

**Sea Duck Joint Venture, Annual Project Summary for Endorsed Projects
FY 2008 – (October 1, 2007 to Sept 30, 2008)**

Project Title - SDJV Project #105: Examining the Impact of Avian Cholera on the Population Dynamics of a Long-lived Sea Duck, the Northern Eider (multi-year 1 of 3).

Principal Investigators

Dr. Grant Gilchrist, Environment Canada, National Wildlife Research Centre, Ottawa, Ontario Phone: (613) 998-7364 Fax: (613) 998-0458, E-mail: grant.gilchrist@ec.gc.ca, and **Dr. Catherine Soos (veterinarian, wildlife pathologist)**. Environment Canada, Saskatoon, Saskatchewan. E-mail: catherine.soos@ec.gc.ca

Partners: Dr. E. Jenkins (veterinarian, wildlife parasitologist), **Drs. S. Lair and A. Dallaire** (Canadian Cooperative Wildlife Health Centre), **Dr. D. Blehert** (microbiologist), **Dr. Sebastien Deschamps** (Post Doctoral Fellow), **I. Buttler** (Graduate Student), **D. Henri** (Graduate Student)

Project Description:

From May to August 2008 field studies were conducted at East Bay, Southampton Island, Nunavut to examine the extent and impact of avian cholera. Avian cholera has rarely been detected among sea ducks, so this site has the potential to provide new information regarding the spread and development of an important wildlife disease. The eider study at East Bay has been ongoing since 1996, and avian cholera has been studied in detail there since it was first detected in 2005 (Table 1). This study was expanded in 2007 and 2008 to sample live eiders (e.g. blood), as well as water and pond sediments to assess whether the disease is being carried by infected birds and whether the disease can over-winter in the Arctic environment. Further, the field program captured eiders prior to nesting in early June, so that factors such as carrier status, early season body condition, and timing of arrival can be examined to assess whether these factors influence the probability that individuals die from cholera later in the breeding season.

Objectives:

To our knowledge, the East Bay research program is the only location in North America where demographic data exists for a sea duck species prior to, and during a major disease epidemic. Consequently, the research team is in the unique position to quantify the impact that the disease is having on timing of arrival, reproductive success, survival of adults while breeding, and on survival of both ducklings and adults during winter.

Eiders are an important species group under the Sea Duck Joint Venture and for Federal Wildlife Agencies both in the United States and Canada, as well as Greenland. The findings from this research have direct relevance to the management of sea duck populations in the United States, particularly given the ecological predictions that disease prevalence will increase and spread northward under current climate change scenarios and that individual common eiders are known to move between eastern and western North American Populations.

Preliminary Results:

- *Breeding Ecology* - Common Eiders were present near the island at least by 26 May; a few days earlier than in past years (26 May- 8 June). In 2008 the team banded 547

Common Eiders (339 females, 208 males), and 180 ducklings (Table 1). Avian cholera was present again within the eider colony. Nest success in 2008 was 47% (380 nests from 5 study plots); much lower than the 83-93% observed from 1998-2004, but similar to that observed in 2006 (65%) and 2007 (45%) when cholera was present. Nest success was low due to high rates of both female mortality and gull predation of nests.

- *Survival* – The probability of adult female survival was estimated to be 54% (SE = 0.029), compared to 64-87% from 1997-2005, and up from 42% in 2007 (Figure 2).
- *Avian Cholera* - A total of 1470 dead Common Eiders were counted on the island (roughly 33% of the estimated breeding population in 2008, Figure 3); we are awaiting lab results to confirm the presence of avian cholera. The first signs of avian cholera symptoms occurred on 15 and 16 June, although the first female eider died on 26 June and the first male eider died on 24 June. This was about 3 weeks earlier than in 2005, a week earlier than in 2007, but the same as in 2006.

