pairs. Port Colborne, situated on Lake Erie, had 37,637 pairs nesting on the mainland and 3733 pairs on the breakwall, for a total of 41,370 pairs (Table 11). In Hamilton Harbour, at the west end of Lake Ontario, 23,590 pairs nested in a number of sub-colonies in 1999; two of these sub-colonies individually had ≥10,000 breeding pairs. There were two additional colonies, in Ontario, with ≥10,000 breeding pairs, one on Lake Ontario and one in Georgian Bay, on Lake Huron (Table 11). The largest colony on Lake Superior was on Granite Island, with 4234 pairs (Table 11). Though there were several very large colonies, about half (73 of 152) of the Ring-billed Gull colonies had fewer than 100 pairs (Figure 35B). Mean colony size, during the 1999–2000 census was 293 pairs (n=20 colonies) for Lake Superior, 1035 pairs (n=96 colonies) for Lake Huron, and 7637 pairs (n=36 colonies) for the Lower Great Lakes (Table 2).

The Ring-billed Gull population on the Great Lakes has increased more than 10-fold since 1960, when it was estimated at only 27,000 pairs (Ludwig 1974). In the 1960s and 1970s the population continued to increase and expand its breeding range (Blokpoel and Tessier 1986). From the 1970s to 2000 there have been three complete censuses of gulls and other waterbirds along the Great Lakes and associated waterways in Ontario, at approximately 10-year intervals: 1980 (surveys took place from 1976 to 1980), 1990 (1989 and 1990), and 2000 (1999 and 2000) (for further details see Blokpoel and Tessier 1993, 1996, 1997, and Morris et al. 2003). For the Ring-billed Gull, the overall population increased sharply in size between the 1980 and 1990 censuses (125%), but then declined slightly between the 1990 and 2000 counts (13%) (Table 12; Figure 36). In the first census (1976–80), two-thirds of all Ring-billed Gulls (128,849 pairs) nested along Lake Huron and associated waterways. This population increased 17% by 1989 but then declined 34% to 99,381 pairs in 2000, which is almost 29,000 fewer pairs than two decades earlier (Table 12). In the late 1970s, the Lower Great Lakes had half as many Ring-billed Gulls as Lake Huron, with almost 61,000 pairs. This population over the next 10 years or so grew very strongly (by 364%) and reached 282,000 pairs (see Blokpoel and Tessier 1996), or almost twice as many as in the Lake Huron system (see Blokpoel and Tessier 1997) (Table 12). And this Lower Great Lakes population, unlike the Lake Huron population, remained stable in the 1990s. The strong growth in this population between the first and second censuses was a result of an expansion in distribution, from 20 to 34 colonies, as well as an increase in mean colony size, from

3042 pairs to 8825 pairs. In this region the strongest growth in the 1980s occurred on Lake Ontario, where Ring-billed Gull numbers increased from approximately 41,000 pairs to 172,000 pairs in 1990 (Table 12). Lake Superior is the only waterbody where Ring-billed Gulls are outnumbered by Herring Gulls. Numbers of breeding Ring-billed Gull pairs on Lake Superior in each of the censuses accounted for <3% of the species' total population. Though small, this population has remained stable since the late 1970s, with about 4900 pairs in 1978, 5000 pairs in 1989 (see Blokpoel and Tessier 1993 for details), and 5900 pairs in 1999–2000 (Table 12).

Figure 36
Population trends of the Ring-billed Gull in the Great Lakes system, Ontario



5.3.2 Herring Gull

In the 1999–2000 Great Lakes waterbirds census, there were 38,781 pairs of Herring Gulls counted nesting at 792 different colonies. Unlike with the Ring-billed Gull, most Herring Gull colonies are quite small, with 89% (708 of 792) having <100 pairs (Figure 35B). Of all the colonies or sites where this species nested in 1999–2000, only four supported 1000 or more pairs: Chantry Island (the largest colony) on Lake Huron, Nottawasaga Island and Barrier Island on Georgian Bay, and Middle Island on Lake Erie (Table 11). Mean colony size from the 1999–2000 census was 37 pairs for Lake Superior (n=318 colonies), 54 pairs for Lake Huron (n=413 colonies), and 75 pairs for the Lower Great Lakes system (n=61 colonies) (Table 3). From the first to the second census, the Herring Gull population on the Great Lakes in Ontario changed very little, staying at about 42,000 pairs (Table 12; Figure 37). Between the second and third

