

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

**Project Title:** Ecological and behavioural monitoring of American Common Eiders during the annual cycle (SDJV # 71; Year 1 of 3)

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**Partners:** Sea Duck Joint Venture ; Canadian Wildlife Service (Quebec Region); Université du Québec à Rimouski (UQAR)

**Project Description**

In this project, we want to apply a recent technique for the study of sea ducks that enables an investigator to monitor the behavior and energy expenditure of an individual during a full annual cycle. The American race of Common Eiders is facing increasing environmental pressure from harvesting of coastal resources, hunting, oil spills and soon, offshore wind parks. Our main goal is to link the various biological phases (post-hatching, molting, pre-laying, etc.) of the annual cycle together by understanding the relationships between habitat use, energy expenditure, food demand and migratory movements.

Our objectives are only slightly different than our original proposal (see Project Status) : 1) to quantify the timing and duration of annual phases, 2) to quantify habitat use (depth), energy expenditure, time spent diving and protein turnover of post-reproductive females, 3) to use depth, daily diving and bottom time to estimate feeding efficiency and foraging effort throughout the annual cycle, 4) to estimate the duration of the pre-laying period based on the timing of spring migration and relate these (individual) estimates to energy expenditure, foraging behavior and laying date.

**Preliminary results**

Our objectives for FY 2006-2007 required to deploy data loggers (DLSs), to monitor breeding biology and assess body condition of post-hatching females. We consider this first year as a pilot experiment where we wanted (1) to check the return rate of experimental and control females, (2) to design and use a set of nest boxes that can be closed from a remote location and (3) develop and apply a new technique to measure the rate of protein synthesis and deterioration in the specimens collected.

We conducted our study at Pointe Mitis (47°34' N; 70°12' W) for the deployment of DLSs. This colony was chosen based on its low number of breeding females and easy access. Because our study requires the deployment of DLSs a first year and catch back the same females one year later, our main concern is to maximize the probability of females' return. One way to achieve this is to maximize the hatching success (because successful females have a higher return rate).

**CATCHING OF EXPERIMENTAL FEMALES:** We designed nest boxes that we were able to close at 500 feet distance using a remote control. Forty-four (44) such nest boxes were installed this year and most (42) of these were used by breeding eiders whereas only 14 nests were found outside the nest boxes (total population = 56 nest). Sixty-eight gulls (*L. argentatus* and *L. marinus*) nests were found on the island. We formerly had problems with nest boxes as the power source was depleted over few days. We found out that it was caused by a manufacture defect of the solar panel (draining all the power from the batteries).

**BREEDING BIOLOGY:** Among the nest boxes used (42), 30 females hatched eggs, 11 nests were predated and 1 was deserted. Clutch size and laying dates averaged  $3.7 \pm (\text{SD}) 1.7$  eggs and  $17^{\text{th}}$  May  $\pm (\text{SD}) 6$  days, respectively. The high number of predated nests observed was probably caused by nesting boxes that were too high above the ground allowing gulls to enter the nest boxes. To remedy to this problem next year, the entrance of nest boxes will be reduced.

**DEPLOYMENT OF DLSs:** We planned to deploy a small number of DLSs the first year (summer 2006) and, depending on the return rate at that colony, deploy a large number (24) the second year (summer 2007). Six (6) DLSs were deployed the 3<sup>th</sup> of June on as many experimental females among which, 5 hatched successfully their eggs. The mean laying dates of these females was 15<sup>th</sup> May.

**ENERGY BALANCE AND ORGAN MASS:** 22 specimens were collected during the post-hatching phase around île Bicquette and île Saint-Barnabé, near Rimouski. Fresh muscle from 6 different regions of the body were removed. In addition, all specimens had their organs (lungs, pectorals, heart, gizzard, spleen, etc.) dissected and weighed and their wing morphology measured (wing span and wing area). Hemoglobin concentration was determined and fresh blood was conserved for further analysis. Because we need to collect all this information within 2 h of collection and tissues need to be frozen at  $-80^{\circ}\text{C}$  we already know that we need to collect less information to comply with these constraints. Enzyme essays will be applied this winter (2007) and RNA<sub>messenger</sub> will be quantified with the tissues collected to assess energy balance in each of the specimen collected. These measurements will be used to determine the metabolic capacity of the muscles and to estimate their growth rate. This project is conducted in collaboration with Dr. Pierre Blier, an eco-physiologist at our department.

### **Project status**

Ongoing. We are very satisfied with data collection during the first year of the project. However, we had to abandon the idea of laboratory estimates of food ingestion of Common Eiders feeding in a diving tank. This is because the diving tank is not available anymore (the plan was to do these experiments at Maurice Lamontagne Institute, IML) and is now used for an experiment on fishes that will last until summer 2008 (since IML is a fisheries institute, the priority is given to ichthyologists). Please see changes that have been incorporated in objective 3 of our proposal.

Next year, we plan to deploy 24 DLSs. We will also collect about 100 specimens to pursue our physiological analysis and we will initiate analysis of the retrieved data loggers.

### **Project Funding Sources (US\$) for FY06 (October 01 2005 to September 30 2006). These exclude in-kind contributions.**

| SDJV (USFWS) contribution | Other U.S. federal contribution | U.S. non-federal contribution | Canadian federal contribution | Canadian non-federal contribution | Source of funding (agency or organisation) |
|---------------------------|---------------------------------|-------------------------------|-------------------------------|-----------------------------------|--------------------------------------------|
| 16383                     |                                 |                               |                               |                                   | SDJV                                       |
|                           |                                 |                               | 8372                          |                                   | CWS                                        |
|                           |                                 |                               |                               | 23221                             | UQAR                                       |
|                           |                                 |                               |                               |                                   |                                            |

### **Total expenditures by Category (US \$) for FY06**

| ACTIVITY      | BREEDING | MIGRATION | MOLTING | WINTERING | TOTAL |
|---------------|----------|-----------|---------|-----------|-------|
| Banding       |          |           |         |           |       |
| Surveys       |          |           |         |           |       |
| Research      |          | 15992     | 15992   | 15992     | 47976 |
| Communication |          |           |         |           |       |
| Coordination  |          |           |         |           |       |