Census of terns and other colonial waterbirds along the Gulf of St. Lawrence coast of New Brunswick - 2005

ANDREW W. BOYNE, BRAD E. TOMS AND JULIE MCKNIGHT

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CENSUS OF TernS AND OTHER COLONIAL WATERBIRDS ALONG THE GULF OF ST. LAWRENCE COAST OF New Brunswick - 2005

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Summary

Common Terns and other colonial waterbird colonies were identified during an aerial survey along the Gulf of St. Lawrence coast of New Brunswick on 25 May 2005. Ground visits to gull and tern colonies were made separately for nest counts during peak laying periods and aerial photographs were interpreted to obtain counts for gulls, Great Blue Herons, Double-crested Cormorants, and Black-legged Kittiwakes. Previous surveys of this area occurred in 1983 and 2000.

A total of 13283 tern nests were counted at seven colonies. Outside Kouchibouguac National Park (KCHNP), the number of tern nests increased from 5707 to 7263 and within the Park, the number of tern nests decreased from 6911 to 6020 since 2000. In 1983 it was estimated that 6065 pairs were nesting at 23 sites outside KCHNP and 6396 pairs were nesting within the Park. Although the number of colonies decreased, the population has rebounded to the level observed in 1983. The number of tern colonies outside KCHNP decreased from eleven to seven but the number of colonies in KCHNP increased as terns colonized a second site. Historical data suggest that only a few Arctic Terns nest along this shore so effort was not made to locate nesting Arctic Terns, although it is likely that a few pairs nested in the study area.

Ring-billed Gulls were identified at two colonies during the aerial survey with a total of 4366 pairs. Since 2000, this represents an increase of 822 pairs and a reduction in the number of colonies from six to two. Most of the recent growth was on Tern Island, Tabusintac where the number of nesting Ring-billed Gulls grew by 17% annually between 2000 and 2005. The annual growth rate between 1986 and 2005 was approximately 5%. Aerial photo interpretation estimated 1025 Great Black-backed Gulls and 2406 Herring Gull pairs at 17 and 12 sites, respectively. The populations of Great Black-backed Gulls and Herring Gulls have been stable or slightly increasing since 2000. The number of Herring Gulls is about half what it was in 1986, and the Great Black-backed Gull population is relatively unchanged since 1986.

Aerial photo interpretation indicated 5107 Double-crested Cormorant nests at 11 colonies. The tree-nesting colony on Heron Island was not included in this survey because of the difficulty of counting large tree-nesting cormorant colonies using aerial photography. Excluding the Heron Island colony, the population increased by 1992 nests between 2000 and 2005.

Black-legged Kittiwakes nested in four colonies with a total estimate of 379 nest sites. This is an increase since 2000, the first year the species was identified along this coast, when 97 nests were observed at a single colony.

Four colonies of Great Blue Herons were identified during aerial surveys in 2005 and the total number of nest was estimated to be 264. When nest numbers were compared by colony, there was a decrease of 69 nests among those four colonies since 2000. Inland colonies were missed by these aerial surveys and therefore no conclusions can be made about the regional population.
Resume

Un total de 13283 nids de sterne ont été comptés à sept colonies. En dehors du parc national de Kouchibouguac (KCHNP), du nombre de nids de sterne accru de 5707 à 7263 et dans le parc, le nombre de nids de sterne a diminué de 6911 à 6020 depuis 2000. En 1983 on l'a estimé que 6065 paires nichaient à 23 emplacements en dehors de KCHNP et 6396 paires nichaient dans le parc. Bien que le nombre de colonies ait diminué, la population a rebondi au niveau observé en 1983. Le nombre de colonies KCHNP extérieur de sterne a diminué d'onze à sept mais le nombre de colonies dans KCHNP accru comme sternes a colonisé un deuxième emplacement. Les données historiques suggèrent que seulement quelques sternes arctiques nichent le long de ce rivage ainsi l'effort n'a pas été fait de localiser les sternes arctiques d'emboîtement, bien qu'il soit probable que quelques paires aient niché dans le secteur d'étude.


L'interprétation de photo aérienne a indiqué 5107 nids Cormoran à aigrettes à 11 colonies. La colonie d'arbre-emboîtement sur l'ile de héron n'a pas été incluse dans cet aperçu en raison de la difficulté de compter de grandes colonies de cormoran d'arbre-emboîtement en utilisant la photographie aérienne. À l'exclusion de la colonie d'ile de héron, la population a augmenté par 1992 nids entre 2000 et 2005.

Mouette tridactyle a niché dans quatre colonies avec une évaluation totale de 379 emplacements de nid. C'est une augmentation depuis 2000, la première année où les espèces ont été identifiées le long de cette côte, quand 97 nids ont été observés à une colonie simple.

Quatre colonies de grands hérons ont été identifiées pendant des aperçus aériens en 2005 et on a estimé à que tout le nombre de nid 264. Quand des nombres de nid ont été comparés par la colonie, il y avait une diminution de 69 nids parmi ces quatre colonies depuis 2000. Des colonies intérieures ont été manquées par ces aperçus aériens et donc aucune conclusion ne peut être faite au sujet de la population régionale.
Introduction

In 1999, the Canadian Wildlife Service (CWS) started a program to census tern colonies in Atlantic Canada after recognising that many tern colonies had not been surveyed in over a decade and, for some, in as many as three decades. Since 1999, all four Atlantic Provinces have been surveyed every 4-5 years. The Gulf of St. Lawrence coast of New Brunswick was surveyed in 2000 and 2005 as part of this program; surveys focussed on Common Terns (*Sterna hirundo*), Great Black-backed Gulls (*Larus marinus*), Herring Gulls (*L. argentatus*), Ring-billed Gulls (*L. delawarensis*), Double-crested Cormorants (*Phalacrocorax auritus*), Great Blue Herons (*Ardea herodias*) and Black-legged Kittiwakes (*Rissa tridactyla*). Surveys in 2000 and 2005 followed identical methodology and timing reflected peak breeding periods for Ring-billed Gulls, Herring Gulls, Great Black-backed Gulls, and Common Terns.

