East Bay Island Migratory Bird Research

2014 Field Season Trip Report and Update to Collaborators

Project Overview

East Bay Island is the largest known colony of common eider ducks in the Eastern Arctic. Our studies at East Bay were initiated in 1996 in response to concerns that northern common eiders were being overharvested at the time on their wintering grounds in west Greenland. As a result of this work in 2002 new harvest quotas were implemented in Greenland and the population at East Bay rebounded. We continue to evaluate the influence of harvest on northern common eiders. We are also investigating potential impacts of several emerging issues in an effort to inform wildlife management decisions, marine areas conservation planning, and marine emergency response planning. Many of the issues we are currently researching are in response to concerns raised by northern communities and environmental assessment initiatives, they include:

1. Investigating polar bear predation on eider nests as sea ice diminishes.
2. Quantifying the disease characteristics of avian cholera at East Bay to determine the effects that cholera has on northern eider populations.
3. Identifying key seabird marine habitats in an effort to mitigate potential issues with northern industrial development, particularly year-round shipping.
4. Understanding the physiological mechanisms linking climate variability, reproduction, and populations of arctic breeding migratory birds.
2014 Research Highlights

Avian Cholera at East Bay Island
Avian cholera is one of the most lethal diseases for birds in North America. Although it has circulated in southern Canada and the United States for many years, its emergence among eiders in the north is new. The long term data set at East Bay Island provides a unique opportunity to document the temporal dynamics of the outbreak and the colony’s ability to recover.

The largest known cholera outbreak to date has occurred at East Bay Island, near Coral Harbour, Nunavut. Deaths from Avian Cholera are reduced from previous years, but the colony has not yet rebounded to pre-cholera levels. We recovered 29 dead eiders in 2014, compared to 3,722 at the peak of the cholera epidemic in 2006.

- The cholera outbreak on East Bay Island resulted in lower survival rates of females from 2005-2008. Survival rates of females have now recovered but the colony remains below pre-outbreak numbers.
- With help from local Hunters and Trappers Organizations, we are also conducting surveys to evaluate the spread of avian cholera in eider colonies throughout Hudson Strait.
Polar Bears at seabird colonies

At East Bay Island polar bears are present on the island more frequently in recent years (a) and this appears to be related to ice conditions (b). The same pattern has been observed for the Thick-billed Murre colony on Coats Island.

Number of days in which at least one bear was seen on East Bay Island by year (a) and in relation to ice conditions (b).

During surveys that we conducted throughout Hudson Strait we found signs of polar bears on 34% of eider colonies that we visited and eider nesting success was three times lower on islands with bear sign than without bear sign. Nest loss at the rates we observed are unsustainable and may be a cause for conservation concern. Taken together, these results suggest that ice conditions are having important indirect effects for eider reproduction in the eastern Arctic due to the relationship between ice conditions and bear prevalence at breeding colonies in June and July.

Due to the high frequency of polar bear visits to the East Bay Island colony scientists must now leave the island for safety reasons during the peak in bear activity. In 2014 we set up time-lapse cameras to photo document bear activity in the absence of humans. These data will allow us to investigate key parameters, such as the rate at which bears depredate nests and how many bears visit the colony during the breeding season.

Time lapse photos of a bear visiting 3 eider nests in 13 minutes at East Bay Island.
**Eider Satellite Tracking**

To assess possible interactions of bird populations with proposed resource development activities (particularly year-round shipping), we used satellite telemetry to identify important marine areas for northern eiders in the Hudson Strait marine region. In partnership with Baffinland Iron Mines and Danish veterinarians from Aarhus University we deployed 46 transmitters in Common and King Eiders in 2012 and 2013. Many of these transmitters were still transmitting throughout the 2014 breeding season.

![Common eider movements (left) and frequently used Hudson Strait marine habitat (right) 2012-2014.](image.png)

The eider satellite tracking data also suggests that eiders wintering in Atlantic Canada typically use the southern coast of Hudson Strait during spring migration, which corresponds to the distribution of known avian cholera outbreaks. The distribution of outbreaks together with documented migration patterns is consistent with the hypothesis that the disease is spread by eiders wintering in Canada through contact with Atlantic eider populations where the disease is known to circulate in the Gulf of St. Lawrence.

