Sea Duck Joint Venture
Annual Project Summary for Endorsed Projects
FY 2006 – (October 1, 2005 to Sept 30, 2006)

SDJV Project # 16: DUCKS UNLIMITED CANADA'S EIDER INITIATIVE

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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 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 anthropogenic affects such as harvest or increased disturbance through aquaculture, inter-tidal harvests, or shipping. 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.

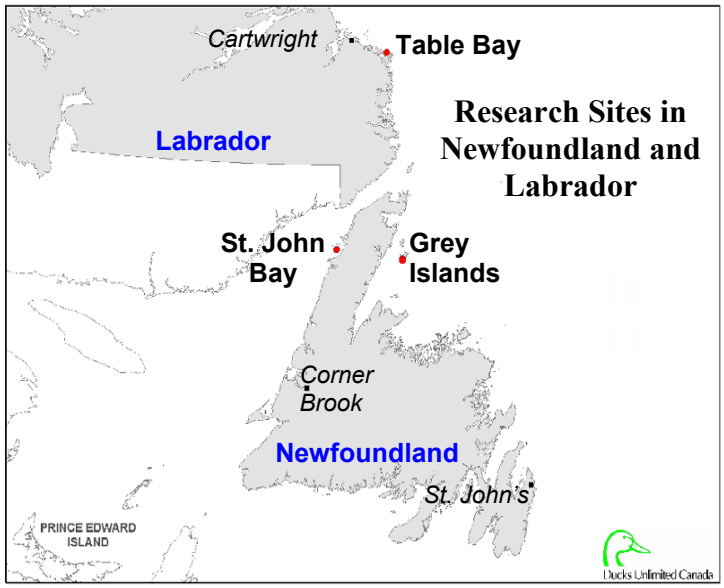
The Eider Initiative is a five-year (2004 – 2008) research initiative. Methods include capturing and banding adult and duckling Common Eiders in mist nets, on the nest and by actively driving ≥ 30 day-old ducklings with accompanying females into submerged drive traps. Mark-recapture techniques will be 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.

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. Obtaining these objectives is necessary to build a successful population model and to establish effective science-based management plans.

Study Area: Primary research sites include 1) Grey Islands, located about 13 km SE of Conch, Newfoundland; 2) St. John Bay, near Barr'd Harbour, Newfoundland, and 3) Table Bay, located about 30 km SE of Cartwright, Labrador (Figure 1).

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



Preliminary Results: To date we have captured 1,837 adult and 6,260 duckling (1 day old) Common Eiders. Tables 1 and 2 provide a summary of the number of eiders captured by site and year. In addition, we have captured 242 and 309 prefledged juvenile eiders (≥30 days of age) on the water at Table Bay during 2005 and 2006, respectively. Total captures in 2006 include 8 known age eiders (n = 1 Grey Islands; n = 7 Table Bay). Six of the known age eiders were 2 years of age and 2 were 1 year of age when captured. We were able to link only 2 of the known age eiders to a nest. Both nesters were 2 years of age. Nesting status was unknown for the remaining 6 eiders.

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

	Year				
Field Site	2003	2004	2005	2006	***Total***
Grey Islands	73	65	205	168	**511**
St. John Bay	30	NA	26	49	**105**
Table Bay	9	115	445	652	**1221**
Total	**112**	**180**	**676**	**869**	**1837**

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				
Field Site	2003	2004	2005	2006	***Total***
Grey Islands	0	420	914	482	**1816**
St. John Bay	23	NA	66	42	**131**
Table Bay	20	1078	1418	1797	**4313**
Total	**43**	**1498**	**2398**	**2321**	**6260**

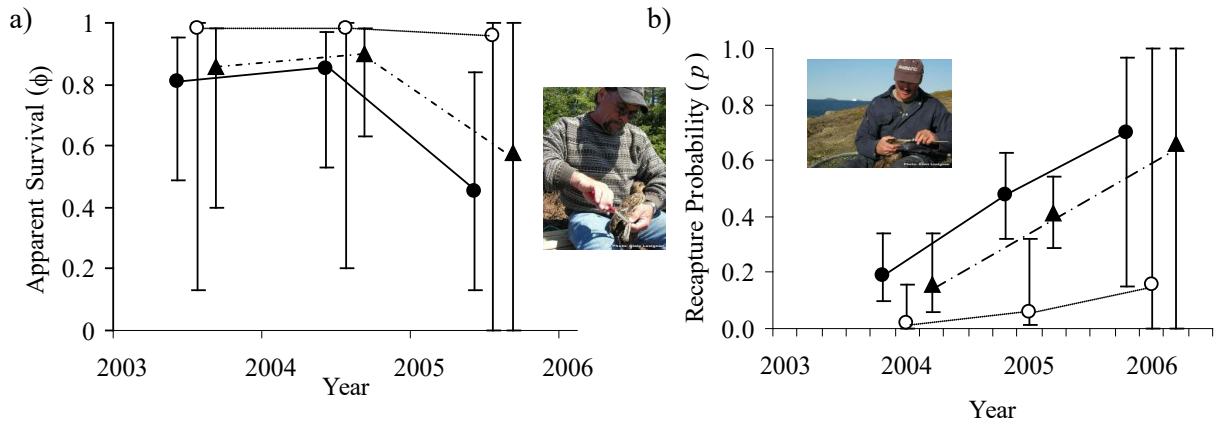
Model results of adult apparent survival suggest adult survival and recapture probabilities varied by both year and study site ($\hat{c}$ = 1.65;.QAIC$_c$ value ≤ 3; Table 3). See Figure 2 for model average estimates of adult apparent survival and recapture probabilities. Recapture rate of ducklings marked at hatch and recaptured as prefledged juveniles (≤30 days of age) was 7% (18/242) and 9% (28/309) for 2005 and 2006, respectively.