The first comprehensive census for Common Terns along the Gulf of St. Lawrence coast of New Brunswick was conducted in 1983 (Lock et al., 1984). During that survey, Lock et al. counted 12461 Common Tern nests at 26 locations (although based on high numbers of empty nests at some colonies he estimated that 15500 pairs attempted to breed at the 26 colonies). In 2000, 12618 nests were counted at 11 colonies along this coast. Outside Kouchibouguac National Park (KCHNP), the 2000 survey showed a decline from 6065 pairs at 23 colonies in 1983 to 5707 pairs at 11 colonies (Boyne and Hudson, 2002). During that same time, the Tern Islands population in KCHNP increased from 6396 to 6911 pairs (Boyne and Hudson, 2002).

The first survey of gulls along the Gulf of St. Lawrence coast of New Brunswick was conducted in 1986 (Lock 1987). A subsequent survey in 2000 saw an increase of 2031 Ring-billed Gull nests to 3565, up from 1534 nests in 1986 (Boyne and Hudson, 2002). The 2000 survey showed a stable population of approximately 900 pairs of Great Black-backed Gulls and a decrease in the number of nesting Herring Gulls by more than 50% since 1986. Also in the 2000 survey, 97 pairs of Black-legged Kittiwakes were observed along with 3704 Double-crested Cormorants, and 647 pairs of Great Blue Herons.

Increased development and human activity along the New Brunswick coast, islands, and barrier beaches are a concern for Common Terns and other colonial waterbirds that rely on these habitats for reproduction. Another concern for these species is the threat of predators and, especially for terns, other colonial nesting species. Studies in Kouchibouguac National Park showed that colonizing Great Black-backed Gulls and Herring Gulls had a negative impact on Common Terns nesting in the park (Poussart et al. 1997) and increasing populations of Ring-billed Gulls were thought to be a threat to Common Terns because they are known to exclude terns from their nesting areas (Blokpoel et al., 1997).

This report summarizes the results of the 2005 surveys and relates the findings to data from previous surveys.
Methods

Aerial Counts

The Gulf of St. Lawrence coast of New Brunswick was surveyed in a fixed wing aircraft (Cessna 172, Tartan Air, Pilot: Mark Coffin) on 25 May 2005. The survey was timed to correspond with the third week of incubation of Great Black-backed Gulls and the second week of incubation for Herring Gulls. Although Common Terns had not begun to nest at the time of the survey, they were observed and recorded at colony sites to determine locations for ground surveys. Surveys in 2000 and 2005 followed identical methodology and timing reflected peak breeding periods for Ring-billed Gulls, Herring Gulls, Great Black-backed Gulls, and Common Terns.

CWS coastal blocks 331-362 (Lock et al., 1996) were surveyed at 250-320m by two observers (A.W. Boyne and J. McKnight) sitting on the same side of the aircraft (Figure 1). The northern coast of New Brunswick was flown from East to West from Baie Vert (45.9915, -63.9453) to Dalhousie (48.0619, -66.4706). Total flight time was 5.5 hours. All potential sites were surveyed regardless of previous presence of breeding seabirds. During the surveys, digital photos were taken from the plane of gull, cormorant, heron, and kittiwake colonies using a Nikon D2x digital camera with a 12.8 megapixel resolution. Photos were taken on an angle from the window of the plane because absolutely vertical photos were not possible due to the position of the landing gear. Colonies were marked as a waypoint using a global positioning system (model- Garmin GPS 76) and a written recording of location was taken for each colony. In most cases, each observer made an independent estimate of the number of individuals within the colony and the two observers mutually decided on an estimate of the species ratio of Great Black-backed Gulls and Herring Gulls. In one occurrence, one observer estimated Ring-billed Gulls while the other estimated Herring Gulls due to logistics. Tern colonies were noted wherever present, but no attempt was made to estimate colony size.

Individuals that were obviously loafing or observed in the intertidal zone were not counted. On islands with small gull colonies, total counts of individual gulls were performed; but at larger colonies, birds were counted in clusters of 5, 10 or 25. The large size of Double-crested Cormorant and Great Blue Heron nests made it possible to identify apparently occupied nest sites from the air, while for gulls it was only possible to identify apparently occupied territories (i.e., individuals or pairs spaced appropriately suggesting they are occupying a territory) from the air.

Ground Counts

Ground censuses were conducted 30 May to 2 June for gulls and 13-19 June for Common Terns. Unlike the 2000 survey in New Brunswick, gulls were surveyed earlier than terns to coincide with the last week of incubation. Tern surveys commenced one week later.
than in 2000 to ensure that peak laying was completed. Each census was undertaken by two to five researchers with the exception of one tern colony that was surveyed by two groups of four and five people, respectively at the same time due to its large size. Researchers walked parallel transects at about an arms length from each other. The outside line of each transect was flagged with standard forestry flags and each nest was marked with a wooden stir stick to avoid double counting. The flags were picked up during the census of the next transect. The tern census in KCHNP was conducted by KCHNP staff and the data were provided to us by the park. Clutch size data were not available for these colonies.

The number of eggs in each nest was recorded and, in the case of colonies with multiple species, the species occupying the nest was determined by a combination of egg size, nest location, direct observation of incubating birds, and hatching chronology. In cases where chicks had wandered too far from their nest to be obviously associated with a nest, the chick was recorded separately as a chick without an association to a nest. This did not allow us to determine clutch sizes for those nests, but did allow calculation of percent hatch for the colony. Problems associating chicks with nests only occurred for gull colonies.

Most ground-nesting cormorants were located near gull colonies and we chose not to disturb these birds due to the increased risk of egg predation by gulls.

**Photo Counts**

Aerial photographs of gull colonies were digitally interpreted using methods described in Boyne and Hudson (2002). In that survey, photos were taken using conventional film and were professionally scanned and saved to compact discs. Pictures taken during this survey were taken with a Nikon D2x 12.8 mega pixel digital camera and the images were downloaded from the camera to a 250GB external hard-drive (Accomdata™ 250GB). Photos were then interpreted using Adobe® Photoshop® 5.5. Where islands or colonies could not be captured in a single photograph, a series of photos were stitched together in Photoshop® to produce a composite image of the entire colony.

If adjacent images did not line up exactly, individuals that appeared twice were erased from the photos to avoid double counting. In the case of dense colonies, a line was drawn using landmarks and individuals were counted on opposite sides of the lines on the two photographs so that no territorial individuals (gulls) or apparently occupied nest sites (herons, cormorants, and kittiwakes) were counted twice. Each image was flattened into a single layer and the canvas size was reduced to the edges of the image in order to reduce the file size. In order to reduce file size, large areas of the photograph that had no breeding birds (e.g. water) were erased.