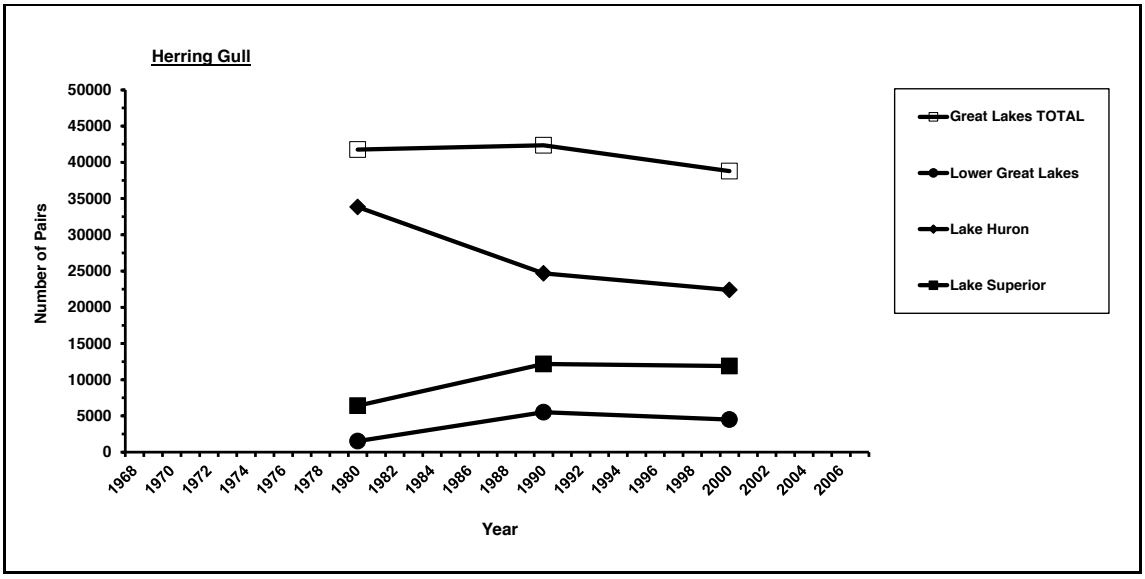
Table 12

Estimated number of Ring-billed Gull and Herring Gull pairs on Ontario's Great Lakes and associated waterways from three census periods (C1: 1976–80; C2: 1989–90; C3: 1999–00) and the percent change between censuses. (Species and waterbody totals in bold; *n*=number of colonies; census year(s) in parentheses)

Species — Waterbody	Census C1 (1976–80)	Census C2 (1989–90)	Census C3 (1999–00)	% change C1 to C2	% change C2 to C3
Ring-billed Gull —					
Great Lakes Total	**203656** *n=104*	**437604** *n=140*	**380163** *n=151*	**125**	**-13**
Lake Superior	**4935** (1978)	**4981** (1989)	**5857** (1999–00)	**1**	**18**
Lake Huron	**137886** (1978)	**150218** (1989)	**99381** (1999–00)	**17**	**-34**
Georgian Bay	47866	64969	39307	36	-39
Main Body	36375	36843	24957	1	-32
North Channel	53645	48406	35117	-10	-27
Lower Great Lakes	**60835** (1976–77)	**282405** (1990)	**274925** (1999)	**364**	**-3**
Detroit River	0	34021	45950	100	35
Lake Erie	14730	48208	43988	227	-9
Lake Ontario	40787	171712	155457	321	-9
Niagara River	400	400	317	0	-21
St. Lawrence River	4918	28064	29213	471	4
Herring Gull —					
Great Lakes Total	**41779** *n=569*	**42358** *n=757*	**38781** *n=791*	**1**	**-14**
Lake Superior	**6409** (1978)	**12181** (1989)	**11895** (1999–00)	**90**	**-19**
Lake Huron	**33845** (1980)	**24670** (1989)	**22389** (1999–00)	**-27**	**-11**
Georgian Bay	17036	13747	10670	-19	-22
Main Body	11161	7151	7254	-36	1
North Channel	5648	3772	4465	-33	18
Lower Great Lakes	**1525** (1976–77)	**5507** (1990)	**4497** (1999)	**261**	**-18**
Detroit River	48	195	207	306	6
Lake Erie	1085	4203	2884	287	-31
Lake Ontario	309	907	1174	194	29
Niagara River	38	104	88	174	-16
St. Lawrence River	45	98	144	118	47

censuses, however, it declined 8% to nearly 39,000 pairs. In each census Lake Huron and associated waterways, in particular Georgian Bay, had the largest population of breeding Herring Gulls. While the overall Great Lakes population did not change substantially between the first and second censuses, the Lake Huron population declined 27%. This decline was offset by strong increases on Lake Superior (+90%) and the Lower Great Lakes system (+261%) (Table 12). The decline on Lake Huron continued through the 1990s, with their being 9% fewer pairs in 1999–2000 than in a decade earlier. A decline also occurred on Lake Superior (-2%) and the Lower Great Lakes system (-18%) (Table 12).

