Sea Duck Joint Venture – Annual Project Summary for Endorsed Projects
FY07 – (October 1 2006 to September 30, 2007)

Project Title: SDJV#16, Ducks Unlimited Canada's Common Eider Initiative (year four of five year study)

Principal Investigators: Katherine R. Mehl, University of North Dakota, 10 Cornell Street, Grand Forks, ND 58201-9019, katherine.mehl@und.nodak.edu and Mark Gloutney, Ducks Unlimited Canada, PO Box 430, Amherst, NS B4H 3Z5, m_gloutney@ducks.ca

Partners: Ducks Unlimited Canada, Institute for Wetlands and Waterfowl Research, Atlantic Canada Opportunities Agency, Environment Canada – Science Horizons, and EcoAction Canadian Wildlife Service, Newfoundland and Labrador Department of Environment and Conservation – Inland Fish and Wildlife Division, Memorial University of Newfoundland, Newfoundland and Labrador Legacy Nature Trust, Quebec-Labrador Foundation, Eastern Habitat Joint Venture, Eagle River Development Association, and White Bay Central Development Association.

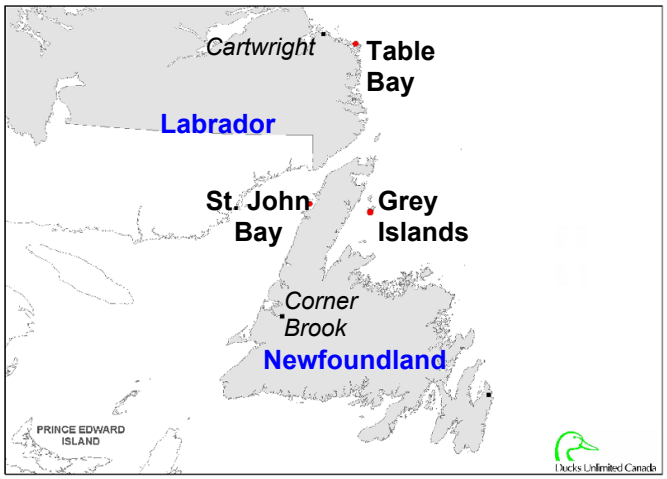
Project Description: The Eider Initiative is a five-year (2004 – 2008) research initiative. The goal of the Eider Initiative is to develop a population model to guide Common Eider *Somateria mollissima dresseri* harvest regulations and management decisions. Development of such models requires current, detailed information on life-history traits throughout the life-cycle of the species. We chose Newfoundland and Labrador as the focal point for this research because Common Eider populations in this region have experienced relatively little growth following their protection by the Migratory Bird Conservation Act, compared to that of other populations south of this area. Specific reasons for depressed population growth of eiders nesting in this region are unknown. Factors that may contribute to low growth rates include affects such as harvest, disturbance, climate change and other such factors. Understanding constraints to population growth requires a strong understanding of species-specific life history traits. This information is critical for developing and implementing management strategies that promote sustainable and harvestable populations.

Objectives: The objectives of the Eider Initiative address Sea Duck Joint Venture (SDJV) priorities for conservation of sustainable sea duck populations. Specific priorities to be addressed are: 1) adult female survival, seniority (proportion of experienced breeders in the population), recruitment (proportion of first time breeders in the population), and realized population growth rates; 2) breeding propensity (proportion of females breeding during any one season); 3) sub adult survival; 4) age at first breeding; and 5) the links between breeding and wintering areas and migration pathways. The ultimate objective is to build a successful population model that will help managers make informed harvest and conservation decisions.

Methods: Methods include capturing and banding adult and duckling Common Eiders in mist nets, on the nest and by actively driving ≥ 30 day-old ducklings with accompanying females into submerged drive traps. Mark-recapture techniques will be used to obtain estimates of juvenile and adult survival, as well as estimates of breeding propensity, and age of first breeding. Collection of this data will allow for a stronger understanding of possible constraints on population growth.

Study Area: Primary research sites include 1) Grey Islands Newfoundland; 2) St. John Bay, Newfoundland, and 3) Table Bay, Labrador (Figure 1).

Figure 1. Study areas for Ducks Unlimited Canada's Eider Initiative.



Preliminary Results: To date we have captured 2,552 adult and 8,225 duckling (1 day old) Common Eiders (Tables 1 and 2). In addition, we have captured 242, 234, 279 prefledged juvenile eiders (≥30 days of age) on the water at Table Bay during 2005 - 2007, respectively. Captures to date include 16 known age eiders. Three of these were 1- year old females (nesting status unknown). Other known age captures included eiders of 2 (n = 6 females) and 3 (n = 4 females, 3 males) years of age. Recapture of both males and females provide evidence of natal philopatry for both sexes.