In Photoshop®, the composite image of a colony or the single image of an island was interpreted by marking targets (territorial individuals, apparently occupied sites) with a square array of pixels of a known size (e.g. 3x3 pixels). This was accomplished by
opening a blank layer for each species present in the colony and using the Photoshop® pencil tool and a square pencil to mark targets which we considered equivalent to pairs. The marks were made using a pure colour (e.g. pure red, pure yellow) in order to avoid any confusion when analyzing the number of pixels and a different colour was used for each species. Similar to the aerial estimates, birds that were loafing or observed in the intertidal zone in the photos were not marked and birds that appeared to be paired were marked only once. When all individuals or pairs appeared to be marked, the layer used for marking was made visible with all other layers hidden and the ‘histogram’ function was used in order to obtain a total number of pixels. This was repeated for each layer. The number of individuals was calculated by dividing the total number of pixels by the number of pixels in each square covering a target. Apparently occupied nest sites for Black-legged Kittiwakes and cliff-nesting cormorants were identified in photos by the presence of a bird on the cliff with white feces below the bird.

Corrections were made for the ground surveys that were started but not completed due to excessive disturbance, or time limitations. This was undertaken for one tern colony, and two gull colonies. Corrections were not made to other incomplete surveys which counted peripheral individuals during focused surveys for another species (i.e., counting Great Black-backed Gulls while surveying Ring-billed Gulls). The area that was surveyed was delineated on the aerial photos using notes made during the ground surveys. A correction factor was calculated and applied to the remainder of the total aerial photo estimates. The corrected value for the unsurveyed area was then added to the ground count of the surveyed area (Equation 1).

Equation 1:

\[
\text{Corrected Estimate} = \left( \frac{\text{Total Photo Estimate} - \text{Photo Estimate of Area Surveyed by ground}}{\text{Photo Estimate of Area Surveyed by ground} / \text{Incomplete Ground Count}} \right) + \text{Incomplete Ground Count}
\]

Aerial photo estimates of gull colonies were corrected by calculating the ratio of apparently occupied nest sites or territories to nests counted on the ground and applying that correction factor to the photo estimates. Aerial estimates and aerial photo estimates were corrected by dividing by the associated correction factor. Correction factors were calculated for photo counts and for aerial observers to determine which method better reflected the true population size and to determine if ground counts could be eliminated in the future with the use of correction factors.
Results and Discussion

Common Terns

Aerial surveys identified ten sites where Common Terns were potentially breeding, two of which were in Kouchibouguac National Park (Figure 2). The absence of Common Terns was noted during ground surveys at one of the nine sites (unnamed island north of Crab Island, 47.292, -64.954) thought occupied during aerial surveys. Individuals observed on that island during aerial surveys and gull ground surveys were either loafers from the nearby colony of Tern Island, Tabusintac or a colony that abandoned the site. Breeding was confirmed during ground surveys and 7263 tern nests were counted at seven colonies by CWS staff and 6020 nests were counted at two colonies in KCHNP by Parks Canada staff (Table 2). The Tern Islands (1, 2, and 3) in Kouchibouguac were considered one colony. The total number of Common Tern nests along this coast was 13283. The average clutch size at colonies outside KCHNP was 2.58 ±0.63 eggs per nests (range = 2.00 - 2.85) (Table 1).

Since 2000, the number of Common Tern nests along the Gulf of St. Lawrence coast of New Brunswick increased from 12618 to 13283 (Table 2). In 2000, only two colonies had greater than 2000 nests, but in 2005, three colonies had more than 2000 nests and two had close to 1000 nests (Table 2). In 2000, two colonies were surveyed on 8 June and 9 June and it was felt that the survey took place before peak laying. The 2005 survey occurred between 13 and 19 June, which was similar to the timing of the rest of the 2000 ground surveys. Based on clutch sizes and the proportion of empty nests, the 2005 survey appeared to take place closer to peak laying.

Historical data suggest that a only a very small number of Arctic Terns (S. paradisaea) nest among Common Terns along the Gulf of St. Lawrence coast of New Brunswick. For this reason minimal effort was made to determine the proportion of Arctic Terns in colonies. One dead Arctic Tern adult was positively identified during the survey of Tern Island, Tabusintac. Despite this finding, it is still assumed that only a small number of Arctic Terns nest along this coast among the more numerous Common Terns.

Tern Islands, KCHNP is the only managed tern colony along the Gulf of St. Lawrence coast of New Brunswick and it supported more than half of the tern nests along that coast in 2000. In 2005, the number of Common Terns nesting in KCHNP decreased from 6911 nests to 6020 nests, but the birds were spread across two colonies. Outside of KCHNP, the number of tern nests increased from 5707 to 7263 (5% annual growth between 2000 and 2005). A 1983 survey found 6065 pairs nesting at 23 sites (Lock et al., 1984) outside of KCHNP on the Gulf of St. Lawrence coast. Although the number of colonies has declined, the population is now larger than the 1983 estimate.

Boyne and Hudson (2002) were concerned that the two tern colonies south of KCHNP supported less than 25 pairs in 2000, which was a major decline from the 1983 surveys that found six colonies supporting over 300 pairs (Lock et al., 1984). The 2005 survey
also only found two colonies south of KCHNP, but these supported 129 nests, with 121
nests at Shediac Bay Yacht Club. The observed increase since 2000 may only be
temporary, however, because the managers of the Shediac Bay Yacht Club are working
to make the sunken barge that offered habitat to breeding Common Terns unsuitable for
nesting to reduce interactions with humans (i.e., dive-bombing boaters).

Ring-billed Gulls

Ring-billed Gulls were identified at two colonies during aerial surveys in 2005 and both
sites were visited during ground surveys (Figure 3). The aerial visual estimate for the two
colonies were 2000 for Tracadie Sand Spit and 1900 for Tern Island. The total number of
apparently occupied territories identified on aerial photos was 3947, and during ground
counts, 4367 nests were counted at these two sites (Table 3). The mean clutch size was
2.71 ± 0.61 and at the time of the survey, 1% of the eggs had hatched (Table 3). On Tern
Island, Tabusintac the colony was separated into two sub-colonies that were less than
100m apart.