Figure 37
Population trends of the Herring Gull in the Great Lakes system, Ontario



6 Discussion and Summary

The history of the Ring-billed Gull in eastern Canada is one of perseverance. In the 1800s this gull nested across much of North America in a belt from the prairies to the Atlantic seaboard, but human settlement, egging, and plumage exploitation took its toll and by the end of the century there were but two small disjunct populations remaining, one on the prairies in western Canada and United States, and the second was comprised of small isolated colonies in Labrador, Québec (James Bay, North Shore of the Gulf of St. Lawrence), and possibly Ontario (Georgian Bay) (Blokpoel and Tessier 1986, Ryder 1993). This species benefited greatly from the protective measures of the Migratory Birds Convention signed in 1916 by Canada and the United States. In the second quarter of the 20th century the Ring-billed Gull had re-established itself firmly on the Great Lakes and grew strongly there over the next 50 years: 3000 pairs in 1930, 35,000 pairs in 1945, 325,000 pairs in 1967, and 648,000 pairs in 1984 (all estimates for Canada and United States portions combined) (Ludwig 1974, Blokpoel and Tessier 1986). By the 1950s this growing population began expanding eastward, with first nesting records as follows: Québec – Montreal, 1953, Gaspé Peninsula, 1989 (Brousseau 1996a); New Brunswick, 1965; Prince Edward Island, 1974 (Lock 1988). As on the Great Lakes, populations in eastern Canada grew strongly through the 1970s and 1980s. The large populations of the Great Lakes in Ontario and St. Lawrence River in Québec, however, appeared to have peaked by the end of this decade (1980s); in the 1990s the Canadian Great Lakes population and Québec's St. Lawrence River population declined 13% and 18%, respectively. In the 2000s, censuses have shown that the St. Lawrence River population in Québec has remained stable, while the smaller populations of the Gaspé Peninsula, Gulf North Shore (Mingan Archipelago NPR), Prince Edward Island, New Brunswick, and Newfoundland have all continued to grow strongly. The species' adaptability with respect to nesting sites and food sources (e.g., grain, mice, eggs, insects as well as scavenging in garbage dumps) is undoubtedly an important factor behind its strong population growth. Nevertheless, Blokpoel and Tessier (1986) observed that by the early 1980s natural nesting habitat was getting scarce on the Lower Great Lakes, and they concluded that because of its adaptability, food would not likely ever be a limiting factor to population growth, nor would diseases, pollution, and predation over the long-term. Conflicts with man, however, have led to artificial control of certain populations, in particular the very large

populations along the Great Lakes and St. Lawrence River. These programs have arisen in response to agricultural crop damage as well as nuisance (garbage dumps) or hazard problems in municipal and industrial areas (in particular health concerns and hazards to aircrafts) (Blokpoel and Tessier 1986). The latter were the principal reasons behind implementing a program in the 1990s to eliminate a colony (22,641 pairs in 1992) in an industrial yard in Québec City (Brousseau 1997). The next census of the Great Lakes and St. Lawrence River will tell us if these areas have reached their carrying-capacity for this species, as the 2000 census suggests. In eastern Québec and Atlantic Canada, however, there is still room for the population to expand, in size and area; for example, there is still not an active colony in the province of Nova Scotia. The outlook for this gull, it would seem, appears positive.