Project Status:

Objectives for the 2008 field season were met, with no major difficulties. Our next priority is to complete ongoing lab work (Table 1), led by C. Soos. This will involve the analysis of ice and pond water to determine the persistence of the bacterium in the environment, serotyping bacterial isolates from carcasses to verify the type of cholera present in the East Bay population in 2008 (serotypes 1 and 3/4 detected to date) and run DNA fingerprinting of *P. multocida*, and serum antibody analyses to determine whether the birds were recently exposed to the bacterium. The project objectives have not changed.

Project Funding Sources (US\$).

SDJV USFWS	Other US Federal	US non-Federal contribution	Canadian Federal contribution	Canadian non-federal contribution	Source of funding
15k	0	0	55k	0	CWS
0	0	0	45k	0	Polar Shelf
0	0	0	10k	0	En Can Disease
0	0	0	0	32k	Nunavut Trust
0	0	0	0	17k	ArcticNet
0	0	0	10k	0	NSTP
0	0	0	0	10k	Universities
15k	0	0	120k	59k	TOTALS

Total Expenditures by Category (SDJV plus all partner contributions; US\$).

ACTIVITY	BREEDING	MOLTING	MIGRATION	WINTERING	TOTAL
Banding	50k	0	0	0	50k
Surveys	0	0	0	0	0
Research	144k	0	0	0	144k
Total					194k

Table 1. Biological samples collected from the East Bay Island (2005 to 2008). AC = avian cholera, AI = avian influenza.

Year	2005	2006	2007	2008
Common Eider mortality*	203	3230	796	1470
Carcass- necropsy, bacteriology, AC serotyping, AC DNA fingerprinting	21	19	42 full, 23 partial	33 full, 6 partial
Serum- serology, corticosterone, NMR, other diseases	none	none	319	232
Smear - immune function	none	none	377	267
Blood - haemoparasites, DNA	none	none	330	266
Chloacal and Choanal Swabs- AI, AC	none	none	2041	1182
Feather - Corticosterone	none	none	539	596
Water, ice - bacterial isolation	none	none	150	175
Pond sediment	none	none	22	none
# adults banded	549	486	732	547
# ducklings banded	180	58	269	180

*King Eider, Brant, Snow Bunting, and Herring Gulls have also been killed by cholera

Figure 1. Number of nests found in study plots (n=5 plots) on East Bay Island from 1997 to 2008. Pitsulak Plot was added in 2000, and was used intensively in 2002 and 2003 for gull research, so nesting numbers are presented separately. Vertical dashed line indicates beginning of the cholera epidemic.