The number of Ring-billed Gull colonies declined from six in 2000 to two in 2005 (Table
4). Despite this decline, the overall number of apparently occupied nest sites of Ring-
billed Gulls estimated from aerial photos increased by 403, from 3544 in 2000 to 3947 in
2005. Comparisons of ground counts could not be done because ground counts were not
conducted in 2000.

In 2005, Bathurst Harbour Island # 3 (47.633, -65.647) was observed from a boat during
ground surveys of gulls and this visit confirmed the absence of Ring-billed Gulls as
indicated by the aerial survey. The absence of nesting Ring-billed Gulls was also
confirmed by air at Maisonette Dune, Fox Dens Beach, and Heron Island. Only half of
Fox Dens beach was visited from the ground, but the incomplete ground survey and the
aerial surveys indicated that Ring-billed Gulls were not nesting there. Other gulls were
breeding at the sites where Ring-billed Gulls had nested in 2000 so competition for
resources could be a factor in the reduction of breeding sites.

A survey in 1986 found 1534 Ring-billed Gull nests (Lock, 1987). Over the 14-year
period between the 1986 and 2000 surveys, there was an average annual population
growth of 6%. Between 1986 and 2005, the population of Ring-billed Gulls underwent an
average annual growth rate of 5%. Comparison of aerial photo estimates from 2000 and
2005 indicate an annual growth rate of 2%. However, the Ring-billed Gull colony on
Tern Island, Tabusintac increased at a growth rate of 17% per year since the 2000 survey,
from 843 nests to 1900 nests (aerial visual estimates).
Herring and Great Black-backed Gulls

Herring Gulls were observed nesting at 11 sites in 2005 (Figure 4). Aerial photo interpretation estimated 2406 Herring Gull nests (Table 5). Ground counts at seven of those sites estimated a total of 241 Herring Gull nests (Table 6). The mean clutch size of Herring Gulls was 2.09 ± 0.63 (range: 1.00 - 2.75) and 1% of the eggs had hatched at the time of the survey (Table 6).

Great Black-backed Gulls were identified nesting at 16 sites in 2005 (Figure 5). The total number of apparently occupied Great Black-backed Gull territories estimated from aerial photos was 1025 (Table 5). Ground counts at nine sites found 329 nests; the largest colony occurred at Fox Dens Beach and the smallest colony that was completely surveyed had 20 nests (Tern Island, Tabusintac and Tracadie Spit Tip had fewer nests but the surveys were incomplete; Table 7). The mean clutch size for Great Black-backed Gull nests was 2.35 ± 0.72, and 29% of eggs had hatched at the time of the survey, suggesting that incubation was nearing completion for most pairs (Table 7).

To obtain more precise estimates of the number of gull nests, we derived correction factors for estimates derived from aerial surveys alone using colonies where we conducted both ground counts and aerial surveys (Table 8). This method is more precise than using correction factors from other surveys undertaken at different times and under different conditions. The photo counts were more precise than the observer counts and, therefore, were chosen as the variable for the correction factor. This is consistent with surveys in Prince Edward Island in 2004 (Boyne and McKnight 2005).

Seven colonies were surveyed using aerial photo estimates and ground counts and produced an average correction factor of 1.57 ± 0.58 (Table 8). Thus, the corrected estimates based on 2005 surveys were 1532 Herring Gull pairs [1119-2430] and 652 [477-1035] Great Black-backed Gull pairs (Table 5).

A correction factor was used in the 2000 survey based on Lock (1987), but was not calculated using ground counts from the same year (Boyne and Hudson 2002). As a result, the corrected estimates are not comparable because they use different methods to derive correction factors. Instead, we compared the uncorrected photo estimates from the 2000 survey (2330 Herring Gulls and 910 Great Black-backed Gulls) to the uncorrected aerial photo estimates from 2005 (2406 Herring Gulls and 1025 Great Black-back Gulls). Based on these results, it appears that populations of Great Black-backed Gulls and Herring Gulls have been stable or slightly increasing since 2000.

Double-crested Cormorants

Twelve cormorant colonies were identified during the aerial survey conducted on 25 May (Figure 6). Of these, seven were ground-nesting colonies, three were cliff-nesting colonies, and two were tree-nesting colonies (Table 9). Heron Island (a tree nesting
colony) was not surveyed because of the inaccuracies involved when estimating large
tree-nesting colonies using aerial photography. Fleming Island was estimated using aerial
photography because it was a small tree nesting colony and therefore relatively easy to
count with accuracy. Only one ground survey was done for these eleven colonies
(Richibucto Harbour), where 21 nests were counted (Table 9). The total number of
apparently occupied nest sites was 5107 (Table 9).

The 2000 survey found cormorants at ten colonies with a total of 3704 apparently
occupied nest sites, although the large tree-nesting colony on Heron Island was thought to
be vastly underestimated. We have observed an apparent increase in cormorant nest
numbers along the Gulf of St. Lawrence coast of New Brunswick from 3115 (not
including Heron island estimate) to 5107 between 2000 and 2005. The largest increase
was on Egg Island, which grew by 1292 nests (132%). Four other colonies increased by
more than 100 nests since 2000. Declines were seen on Pokeshaw Island, Cap Pele
(47.819, -65.162), and New Bandon since 2000 and their decreases were possibly a result
of emigration to the nearby colony at Clifton, which grew by 199 nests. The overall
annual growth rate of the cormorant population (excluding Heron Island) between 2000
and 2005 was approximately 10% per year. Eight colonies were surveyed in both 2000
and 2005. The other four colonies were new to us in 2005.

**Black-legged Kittiwakes**

During aerial surveys, four Black-legged Kittiwake colonies were identified and
photographed (Figure 7). Two of those colonies were near cliff-nesting Double-crested
Cormorant colonies. The smallest colony had six nest sites (Pokeshaw) and the largest
(Cap Pele) was estimated to have 166. The total number of kittiwake nest sites estimated
from aerial photos was 379 (Table 10).

The 2000 survey found one colony of kittiwakes east of Grindstone Point with an
estimated 97 apparently occupied nest sites present among a cliff-nesting cormorant
colony. This colony was the first nesting record for the species in northern New
Brunswick. Since 2000, the population has increased by 282 nest sites at four sites along
the cliffs (Table 10). One colony (Cap Pele) was visited during ground surveys on 1 June
and the presence of nests was confirmed. Since the 2000 survey, the number of kittiwakes
nesting in northern New Brunswick has risen by 31% per year.