After the Ring-billed Gull, the Herring Gull is the second most abundant larid breeding along shoreline and coastal areas of eastern Canada. Unlike Ring-billed Gulls which breeds mostly along the Great Lakes in Ontario and the St. Lawrence River in Québec (i.e., freshwater), this gull is relatively evenly distributed in terms of numbers among Ontario, Québec, the Maritime provinces, and Newfoundland and Labrador. That said, about two-thirds of Herring Gulls breed along saltwater and only one-third along freshwater, reflecting the greater amount (length) of marine coastline available (see also Erskine 1992, Brousseau 1996b, Weseloh 2007d). Of the 16 subregions covered by this report (Table 1), over half (53%) of all Herring Gulls breed in just three: insular Newfoundland (25% of total population), Lake Huron (17%), and the Bay of Fundy in New Brunswick (11%). In North America, this widely distributed species reached very low numbers by the end of the 19th century due to egging and feather exploitation, but rebounded back strongly in the 20th century after protection was afforded to it and other gulls by the Migratory Bird Convention of 1916 (Pierotti and Good 1994). In eastern North America, populations increased rapidly between the 1930s and 1960s, and then in many areas stabilized through the 1970s and 1980s as food supply became a problem in many areas (closure of municipal dumps, forage fish stocks destroyed due to over-fishing) (Pierotti and Good 1994). The artificial food source derived from the cod *Gadus morhua* fishery (fish offal and discards) also dried up after this fishery collapsed, which may have contributed to regulate gull populations (Chapdelaine and Rail 1997). In eastern Canada, the trend was similar across provinces; in the 1970s and 1980s most Herring Gull populations grew (NL: Witless Bay colony doubled in size; NS: maincoast increased 58%; PEI: increased >10% per year; QC: Îles-de-la-Madeleine and Gulf North Shore MBS increased). Only Ontario's Great Lakes population remained stable in the 1980s, and Québec's Gaspé Peninsula population actually declined during this decade. In the 1990s populations everywhere declined, although in the Migratory Bird Sanctuaries along Québec's Gulf North Shore, which are surveyed every 5–6 years,

after a very substantial decline (78%) between 1988 and 1993, populations have since remained stable (Rail and Cotter 2007).

Of the four principal larid species covered by this report, the least abundant is the Great Black-backed Gull. It is largely restricted to Atlantic Canada (79% of total population), in particular Newfoundland and the East Coast of Nova Scotia. Although in Atlantic Canada there are over twice as many nesting Herring Gulls as Great Black-backed Gulls, the latter is more widespread, that is, in the censuses Great Black-backed Gulls were recorded nesting at 581 sites while Herring Gulls at only 440 sites. These two species often nest in the same colony; in Atlantic Canada, 266 sites (or 60% of all Herring Gull colonies) had both species while in Québec, 128 sites (or 88% of all Herring Gull colonies) had both species. As observed in other gull species, the North American population of the Great Black-backed Gull suffered a drastic decline in the 19th century due to exploitation but then recovered in the 20th century as a result of legal protection and abundant food resources, in particular garbage dumps and fisheries waste (Good 1998). Since the 1970s in eastern Canada, the trend for most provinces of this gull is similar to that for the Herring Gull, that is, most populations increased in the 1970s to mid-1980s and then declined or remained stable up to the 2000s. Populations in Nova Scotia, Prince Edward Island, Îles-de-la-Madeleine, Gaspé Peninsula, and in the Migratory Bird Sanctuaries of the Gulf North Shore (Québec) all grew strongly in the first period and then the easternmost three regions (Nova Scotia, Prince Edward Island, and Îles-de-la-Madeleine) suffered strong declines while the populations in the other two regions remained stable. Although the population on Îles-de-la-Madeleine fell by 40% in the 1990s, it changed little in size (+2%) between the 2000 and 2007 censuses (Rail 2009). Census data from Newfoundland's Witless Bay suggest a trend similar to that observed elsewhere in Atlantic Canada. In New Brunswick, encouragingly, in the Bay of Fundy there were nearly three times more Great Black-backed Gulls nesting in 1998 than in 1979.

Unlike its 3 larger cousins, the Black-legged Kittiwake does not nests on the ground nor typically as single pairs but only in colonies located on cliffs (Baird 1994). The latter fact is undoubtedly one of the reasons for its relatively restricted range; it has the fewest number of colonies of the 4 species and 88% of its population breeds in only 3 regions: Anticosti Island, Gaspé Peninsula, and Newfoundland. In the Maritimes the Black-legged Kittiwake is absent from Prince Edward Island while Nova Scotia and New Brunswick have a combined population of about 750 pairs (<1% of total population). In Québec, from the 1970s to about 2000, population trends among regions were similar, that is, increases during the 1970s and 1980s and then declines in the 1990s to levels near 1970s levels. In the 2000s, however, the population trend was rather stable on Îles-de-la Madeleine (6% decline between 2000 and 2007) and in the Migratory Bird