![Avian cholera emergence pattern in Hudson Strait in relation to the migratory paths of (a) common eiders wintering in Atlantic Canada, (b) common eiders wintering in west Greenland, and (c) mid-continent lesser snow geese. Yellow stars indicate locations where avian cholera outbreaks have been observed.](image.png)
Linking ice conditions, physiology and reproduction

Recent work by graduate students working at East Bay Island further demonstrates the degree to which reproduction of common eiders is strongly linked to sea-ice conditions. After migrating to East Bay in spring, female eiders spend 2 weeks feeding at ice-free river mouths while the remainder of sea ice in the bay is still solid. Using cutting edge physiological techniques, Holly Hennin (PhD candidate; University of Windsor) has found that female eiders start producing egg follicles prior to arriving at East Bay. Upon arrival they undergo a period of physiological change for 9 days prior to laying which stimulates higher foraging activity during this period. The time window between arrival at East Bay and egg laying is therefore critical for females in order to produce well-developed eggs and for them to put on sufficient fat reserves before they begin their 24-day fast during incubation.

![Common eiders foraging in gaps in the sea ice prior to breeding at East Bay Island.](image)

Using high resolution satellite imagery to determine ice conditions at river mouths, Frankie Jean-Gagnon (MSc candidate; UQAR) has determined that the timing at which females lay their eggs is strongly correlated to the timing of ice break-up at river mouths. From previous work, we know that there is a finite pre-breeding time window for females to accumulate energy reserves sufficient for egg laying, incubation, and rearing ducklings. Frankie has found that in years with earlier break-up at river mouths, a higher proportion of small females initiated breeding at East Bay Island. Taken together, Holly and Frankie’s work suggest that a longer pre-breeding time window associated with earlier ice breakup apparently allows smaller females the foraging time required to accumulate fat reserves necessary for reproduction.
Tracking Migratory Birds at East Bay

Our work on Snow Buntings and Herring Gulls at East Bay Island collects data on timing of breeding, migration patterns, and inter-year survival to better understand population trends for arctic-breeding birds.

**Snow Buntings**

In 2011-2012 we were able to track migrations of Snow Buntings breeding at East Bay Island and found they were spending the winter in the prairie regions of central Canada and the US. We expanded this program to include buntings captured near Iqaluit in 2013 and we recovered one of the geolocators this summer. It indicates that this individual spent the winter in a similar region as the buntings we initially tracked from East Bay Island. In order to understand relationships between climate, prey availability, and timing of breeding of Snow Buntings, we also monitor insect emergence and timing of Snow Bunting hatch. Our long term dataset suggests that Snow Buntings somehow time their egg laying such that hatching occurs near the peak of insect emergence at East Bay.

**Herring Gulls**

In 2013 and 2014 we deployed solar powered satellite tags to document the movement behavior of Herring Gulls breeding at East Bay Island.

- Many of the gulls followed the continental shelf edge as they travelled south in fall migration.
- Tracking data also indicates that the Gulf of Mexico is an important wintering site for many of the individual gulls we tracked. This suggests that gulls breeding in Canada's Arctic could be influenced by the Deep Water Horizon oil spill.
Recent Popular Press

Gilchrist, H.G. “Arctic ducks adjust nesting to combat polar bear threat.”
- Online-CBCNews.ca Nov. 19, 2014

2014 East Bay Island Publications


Provencher JF. 2014. How Arctic marine birds are helping us study changes across the north. Arctic; (in press).

Research Partners and Financial Support
Our research at East Bay Island was a combined effort of many people and organisations. Dr. Grant Gilchrist (Environment Canada) leads the project together with Dr. Oliver Love (University of Windsor) and Dr. Joël Bêty (Université du Québec à Rimouski). The project coordinator in 2014 was Mike Janssen (Environment Canada).

The research at East Bay Island is logistically complicated and labour intensive, requiring a relatively large, dedicated crew of students and biologists. Students and contractors in 2014 included Donald Pirie-Hay, Jenna Cragg, Frankie Jean-Gagnon, Nik Clyde, Chris Baird, Kevin Kelly, Rolanda Steenweg, Jennifer Provencher and Pierre Legagneaux. Local expertise was provided by Josiah Nakoolak and Juipi Angootealuk of Coral Harbour. Christie Macdonald conducted all preliminary spatial analyses and mapping.

Research in Canada's north is expensive and funding for this work is necessarily provided by a network of partnerships that includes but is not limited to: Baffinland Iron Mines Corporation, Nunavut Wildlife Management Board, ArcticNet, Nunavut General Monitoring Plan, Environment Canada Wildlife Research Division, Environment Canada Ecotoxicology and Wildlife Health Division, the Canadian Wildlife Service, Université du Québec à Rimouski, University of Windsor, University of Saskatoon, Carleton University, Polar Continental Shelf Program (PCSP), Northern Scientific Training Program, the Weston Foundation, NSERC, and the Nasivvik Centre for Inuit Health and Changing Environments.

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