**Great Blue Herons**

Four colonies of Great Blue Herons were identified during aerial surveys in 2005 (Figure
8). The largest colony was Caraquet with 107 apparently occupied nest sites. The total
number of nest sites was estimated to be 264 (Table 11). A separate ground survey found
181 apparently occupied Great Blue Heron nest sites on Bay du Vin Island (Mackinnon et
al., 2005), whereas only 105 were estimated from aerial photos (Table 11). This suggests
that aerial photo estimates likely underestimated the size of Great Blue Heron colonies.
Between 2000 and 2005, declines were observed at three colonies (Shediac Island, Inkerman and Bay du Vin) and numbers at Caraquet Island increased. Overall, the number of Great Blue Herons at the four colonies surveyed in 2005 declined by 161 nest sites. As the 2005 survey did not specifically target Great Blue Herons, inland colonies were missed by aerial surveys, and therefore conclusions can only be made at the colony level.

Acknowledgements

We would like to thank Lewnanny Richardson and Ivy Austin and the rest of the crew from Piper Project / Projet Siffleur for their help during ground surveys of both gulls and terns. We would also like to thank our pilot Mark Coffin from Tartan Air, and Eric Tremblay and staff at Kouchibouguac National Park for providing their data from the National Park. We would also like to thank Carina Gjerdrum and John Chardine for invaluable comments made during editing.
Literature Cited


Table 1. Clutch sizes of Common Tern colonies surveyed along the Gulf of St. Lawrence coast of New Brunswick, 2005.

<table>
<thead>
<tr>
<th>Location</th>
<th>Latitude</th>
<th>Longitude&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Date</th>
<th>Clutch size (eggs)</th>
<th>Total nests with eggs</th>
<th>Total eggs</th>
<th>Mean clutch size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shediac Bay Yacht Club</td>
<td>46.227</td>
<td>-64.545</td>
<td>13 June</td>
<td>1 11 18 92 0 0</td>
<td>121</td>
<td>323</td>
<td>2.67</td>
</tr>
<tr>
<td>Unnamed Island # 2 in Richibucto Harbour</td>
<td>46.688</td>
<td>-64.855</td>
<td>13 June</td>
<td>0 2 4 2 0 0</td>
<td>8</td>
<td>16</td>
<td>2.00</td>
</tr>
<tr>
<td>Tern Island, Tabusintac</td>
<td>47.317</td>
<td>-64.929</td>
<td>14 June</td>
<td>4 290 1073 2085 15 0</td>
<td>3463</td>
<td>8751</td>
<td>2.53</td>
</tr>
<tr>
<td>Unnamed Island # 1 in Pokemouche Bay</td>
<td>47.662</td>
<td>-64.793</td>
<td>15 June</td>
<td>0 7 12 144 2 0</td>
<td>165</td>
<td>471</td>
<td>2.85</td>
</tr>
<tr>
<td>Unnamed Island # 2 in Pokemouche Bay</td>
<td>47.659</td>
<td>-64.794</td>
<td>15 June</td>
<td>0 28 43 393 1 0</td>
<td>465</td>
<td>1297</td>
<td>2.79</td>
</tr>
<tr>
<td>Fox Dens Beach</td>
<td>47.899</td>
<td>-64.499</td>
<td>15 June</td>
<td>0 81 268 531 0 0</td>
<td>880</td>
<td>2210</td>
<td>2.51</td>
</tr>
<tr>
<td>Tracadie</td>
<td>47.533</td>
<td>-64.882</td>
<td>19 June</td>
<td>0 116 486 1544 13 2</td>
<td>2161</td>
<td>5782</td>
<td>2.68</td>
</tr>
</tbody>
</table>

<sup>1</sup> Negative latitude refers to location west of the prime meridian
Table 2. Size and location of Common Tern colonies surveyed by ground along the Gulf of St. Lawrence coast of New Brunswick, 2000 and 2005.

<table>
<thead>
<tr>
<th>Location</th>
<th>Latitude</th>
<th>Longitude</th>
<th>2000</th>
<th>Nests</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shediac Bay Yacht Club</td>
<td>46.227</td>
<td>-64.545</td>
<td>2</td>
<td>121</td>
<td></td>
</tr>
<tr>
<td>Unnamed Island # 2 in Richibucto Harbour</td>
<td>46.688</td>
<td>-64.855</td>
<td>0</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Tern Island, Tabusintac</td>
<td>47.317</td>
<td>-64.929</td>
<td>2607</td>
<td>3463</td>
<td></td>
</tr>
<tr>
<td>Unnamed Island in Pokemouche Bay # 1</td>
<td>47.662</td>
<td>-64.793</td>
<td>0</td>
<td>165</td>
<td></td>
</tr>
<tr>
<td>Unnamed Island # 2 in Pokemouche Bay</td>
<td>47.659</td>
<td>-64.794</td>
<td>0</td>
<td>465</td>
<td></td>
</tr>
<tr>
<td>Fox Dens Beach</td>
<td>47.899</td>
<td>-64.499</td>
<td>678</td>
<td>880</td>
<td></td>
</tr>
<tr>
<td>Tracadie</td>
<td>47.533</td>
<td>-64.882</td>
<td>0</td>
<td>2161</td>
<td></td>
</tr>
<tr>
<td>Tern Islands (1,2,3), KCHNP</td>
<td>46.776</td>
<td>-64.874</td>
<td>6911</td>
<td>5034</td>
<td></td>
</tr>
<tr>
<td>North Beach, KCHNP</td>
<td>46.834</td>
<td>-64.910</td>
<td>0</td>
<td>986</td>
<td></td>
</tr>
<tr>
<td>Neguac North Spit</td>
<td>47.257</td>
<td>-65.000</td>
<td>601</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Unnamed Island North of Crab Island</td>
<td>47.292</td>
<td>-64.9504</td>
<td>546</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Grande Anse Unnamed</td>
<td>47.670</td>
<td>-64.777</td>
<td>656</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Caraquet Island</td>
<td>47.824</td>
<td>-64.885</td>
<td>128</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Maisonette Dune</td>
<td>47.815</td>
<td>-64.964</td>
<td>180</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Bathurst Harbour Island 3</td>
<td>47.633</td>
<td>-65.647</td>
<td>240</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Dalhousie (Bowater Jetty)</td>
<td>48.069</td>
<td>-66.382</td>
<td>69</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Totals                                      | 12618    | 13283     |
Number of colonies                          | 11       | 9         |
Table 3. Clutch size of Ring-billed Gull nests observed during ground counts at colonies along the Gulf of St. Lawrence coast of New Brunswick, 2005.