Sanctuaries along the Gulf North Shore (4% increase between 1999 and 2005). In Newfoundland, possibly the largest ever colony of the species in Canada, Great Island in Witless Bay (~23,500 pairs), changed in size by only 2% (an increase) between censuses in 1968 and 1994. However, a census in 2005 recorded 64% fewer nesting pairs there than a decade earlier. Another very large colony in this province, Baccalieu Island, also suffered a sizable decline, between 1983 and 2003 its numbers fell by 50%. The moderately-sized colony on Gull Island (Witless Bay) declined in size by 25% between 1969 and 2001, but has since increased slightly (3% in 2006). Interestingly, while some of the largest colonies have declined small colonies in Newfoundland have all appeared to have increased in size in the last twenty years. Notably the colonies that have increased in Newfoundland tend to be mainland cliff-nesting sites where relatively few other species nest, while the large declines have been noted at major seabird colonies where 100,000s of auks and other large gulls also nest in relative abundance. Predation of kittiwakes chicks by large gulls was shown to be an important driver of reproductive success in Witless Bay, since the decline of the groundfish fishery and the delayed arrival of capelin inshore (Regehr and Montevecchi 1997, Massaro et al. 2000) and on the North Shore of the Gulf of St. Lawrence (Rail and Chapdelaine 2004).

In conclusion, using census data up to and including 2007, there are about 790,000 breeding pairs of gulls and kittiwakes in eastern Canada. In broad terms, trends for all four species are similar: sharp decline in the 19th century due to overharvesting (eggs, feathers), strong recovery in the first half of the 20th century after the introduction of legal protective measures, population growth and expansion in the 1970s and 1980s as new artificial habitats were created and food resources were abundant (human refuse, forage fish stocks, fish offal and discards), and, with the exception of the Ring-billed Gull in eastern Québec and Atlantic Canada, declines in the 1990s as food resources became scarcer (closure or changes to municipal dumps, overfishing of forage fish stocks, collapse of cod fishery) and in certain areas due to control programs because of conflicts with man in urban areas or to decrease gull predation on other species, in particular terns. Encouragingly, recent censuses (in the 2000s) show a stabilization or even slight increase for many populations: Ring-billed Gull in New Brunswick and along the St. Lawrence River and Estuary in Québec, Herring Gull along the Gulf of St. Lawrence in New Brunswick and in the Migratory Bird Sanctuaries along Québec's Gulf North Shore, Great Black-backed Gull along the Gulf of St. Lawrence in New Brunswick and on Îles-de-la-Madeleine, and Black-legged Kittiwake in Îles-de-la-Madeleine, Migratory Bird Sanctuaries along Québec's Gulf North Shore, and Great Island (Witless Bay) in Newfoundland. Nevertheless, some populations have continued to decline and for others census data are lacking. Monitoring of the gull and kittiwake populations in eastern Canada is necessary to guide management decisions of these populations.

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Appendix
Summary of survey methods and years

PROVINCE Waterbody	Species[1]	Region	Reference(s)	Survey type	Survey year(s)	Colony(ies)
NEWFOUNDLAND AND LABRADOR						
East Coast –Labrador	GBBG/BLKI	Gannet Islands	Robertson and Elliot 2002	Nests counted from a boat or from the ground	1999	Gannet Clusters; Outer Gannet I.
	GBBG	Groswater Bay	Robertson et al. 2002	Ground count of all nests; conducted post-hatch	2002	All colonies
	GBBG/HERG	Labrador	Chaulk (data file)	Ground count of nests; conducted during Common Eider (*Somateria mollissima*) study (see Chaulk et al. 2005a, b)	1998–2002	Complete count: Hopedale, Makkovik, and Nain; Partial count: St. Peter's Bay and Northwest River; Mix of complete and partial counts: Rigolet
–Newfound-land	GBBG/HERG	Witless Bay Seabird Ecological Reserve	Robertson et al. 2001	Ground count of all nests	2000	Gull, Great, and Pee Pee Islands
	ALL	Region-wide (NOTE: excludes 6 colonies of St-Pierre-et-Miquelon, France)	Boyne et al. 2011	Aerial survey (Cessna 185); counts limited to size categories: small colonies with 1–100 individuals (=25 pairs); medium, 101–500 individuals (=125 pairs); large, 501–1000 individuals (=375 pairs); very large, >1000 individuals (=500 pairs)	2000–2002	All colonies of insular Newfoundland, except Belle Isle and Seabird Ecological Reserves at Witless Bay, Cape St. Mary's, Funk Island, and Baccalieu Island
	ALL	Region-wide	Robertson (data file)	Ground count of all nests	2000–2006	Select colonies. NOTE: Cape St. Mary's surveyed in 1979
	RBGU	Northern Peninsula	Robertson (data file)	Ground count of all nests	2005	Mutton Island
NOVA SCOTIA						
Bay of Fundy	GBBG/HERG	Annapolis, Digby, and Kings Counties	Boyne and Beukens 2004	Aerial survey (Cessna 172) with visual estimate of number of individuals multiplied by correction factor of 1.31 (obtained from aerial and ground counts of subset of colonies) to obtain number of breeding pairs	2002	All colonies
	GBBG/HERG	Colchester and Cumberland Counties	Chardine, J. (CWS; data file)	Aerial survey (Cessna) by A.R. Lock	2004	All colonies