Table 3. Top 3 of 9 candidate models of apparent survival (ϕ) and capture probability (*p*) of 1,772 individual adult Common Eiders captured on coastal islands near Newfoundland and Labrador during 2003–2006. Parameter estimates included variation among year and study 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	No. of Parameters	QDeviance
1. ϕ(site+year) *p*(site+year)	0.00	0.64	9	26.49
2. ϕ(.) *p*(site+year)	3.25	0.13	6	35.81
3. ϕ(site*year) *p*(site+year)	3.59	0.11	11	26.01

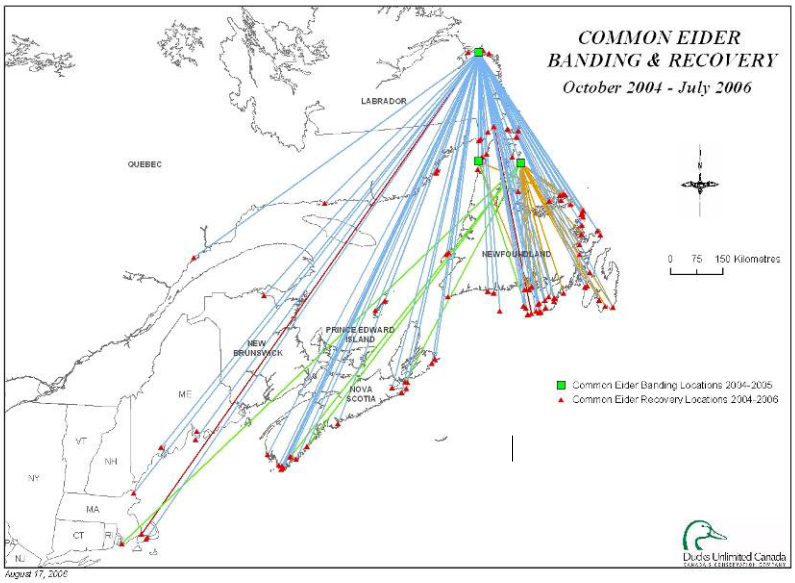
[a]lowest $QAIC_c$ value was 1185.65

Figure 2. Estimates of a) apparent survival and b) recapture probabilities (±95% CI) for adult Common Eiders banded at Grey Islands (solid circle), and St. John Bay, Newfoundland (open circle), and Table Bay, Labrador (triangle) during 2003-2006. Values were calculated using the sin-link function and are the weighted averages based on 9 candidate models. Averages were weighted according to $QAIC_c$ values.



To date we received a total of 164 band recoveries from the following areas: Newfoundland and Labrador (*n* = 94), Nova Scotia (*n* = 26), Quebec (*n* = 16), St. Pierre Miquelon (*n* = 18), Maine (*n* = 4), Massachusetts (*n* = 5), and Rhode Island (*n* = 1). Most band recoveries (*n* = 153) are for eiders marked at < 30 days of age. Most juvenile eiders (70%;107/153) were shot near the coasts of Newfoundland and Labrador, whereas most adults (64%; 7/11) were shot in other areas (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 2004-2005 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 139 direct recoveries from both adults (n = 9) and young (n = 130). Direct recovery rates varied by site and were greatest for ducklings marked in 2004. In contrast, direct recovery rates for adults were greatest in 2005 (Table 4).

Table 4. Percent of direct hunter band recoveries of Common Eiders banded under DUC's Eider Initiative and recovered during 2004-05.

	2004			2005			
Age Category	Grey Islands	St. John Bay	Table Bay	Grey Islands	St. John Bay	Table Bay	***Total***
Duckling	2.6% (11/420)		4.3% (45/1078)	1.4% (13/914)	4.5% (3/66)	3.0% (44/1418)	**1.3% (116/3896)**
Juvenile	-	-	-	-	-	5.8% (14/242)	**4.3% (14/242)**
Adult	0% (0/65)	-	0% (0/115)	1.9% (4/205)	1.9% (1/26)	0.9% (4/445)	**1.3% (9/676)**

Differences between direct recovery rates for eiders marked as prefledged juveniles and day old ducklings (2.8%) represents the difference between juvenile and duckling survival rates (Table 4, 2005 data). Assuming that recovery rates are equal among age categories of prefledged young and that all marked juveniles survive to the hunting season, we estimate maximum duckling survival to be 0.17 based on the following equation: $(m_j * S_j * r_j) - (m_d * S_d * r_d) = 0.028$, where m = the number of eiders marked, S = survival, and r = the number of direct band recoveries for eiders marked as juveniles ($_j$) and ducklings ($_d$).

Common Eider adults and ducklings banded to date form a solid base for future mark-recapture survival analyses. The upcoming 2007 field season will provide the fourth year of mark-recapture data, permitting our first 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$; 0.75 CA$ to US$ Exchange Rate).

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
			$9,188		CWS (in kind)
					ACOA
			$2,100		NSTP
				$94,934	DUC
				$4,688	MUN
				$2,453	EHJV (in kind)
$38,465			**$11,288**	**$102,074**	**$151,827**

Total Expenditures by Category (US$)

ACTIVITY	BREEDING	MOLTING	MIGRATION	WINTERING	TOTAL
Banding					
Surveys					
Research	$151,827				
Communication					
Coordination					

Total project cost was $151,827. The SDJV investment of $38,465 was leveraged 4 times.