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Active Nests</th>
<th>Number of Eggs</th>
<th>Number of Chicks</th>
<th>Percent hatch</th>
<th>Mean clutch size</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tern Island, Tabusintac</td>
<td>31 May</td>
<td>2137</td>
<td>5807</td>
<td>71</td>
<td>1.20</td>
<td>2.72</td>
<td>0.58</td>
</tr>
<tr>
<td>Tracadie</td>
<td>16 June</td>
<td>2229</td>
<td>5991</td>
<td>87</td>
<td>1.43</td>
<td>2.69</td>
<td>0.63</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td>4367</td>
<td>11798</td>
<td>158</td>
<td>1.32</td>
<td>2.71</td>
<td>0.61</td>
</tr>
</tbody>
</table>
Table 4. Ring-billed Gull nest counts of colonies surveyed along the Gulf of St. Lawrence Coast of New Brunswick, 2000 and 2005.

<table>
<thead>
<tr>
<th>Location</th>
<th>Latitude</th>
<th>Longitude</th>
<th>2000 Method</th>
<th>Nests</th>
<th>2005 Method</th>
<th>Nests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fox Dens Beach</td>
<td>47.899</td>
<td>-64.499</td>
<td>GC</td>
<td>262</td>
<td>GC</td>
<td>0</td>
</tr>
<tr>
<td>Maisonette Dune</td>
<td>47.815</td>
<td>-64.964</td>
<td>APE</td>
<td>268</td>
<td>APE</td>
<td>0</td>
</tr>
<tr>
<td>Tracadie</td>
<td>47.309</td>
<td>-64.941</td>
<td>APE</td>
<td>2109</td>
<td>GC</td>
<td>2229</td>
</tr>
<tr>
<td>Tern Island, Tabusintac</td>
<td>47.317</td>
<td>-64.929</td>
<td>APE</td>
<td>843</td>
<td>GC</td>
<td>2137</td>
</tr>
<tr>
<td>Bathurst Harbour Island # 3</td>
<td>47.633</td>
<td>-65.647</td>
<td>GC</td>
<td>6</td>
<td>GC</td>
<td>0</td>
</tr>
<tr>
<td>Heron Island</td>
<td>48.000</td>
<td>-66.162</td>
<td>APE</td>
<td>56</td>
<td>APE</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Colonies</strong></td>
<td></td>
<td></td>
<td></td>
<td>3544</td>
<td></td>
<td>4367</td>
</tr>
</tbody>
</table>

1APE = Aerial Photo Estimate, GC = Ground Count
Table 5. Estimates from aerial photos of apparently occupied territories at Herring Gull (HERG) and Great Black-backed Gull (GBBG) colonies along the Gulf of St. Lawrence coast of New Brunswick, 2005.

<table>
<thead>
<tr>
<th>Location</th>
<th>Latitude</th>
<th>Longitude</th>
<th>HERG</th>
<th>GBBG</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathurst Harbour Island # 3</td>
<td>47.633</td>
<td>-65.647</td>
<td>186</td>
<td>39</td>
<td>225</td>
</tr>
<tr>
<td>Bathurst Harbour Island # 2</td>
<td>47.632</td>
<td>-65.647</td>
<td>68</td>
<td>55</td>
<td>123</td>
</tr>
<tr>
<td>Egg Island</td>
<td>47.105</td>
<td>-65.047</td>
<td>52</td>
<td>142</td>
<td>194</td>
</tr>
<tr>
<td>Maisonette Dune</td>
<td>47.815</td>
<td>-64.964</td>
<td>198</td>
<td>37</td>
<td>235</td>
</tr>
<tr>
<td>Fox Dens Beach</td>
<td>47.899</td>
<td>-64.499</td>
<td>937</td>
<td>175</td>
<td>1112</td>
</tr>
<tr>
<td>Pokeshaw</td>
<td>47.789</td>
<td>-65.256</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Richibucto Harbour</td>
<td>46.688</td>
<td>-64.855</td>
<td>0</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>Tern Island, Tabusintac</td>
<td>47.317</td>
<td>-64.929</td>
<td>0</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Tracadie</td>
<td>47.514</td>
<td>-64.908</td>
<td>304</td>
<td>46</td>
<td>350</td>
</tr>
<tr>
<td>Tracadie Spit Tip</td>
<td>47.552</td>
<td>-64.868</td>
<td>0</td>
<td>58</td>
<td>58</td>
</tr>
<tr>
<td>Neguac Bar</td>
<td>47.225</td>
<td>-65.020</td>
<td>592</td>
<td>101</td>
<td>693</td>
</tr>
<tr>
<td>Crab Island, Unnamed Island North of</td>
<td>47.292</td>
<td>-64.954</td>
<td>0</td>
<td>57</td>
<td>57</td>
</tr>
<tr>
<td>Crab Island, Near Neguac</td>
<td>47.273</td>
<td>-64.966</td>
<td>4</td>
<td>69</td>
<td>73</td>
</tr>
<tr>
<td>Unnamed Island W of Tracadie S. Beach, Unnamed island # 1 in Pokemouche Bay</td>
<td>47.309</td>
<td>-64.941</td>
<td>29</td>
<td>155</td>
<td>184</td>
</tr>
<tr>
<td>Fleming Island</td>
<td>47.976</td>
<td>-66.183</td>
<td>9</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>2406</td>
<td>1025</td>
<td>3431</td>
</tr>
<tr>
<td>Colonies</td>
<td></td>
<td></td>
<td>11</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>
Table 6. Ground counts of Herring Gull nests, eggs and chicks on the Gulf of St. Lawrence coast of New Brunswick, 2005.