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Gulf of St. Lawrence	BLKI	Inverness County	Chardine, J. (CWS; data file)	Aerial survey (Cessna) by A.R. Lock	2004	Gros Cap (Cheticamp I.)
	GBBG/HERG	Antigonish County	Boyne and Beukens 2004	Aerial survey (Cessna 172) with visual estimate of number of individuals multiplied by correction factor of 1.31 (obtained from aerial and ground counts of subset of colonies) to obtain number of breeding pairs	2002	All colonies
	GBBG/HERG	Antigonish County	Chardine, J. (CWS; data file)	Aerial survey (Cessna) by A.R. Lock	2004	Gooseberry I.; Grahams I.
	GBBG	Pictou County	Boyne and Beukens 2004	Aerial survey (Cessna 172) with visual estimate of number of individuals multiplied by correction factor of 1.31 (obtained from aerial and ground counts of subset of colonies) to obtain number of breeding pairs	2002	Amet I.
	HERG	Pictou County	Chardine, J. (CWS; data file)	Aerial survey (Cessna) by A.R. Lock	2004	Amet I.
East Coast	BLKI	Cape Breton County	Chardine, J. (CWS; data file)	Aerial survey (Cessna) by A.R. Lock	2004	Baleine; Flint I.
	BLKI	Lunenburg County	Boyne (data file)	—	2003	Pearl I. (Mahone Bay)
	GBBG/HERG	Guysborough, Halifax, Lunenburg, Queens, Shelburne, and Yarmouth Counties	Boyne and Beukens 2004	Aerial survey (Cessna 172) with visual estimate multiplied by correction factor of 1.31 obtained from aerial and ground counts of subset of colonies	2002	All colonies
	GBBG/HERG	Guysborough, Halifax, Lunenburg, Queens, Richmond, and Victoria Counties	Chardine, J. (CWS; data file)	Aerial survey (Cessna) by A.R. Lock	2004	All colonies
	GBBG	Halifax	Boyne (data file)	—	2002	Simmons I.

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PROVINCE Waterbody	Species[1]	Region	Reference(s)	Survey type	Survey year(s)	Colony(ies)
PRINCE EDWARD ISLAND						
Gulf of St. Lawrence	ALL	Region-wide	Boyne and McKnight 2005	Ground count of all nests	2004	All colonies
NEW BRUNSWICK						
Bay of Fundy	RBGU	Musquash/ St. George/ St. Stephen	McAlpine et al. 2005	Ground count of all nests	2004	Manawagonish I.
	BLKI	Campobello	Kehoe and Diamond 2001	Nests counted from boat; 15–20m from nesting cliffs	1999	South Wolf I.
	BLKI	Campobello	Robertson (data file)	—	2002	Whitehorse I.
	GBBG/HERG	Campobello and Musquash/ St. George/ St. Stephen	Mawhinney et al. 1999	Aerial survey (Cessna 150); corrected with ratio established from ground counts: GBBG 1.01:1; HERG 0.904:1	1998	All colonies
	GBBG/HERG	Grand Manan Archipelago	Ronconi and Wong 2003	Ground count; all nests counted on small islands while transects used on large islands and count extrapolated	2001	All colonies
	GBBG/HERG	Chignecto Bay	Robertson (data file)	—	1998	Grindstone Island
Gulf of St. Lawrence	RBGU	Region-wide	Boyne et al. 2006	Ground count of all nests	2005	Tern Island; Tracadie
	GBBG/HERG/ BLKI	Region-wide	Boyne et al. 2006	Aerial survey (Cessna 172) with counts of apparently occupied nests derived from photos	2005	All colonies
QUÉBEC						
Gulf of St. Lawrence						
–Îles-de-la-Madeleine	GBBG/HERG	Region-wide	Rail 2009	Aerial survey (B-N Islander) with counts of occupied nests derived from photos)	2007	Îlot B, Le Corp Morts, Île Shag (top surface), boat wreck (Étang-du-Nord)