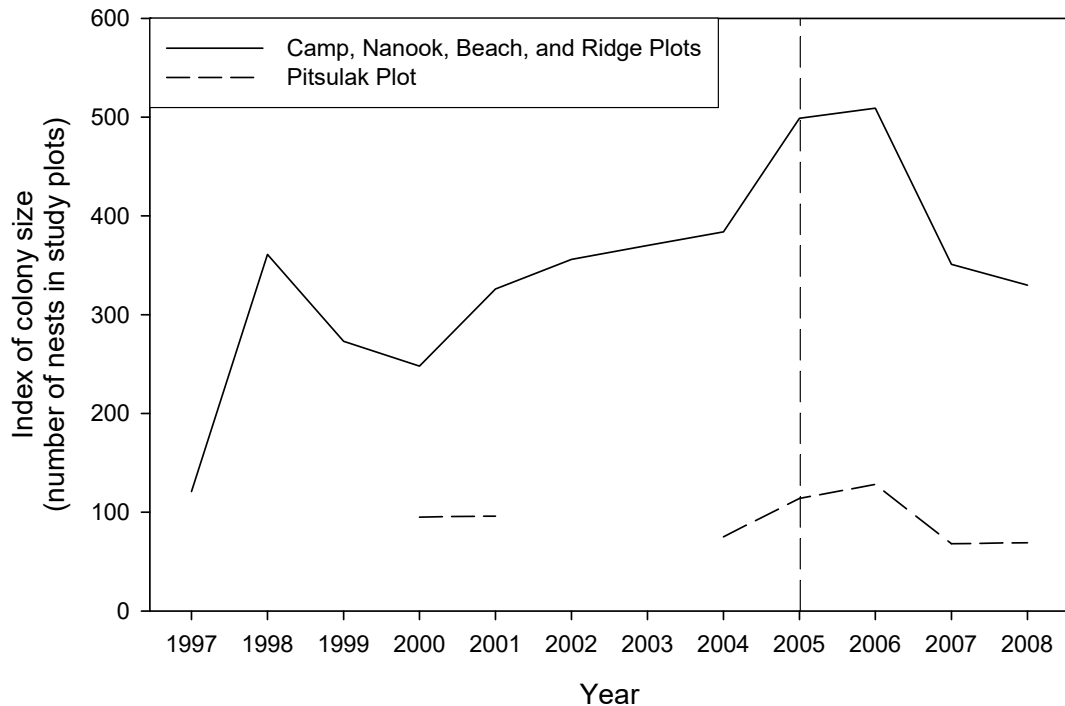


Figure 2. Survival probability estimates of female Common Eiders breeding on East Bay Island from 1997 to 2008. Vertical dashed line indicates beginning of the cholera epidemic.

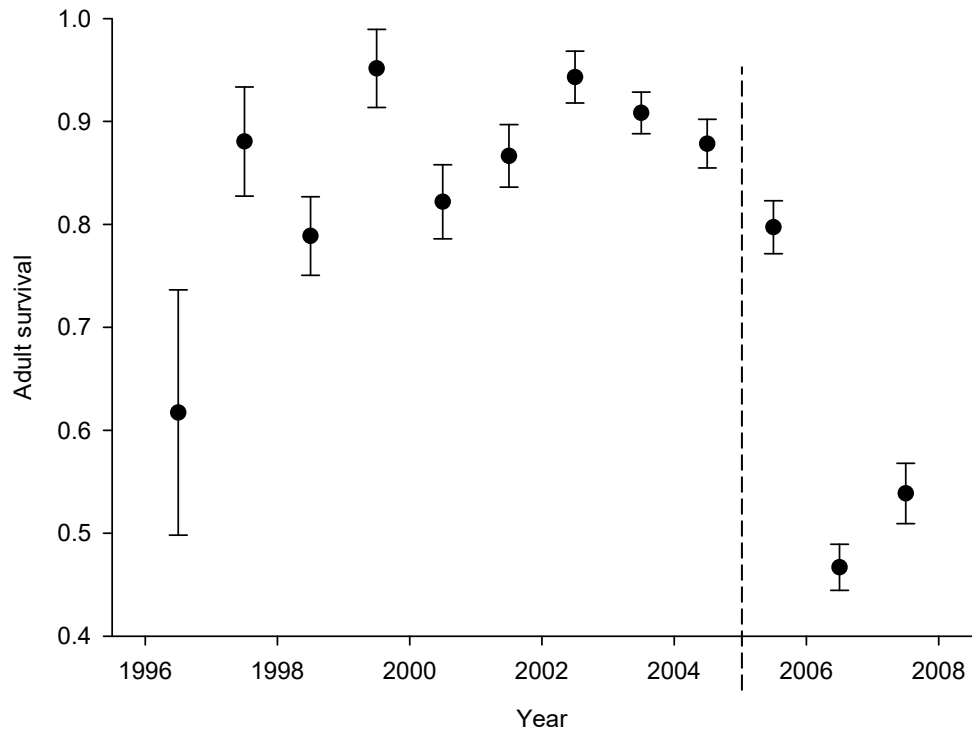


Figure 3. Mortality of Common Eiders due to avian cholera at the East Bay Island from 1997 to 2008. Vertical dashed line indicates beginning of the cholera epidemic.