Table 1. Number of adult Common Eiders captured in Newfoundland and Labrador under DUC's Eider Initiative during 2003-2006. This represents 1911 unique individuals. **2003 = pilot year only.*

	Year					***Total***
Field Site	2003	2004	2005	2006	2007	
Grey Islands	73	75	205	168	0[a]	**521**
St. John Bay	30	27	26	52	33	**168**
Table Bay	9	124	446	676	608	**1863**
Total	**112**	**226**	**677**	**896**	**641**	**2552**

[a] Polar Bear disrupted eider nesting and precluded data collection

Table 2. Number of one-day-old Common Eider ducklings captured and banded under DUC's Eider Initiative during 2003-2006. **2003 = pilot year only*

	Year					***Total***
Field Site	2003	2004	2005	2006	2007	
Grey Islands	0	420	914	482	10[a]	**1816**
St. John Bay	23	NA	66	41	NA	**127**
Table Bay	20	1078	1418	1785	1978	**6279**
Total	**43**	**1498**	**2398**	**2308**	**1978**	**8225**

[a] Polar Bear disrupted eider nesting and precluded data collection

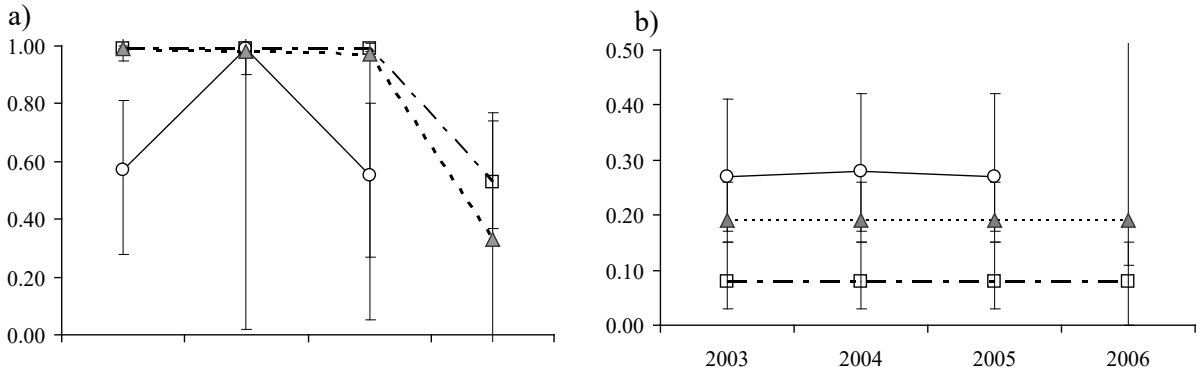
Model results of adult apparent survival suggest adult survival and recapture probabilities varied by both year and study site ($\hat{c}$ = 1.67; $QAIC_c$ value ≤ 3; Table 3). See Figure 3 for model average estimates of adult apparent survival and recapture probabilities.

Table 3. Top 3 of 8 candidate models of apparent survival (ϕ) and capture probability (*p*) of 1,911 individual adult Common Eiders captured on coastal islands near Newfoundland and Labrador during 2003–2007. Parameter estimates included variation among year, study site, and models with no variation (.). Models are ranked in accordance $QAIC_c$ values and are denoted as additive models (+) or models with single and interactive effects (*).

Model Number/Name	$\Delta QAIC_c$[a]	$QAIC_c$ Weights	# Parameters	QDeviance
1. ϕ(site+year) *p*(site, .)	0.00	0.79	7	34.77
2. ϕ(site*year) *p*(site, .)	3.22	0.16	9	33.96
3 ϕ(site+year) *p*(.)	7.02	0.02	5	45.83