Appendix
Summary of survey methods and years

PROVINCE Waterbody	Species[1]	Region	Reference(s)	Survey type	Survey year(s)	Colony(ies)
	ALL	Region-wide	Rail 2009	Boat survey (Boston Whaler) at low speed along coast; visual counts of occupied nests. For BLKI, areas of high densities counts derived from photos	2007	Île du Havre-aux-Maisons, Île du Cap-aux-Meules, Île aux Goélands, Cap du Sud, Cap du Sud-Ouest, Cap Noir, Rochers aux Oiseaux, Île Brion, Pointe-aux-Loups, Île-d'Entrée, Le Corps-Mort
	GBBG/HERG/ BHGU	Region-wide	Rail 2009; Shaffer, F. (CWS; BHGU data)	Ground count of all nests. For colonies with both GBBG and HERG, ratio of adults applied to nest count	2007	Île du Havre-aux-Maisons, Cap-aux-Meules marina, Îlots de la lagune de Havre-aux-Basques, Pointe de l'Est NWA, Île du Bassin, Îlot C
–Gaspé Peninsula	RBGU	Baie des Chaleurs	Cotter and Rail 2007	Ground count of all nests	2002	Saint-Omer
	RBGU	Baie de Gaspé	Rail (data file; Banque Informatisée des Oiseaux Marins du Québec, BIOMQ)	Ground count of all nests	2004	Pointe de Sandy Beach
	GBBG/HERG	Region-wide	Cotter and Rail 2007	Ground count or boat survey (Boston Whaler); all nests. For colonies with both species, ratio of adults applied to nest count	2002	All colonies
	GBBG/HERG	Baie de Gaspé	Rail (data file; BIOMQ)	Ground count of all nests	2006	Pointe de Sandy Beach
	BLKI	Region-wide	Cotter and Rail 2007	Boat survey (Boston Whaler) at low speed along coast; visual counts of nests. For Bonaventure I., Cap d'Espoir, and Forillon Peninsula counts derived from photos	2002	All colonies
–Anticosti Island	ALL	Region-wide	Rail (data file; BIOMQ)	Boat survey (Zodiac) at low speed along coast; visual counts of nests except for areas of high BLKI densities, where counts were derived from photos	2004	All colonies
–North Shore	ALL	CWS Migratory Bird Sanctuaries (MBS)	Rail and Cotter 2007	Ground survey; counts of nests or adults. For colonies with HERG and GBBG, ratio of adults applied to nest count	2005	All colonies

Appendix
Summary of survey methods and years

PROVINCE Waterbody	Species[1]	Region	Reference(s)	Survey type	Survey year(s)	Colony(ies)
	GBBG/HERG	Mingan Archipelago National Park Reserve (Mingan Archipelago NPR)	Roberge 2004	Ground survey; counts of nests or adults. For some colonies with HERG and GBBG, ratio of adults applied to nest count	1990	Île de la Fausse Passe, Grosse île au Marteau, Île à Bouleaux de Terre, Île à Bouleaux du Large, Île à Firmin, Île à Mouton, Île du Fantôme, Île Herbée, Île Jaune, Île Niapiskau, Île Quarry, Île Sainte-Geneviève, La Grande Île, La Grosse Romaine, La Petite Romaine, Petite île au Marteau
	GBBG/HERG	Mingan Archipelago NPR	Roberge 2004	Ground survey; count of nests; ratio of adults applied to nest count	1996	Île Nue de Mngan
	GBBG/HERG	Mingan Archipelago NPR	Roberge 2004	Ground survey; count of nests	1998	Caye à Foin, Cayes à Cochon, Cayes à Meck, Île à Calculot, Île à la Chasse, Île aux Goélands (Mingan), Île aux Oiseaux, Île aux Perroquets, Île de la Maison, Île de la Pointe aux Morts, Île du Wreck, Île Pogomo, Îlots du Petit Passage, Le Pain de Sucre, L'Îlot, Petite île Sainte-Geneviève
	BLKI	Mingan Archipelago NPR	Roberge 2004	Ground survey; count of nests	1996	Cap Ferré, Grosse île au Marteau, Île à Bouleaux du Large, Île à Firmin, Île aux Perroquets, Île du Fantôme, Île Nue de Mingan, Le Pain de Sucre, L'Îlot, Petite île Sainte-Geneviève
	RBGU	Mingan Archipelago NPR	Roberge 2004	Ground survey; count of nests	1996	Île Nue de Mngan
					1998	Île à Calculot, Île à la Chasse, Île de la Maison
					1999	Cayes à Meck, Île du Wreck, Îlots du Petit Passage