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Active Nests</th>
<th>Eggs</th>
<th>Chicks</th>
<th>Percent Hatch (eggs)</th>
<th>Mean Clutch Size</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richibucto Harbour</td>
<td>May 30</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>0.00</td>
<td>2.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Tern Island, Tabusintac¹</td>
<td>May 31</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0.00</td>
<td>1.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Pokemouche, Unnamed Island # 1 in</td>
<td>May 31</td>
<td>14</td>
<td>38</td>
<td>0</td>
<td>0.00</td>
<td>2.71</td>
<td>0.59</td>
</tr>
<tr>
<td>Unnamed Island W of Tracadie S. Beach,</td>
<td>Jun 1</td>
<td>7</td>
<td>17</td>
<td>0</td>
<td>0.00</td>
<td>2.43</td>
<td>0.90</td>
</tr>
<tr>
<td>Bathurst Harbour Island # 1</td>
<td>Jun 1</td>
<td>11</td>
<td>19</td>
<td>0</td>
<td>0.00</td>
<td>1.73</td>
<td>0.45</td>
</tr>
<tr>
<td>Crab Island, Near Neguac</td>
<td>Jun 2</td>
<td>4</td>
<td>8</td>
<td>0</td>
<td>0.00</td>
<td>2.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Fox Dens Beach¹</td>
<td>Jun 2</td>
<td>202</td>
<td>555</td>
<td>6</td>
<td>1.06</td>
<td>2.75</td>
<td>0.65</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>241</td>
<td>642</td>
<td>6</td>
<td>0.93</td>
<td>2.09</td>
<td>0.63</td>
</tr>
</tbody>
</table>

¹ Incomplete ground survey
Table 7. Ground counts of Great Black-backed Gull nests, eggs and chicks on the Gulf of St. Lawrence coast of New Brunswick, 2005.

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Active Nests</th>
<th>Eggs</th>
<th>Chicks</th>
<th>Percent Hatch (eggs)</th>
<th>Mean Clutch Size</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richibucto Harbour, unnamed island # 1</td>
<td>30 May</td>
<td>29</td>
<td>55</td>
<td>13</td>
<td>23</td>
<td>1.90</td>
<td>0.77</td>
</tr>
<tr>
<td>Egg Island</td>
<td>31 May</td>
<td>46</td>
<td>113</td>
<td>60</td>
<td>53</td>
<td>2.46</td>
<td>0.7</td>
</tr>
<tr>
<td>Tern Island, Tabusintac¹</td>
<td>31 May</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>33</td>
<td>3.00</td>
<td>0</td>
</tr>
<tr>
<td>Pokemouche Bay, unnamed island # 1 in</td>
<td>31 May</td>
<td>20</td>
<td>54</td>
<td>6</td>
<td>11</td>
<td>2.70</td>
<td>0.57</td>
</tr>
<tr>
<td>Tracadie Sand Spit¹</td>
<td>1 June</td>
<td>9</td>
<td>26</td>
<td>0</td>
<td>0</td>
<td>2.89</td>
<td>0.33</td>
</tr>
<tr>
<td>Bathurst Harbour Island # 3</td>
<td>1 June</td>
<td>69</td>
<td>90</td>
<td>44</td>
<td>49</td>
<td>1.30</td>
<td>0.78</td>
</tr>
<tr>
<td>Fox Dens Beach</td>
<td>2 June</td>
<td>83</td>
<td>215</td>
<td>74</td>
<td>34</td>
<td>2.59</td>
<td>0.66</td>
</tr>
<tr>
<td>Crab Island, Unnamed Island North of</td>
<td>2 June</td>
<td>35</td>
<td>77</td>
<td>52</td>
<td>68</td>
<td>2.20</td>
<td>0.76</td>
</tr>
<tr>
<td>Crab Island, near Neguac</td>
<td>2 June</td>
<td>37</td>
<td>79</td>
<td>42</td>
<td>53</td>
<td>2.14</td>
<td>0.82</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>329</td>
<td>712</td>
<td>292</td>
<td>36</td>
<td>2.35</td>
<td>0.72</td>
</tr>
</tbody>
</table>

¹ Incomplete surveys
Table 8. Correction factors for gull colonies surveyed along the Gulf of St. Lawrence coast of New Brunswick, 2005.

<table>
<thead>
<tr>
<th>Location</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Ground count (nests)</th>
<th>Aerial photo estimate (territories)</th>
<th>Aerial visual estimate observer 1 (territories)</th>
<th>Aerial visual estimate observer 2 (territories)</th>
<th>Photo estimate/ Ground count</th>
<th>Obs.1/ Ground count</th>
<th>Obs. 2/ Ground count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richibucto Harbour</td>
<td>46.688</td>
<td>-64.855</td>
<td>31</td>
<td>52</td>
<td>-</td>
<td>-</td>
<td>1.68</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tracadie</td>
<td>47.514</td>
<td>-64.908</td>
<td>2229</td>
<td>2153</td>
<td>-</td>
<td>2000</td>
<td>0.96</td>
<td>0.90</td>
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</tr>
<tr>
<td>Bathurst Harbour Island #1</td>
<td>47.649</td>
<td>-65.626</td>
<td>85</td>
<td>225</td>
<td>150</td>
<td>120</td>
<td>2.65</td>
<td>1.76</td>
<td>1.41</td>
</tr>
<tr>
<td>Fox Dens Beach</td>
<td>47.899</td>
<td>-64.499</td>
<td>986*</td>
<td>1191</td>
<td>425</td>
<td>650</td>
<td>1.21</td>
<td>1.47</td>
<td>2.25</td>
</tr>
<tr>
<td>Crab Island, Near Neguac</td>
<td>47.273</td>
<td>-64.966</td>
<td>36</td>
<td>57</td>
<td>50</td>
<td>55</td>
<td>1.58</td>
<td>1.39</td>
<td>1.53</td>
</tr>
<tr>
<td>Unnamed Island N. of Crab Island</td>
<td>47.292</td>
<td>-64.954</td>
<td>35</td>
<td>74</td>
<td>85</td>
<td>70</td>
<td>2.11</td>
<td>2.43</td>
<td>2.00</td>
</tr>
<tr>
<td>Egg island</td>
<td>47.105</td>
<td>-65.047</td>
<td>198*</td>
<td>194</td>
<td>240</td>
<td>165</td>
<td>0.98</td>
<td>1.21</td>
<td>0.83</td>
</tr>
<tr>
<td>Unnamed Island #1 in Pokemouche Bay</td>
<td>47.662</td>
<td>-64.793</td>
<td>34</td>
<td>48</td>
<td>50</td>
<td>20</td>
<td>1.41</td>
<td>1.47</td>
<td>0.59</td>
</tr>
</tbody>
</table>

*Corrected because the ground survey was not complete

\[
\bar{y} = \frac{\sum y}{n} = 1.57
\]
\[
\text{S.D.} = \sqrt{\frac{\sum (y - \bar{y})^2}{n-1}} = 0.58
\]
\[
\text{Confidence Interval (95%)} = 1.96 \times \frac{S.D.}{\sqrt{n}} = 0.40
\]
Table 9. Estimates from aerial photos of apparently occupied nest sites at Double-crested Cormorant colonies along the Gulf of St. Lawrence coast of New Brunswick, 2005.