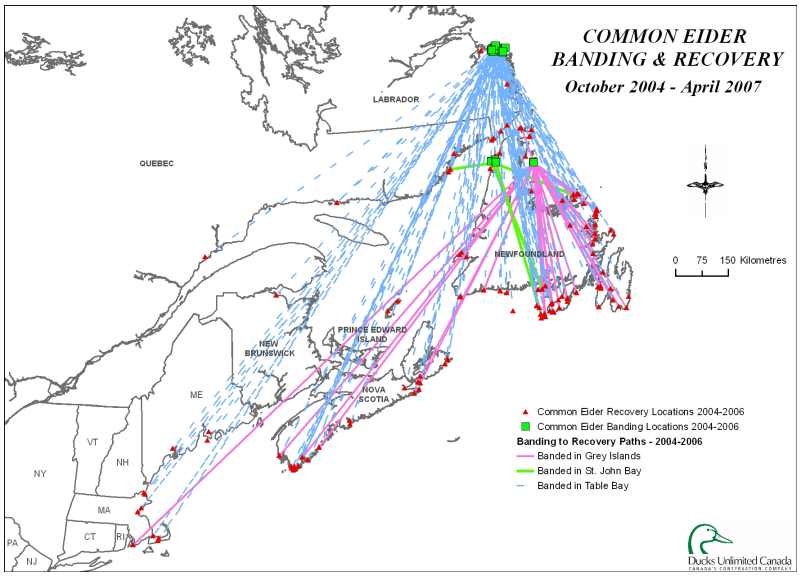
[a]lowest $QAIC_c$ value was 1185.65

Figure 2. Estimates of a) apparent survival and b) recapture probabilities (±95% CI) for adult Common Eiders banded at Grey Islands (circle), and St. John Bay, Newfoundland (square), and Table Bay, Labrador (triangle) during 2003-2007. Values were calculated using the sin-link function and are the weighted averages based on 8 candidate models. Averages were weighted according to $QAIC_c$ values.



To date we have received a total of 263 band recoveries from the following areas: Newfoundland and Labrador (*n* = 181; includes 27 from St. Pierre Miquelon), Nova Scotia (*n* = 41), Quebec (*n* = 25), Massachusetts (*n* = 10), Maine (*n* = 3), New Brunswick (*n* = 2) and Rhode Island (*n* = 1). Most band recoveries (85%; *n* = 223) are for eiders marked at < 30 days of age. Most juvenile eiders (74%;164/223) were shot near the coasts of Newfoundland and Labrador (Figure 3).

Figure 3. Location of hunter band recoveries of adult and locally hatched young eiders banded during summers of 2004-2006 and recovered during 2004-2006 hunting seasons. Links between breeding and recovery locations are shown in yellow and blue for young and green and red for adults banded in Newfoundland and Labrador, respectively.



Direct band recoveries (those shot during the same year as marking) provide indices to age specific hunting pressures. To date we have received 197 direct recoveries from both adults (n = 16) and young (n = 181; Table 4).

Table 4. Percent of direct hunter band recoveries of Common Eiders banded under DUC's Eider Initiative and recovered during 2004-06.

	2004		2005		2006		Total
Age Category	Grey Islands	Table Bay	Grey Islands	Table Bay	Grey Islands	Table Bay	
Duckling	2.6% (11/420)	4.3% (45/1078)	1.4% (13/914)	3.2% (46/1418)	2.3% (11/482)	1.3% (23/1785)	2.4% (149/6097)
Juvenile	-	-	-	6.6% (16/242)	-	4.7% (11/234)	1.6% (77/476)
Adult	0% (0/65)	0% (0/115)	2.4% (5/205)	0.9% (4/446)	0.6% (1/168)	0.8% (5/608)	0.9% (15/1607)

Common Eider adults and ducklings banded to date form a solid base for future mark-recapture survival analyses. The upcoming 2008 field season will provide the fifth year of mark-recapture data, permitting further refinement of estimates of adult true survival using live-dead recoveries. Banding of prefledged juveniles, in addition to that of day-old ducklings will aid in obtaining estimates of duckling survival, age of first breeding, and in understanding survival of prebreeding eiders.

Status: This research project is ongoing.

Project Funding Sources 2007 (US dollars).

SDJV (USFWS) Contribution	Other U.S. federal contributions	U.S. non-federal contributions	Canadian federal contributions	Canadian non-federal contributions	Source of funding (agency or organization
$38,465					SDJV
			$35,000		EDF
			$7,000		Science Horizon
			$11,500		CWS (in kind)
				$67,828	DUC
				$9,690	MUN
				$2,000	QLF
				$2,000	EHJV (in kind)
$38,465			**$53,500**	**$81,518**	**$173,483**

Total Expenditures by Category (US $)

ACTIVITY	BREEDING	MOLTING	MIGRATION	WINTERING	TOTAL
Banding					
Surveys					
Research	$173,483				
Communication					
Coordination					

Total project cost was $173,483. The SDJV investment of $38,465 was leveraged 4.5 times.

Project Funding Sources 2005 - 2007 (US $)

SDJV (USFWS) Contribution	Other U.S. federal contributions	U.S. non-federal contributions	Canadian federal contributions	Canadian non-federal contributions	Source of funding (agency or organization
$115,395					SDJV
			$45,445		ACOA
			$35,000		EDF
			$7,000		Science Horizon
			$22,376		CWS (in kind)
			$2,100		NSTP
				$229,463	DUC
				$14,378	MUN
				$2,000	QLF
				$6,906	EHJV (in kind)
$115,395			**$111,921**	**$252,747**	**$480,063**

Total Expenditures by Category (US $)

ACTIVITY	BREEDING	MOLTING	MIGRATION	WINTERING	TOTAL
Banding					
Surveys					
Research	$480,063				
Communication					
Coordination					

Total project cost was $480,063. The SDJV investment of $115,395 was leveraged 4.2 times.