Appendix
Summary of survey methods and years

PROVINCE Waterbody	Species[1]	Region	Reference(s)	Survey type	Survey year(s)	Colony(ies)
	GBBG/HERG	Region-wide (outside of MBS and Mingan Archipelago NPR)	Rail (data file; BIOMQ)	Ground survey; count of nests	1991	Rivière de la Trinité
					1995	Cayes Joncas, Cayes Rouges, Île à la Croix (Baie-Trinité), Île Cairntorr, Île du Brisant South, Île du Grand Caouis, Île du Petit Caoui, Île Matchiatic Sud, île Upuamitukaiahtet, Îles de Ouapitagone du Large, Îles du Détroit, Îles Galibois, Îles Puzzle, Îlets Galibois, Îlot du Havre Jones, Îlot Matchiatic Ouest, Îlots d'Audubon, Îlots de la baie des Loups, Les Jumeaux, Pointe Emery, Récifs aux Cormorans, Whale Islands
					1999	Île aux Oeufs
					2005	Cayes de l'Est, Île Manowin, Îles aux Oeufs (Cap Whittle), Îlets Dequen, La Grande Basque, La Grosse Boule, La Petite Basque, La Petite Boule
	BLKI	Region-wide	Rail (data file; BIOMQ)	Ground survey; count of nests	2005	Île de Ouapitagone du Large Ouest, La Petite Boule
	RBGU	Region-wide	Rail (data file; BIOMQ)	Ground survey; count of nests	1995	Baie des Loups, Île Matchiatic Sud, île Upuamitukaiahtet, Îles du Havre de Ouapitagone, Îles Puzzle
					1996	Île du Brisant South
					1997	Îlet Sealnet, Île des Récifs Noirs
St. Lawrence River and Estuary						
	RBGU	Region-wide	Brousseau (data file; BIOMQ)	Aerial survey with counts of apparently occupied nests derived from photos	2006	Île Deslauriers
	RBGU	Region-wide	Brousseau (data file; BIOMQ)	Ground survey; count of nests	2006	All colonies
					2007	Terrain du Versant-Nord, Îles Mud Pie, Île du Moulin

Appendix
Summary of survey methods and years

PROVINCE Waterbody	Species[1]	Region	Reference(s)	Survey type	Survey year(s)	Colony(ies)
	GBBG/HERG	Region-wide	Rail (data file; BIOMQ)	Ground survey; count of nests	1990	Île à l'Oignon, Île aux Basques, Île aux Lièvres, Île Saint-Barnabé, Îles Bare, Îlets D'Amours, Îlots sud de Bicquette, Le Pilier de Bois, Récif de l'Ouest
					1995	Banc de Portneuf, Îlot de Bergeronnes
					2001	Île aux Fraises, Île aux Pommes, Île Blanche, Île Rasade Nord-Est (en-Bas), Île Rasade Sud-Ouest (en-Haut), Îlet aux Alouettes
					2003	Baie des Anglais, Baie des écluses de Sainte-Catherine, Île Deslauriers
					2004	Les récifs de Ragueneau
					2005	Caye des Oiseaux
					2006	ALL (other active colonies)
					2007	Île Bicquette, Îlot nord du pont Champlain
	BLKI	Region-wide	Rail (data file; BIOMQ)	Ground survey; count of nests	1990	Îlots sud de Bicquette
					2001	Île aux Pommes
					2004	Anse du Moulin
					2006	La Grande Caye, Ruisseau-à-Sem, Grande Caye à Brisson, Petite Caye à Brisson
					2007	Île Bicquette
	BLKI	Region-wide	Rail (data file; BIOMQ)	Boat survey (Boston Whaler) at low speed along coast	2006	Île Laval, Le Gros Pèlerin, Le Petit Pèlerin, Le Petit Pot
ONTARIO						
Great Lakes system	RBGU/GBBG	Region-wide	Weseloh (data file)	Ground survey; count of nests	1999–2000	All colonies
	HERG	Region-wide	Morris et al. 2003	Ground survey; count of nests	1999–2000	All colonies

[1] RBGU: Ring-billed Gull; HERG: Herring Gull; GBBG: Great Black-backed Gull; BLKI: Black-legged Kittiwake; ALL: all four principal larid species; BHGU: Black-headed Gull

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