<table>
<thead>
<tr>
<th>Location</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Date surveyed 2005</th>
<th>Nesting habitat</th>
<th>Number of apparently occupied nest sites 2000</th>
<th>Number of apparently occupied nest sites 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathurst Harbour Island # 1</td>
<td>47.649</td>
<td>-65.626</td>
<td>25 May</td>
<td>Ground</td>
<td>0</td>
<td>171</td>
</tr>
<tr>
<td>Bon Ami Rocks</td>
<td>48.056</td>
<td>-66.347</td>
<td>25 May</td>
<td>Ground</td>
<td>287</td>
<td>465</td>
</tr>
<tr>
<td>Clifton</td>
<td>47.729</td>
<td>-65.392</td>
<td>25 May</td>
<td>Cliff</td>
<td>19</td>
<td>218</td>
</tr>
<tr>
<td>Egg Island</td>
<td>47.105</td>
<td>-65.047</td>
<td>25 May</td>
<td>Ground</td>
<td>974</td>
<td>2266</td>
</tr>
<tr>
<td>Grindstone Point</td>
<td>47.756</td>
<td>-65.359</td>
<td>25 May</td>
<td>Cliff</td>
<td>573</td>
<td>21</td>
</tr>
<tr>
<td>Maisonette Dune</td>
<td>47.815</td>
<td>-64.964</td>
<td>25 May</td>
<td>Ground</td>
<td>10</td>
<td>985</td>
</tr>
<tr>
<td>New Bandon</td>
<td>47.733</td>
<td>-65.382</td>
<td>25 May</td>
<td>Cliff</td>
<td>619</td>
<td>41</td>
</tr>
<tr>
<td>Pokeshaw</td>
<td>47.789</td>
<td>-65.256</td>
<td>25 May</td>
<td>Ground</td>
<td>619</td>
<td>486</td>
</tr>
<tr>
<td>Richibucto Harbour</td>
<td>46.688</td>
<td>-64.855</td>
<td>25 May</td>
<td>Ground</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>Unnamed Island W of Tracadie S. Beach</td>
<td>47.309</td>
<td>-64.941</td>
<td>25 May</td>
<td>Ground</td>
<td>0</td>
<td>423</td>
</tr>
<tr>
<td>Fleming Island</td>
<td>47.976</td>
<td>-66.182</td>
<td>25 May</td>
<td>Trees</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Heron Island</td>
<td>48.000</td>
<td>-66.163</td>
<td>25 May</td>
<td>Trees</td>
<td>589</td>
<td>Not estimated</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>5107</strong></td>
<td></td>
</tr>
</tbody>
</table>
Table 10. Estimates from aerial photos of apparently occupied nest sites at Black-legged Kittiwake colonies along the Gulf of St. Lawrence coast in New Brunswick, 2005.

<table>
<thead>
<tr>
<th>Location</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Date surveyed</th>
<th>Apparently occupied nest sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grindstone Point</td>
<td>47.756</td>
<td>-65.358</td>
<td>25 May</td>
<td>59</td>
</tr>
<tr>
<td>Cap Pele</td>
<td>47.819</td>
<td>-65.162</td>
<td>25 May</td>
<td>166</td>
</tr>
<tr>
<td>New Bandon</td>
<td>47.733</td>
<td>-65.382</td>
<td>25 May</td>
<td>148</td>
</tr>
<tr>
<td>Pokeshaw</td>
<td>47.789</td>
<td>-65.256</td>
<td>25 May</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>379</strong></td>
</tr>
</tbody>
</table>
Table 11. Estimates from aerial photos of apparently occupied nest sites at Great Blue Heron colonies along the Gulf of St. Lawrence coast of New Brunswick, 2005.

<table>
<thead>
<tr>
<th>Location</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Date surveyed</th>
<th>Apparently occupied nest sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bay du Vin</td>
<td>47.092</td>
<td>-65.101</td>
<td>25 May</td>
<td>105</td>
</tr>
<tr>
<td>Inkerman</td>
<td>47.672</td>
<td>-64.831</td>
<td>25 May</td>
<td>19</td>
</tr>
<tr>
<td>Shediac Island</td>
<td>46.265</td>
<td>-64.540</td>
<td>25 May</td>
<td>33</td>
</tr>
<tr>
<td>Caraquet Island</td>
<td>47.824</td>
<td>-64.885</td>
<td>25 May</td>
<td>107</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>264</strong></td>
</tr>
</tbody>
</table>
Figure 1. Extent of colonial water bird surveys along the Gulf of St. Lawrence coast, New Brunswick, Canada, conducted on 25 May 2005 (Coastal Survey Blocks, 331-364. Lock et al., 1996).
Figure 2. Location of Common Tern colonies surveyed along the Gulf of St. Lawrence coast of New Brunswick, 2005.
Figure 3. Location of Ring-billed Gull colonies surveyed along the Gulf of St. Lawrence of New Brunswick, 2005.
Figure 4. Location of Herring Gull colonies surveyed along the Gulf of St. Lawrence coast of New Brunswick, 2005.
Figure 5. Location of Great Black-backed Gull colonies surveyed along the Gulf of St. Lawrence coast of New Brunswick, 2005.
Figure 6. Location of Double-crested Cormorant colonies surveyed along the Gulf of St. Lawrence coast of New Brunswick, 2005.
Figure 7. Locations of Black-legged Kittiwake colonies surveyed along the Gulf of St. Lawrence coast of New Brunswick, 2005.
Figure 8. Location of Great Blue Heron colonies surveyed along the Gulf of St. Lawrence coast of New Brunswick, 2005.