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

Project Title: (SDJV # 44; Year 3 of 3) **Winter habitat use and selection of the Barrow's Goldeneye (*Bucephala islandica*), Eastern population, along the St. Lawrence River Estuary, Quebec, Canada**

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Partners: Sea Duck Joint Venture, Canadian Wildlife Service (Quebec Region), Université du Québec à Rimouski (UQAR), Fondation de la Faune du Québec (FFQ), Fonds Québécois de Recherche sur la Nature et la Technologie (FQRNT)

Project Description
The St. Lawrence River Estuary is the major wintering area for the Eastern North American population of Barrow's Goldeneye, which is legally considered "at risk" by the Canadian and Quebec Governments. Six months a year, this estuary supports over 50% of the population, estimated at no more than 4,500 birds. Still, nothing is known about factors that may control the species distribution (e.g. macro- and microhabitats, food preferences and depletion) along its main wintering area. Winter habitats are likely critical to this small population whose annual recruitment is dependant upon high adult survival.

Our objectives are : 1) to describe macrohabitats used by the population at the scale of the estuary, 2) to describe microhabitats at the scale of the bay or foreshore flat itself, 3) to describe winter diet and trophic level, 4) to quantify time and energy budget in order to understand what may constrain winter survival of the population. Knowledge about the habitat requirements of Barrow's Goldeneyes is quoted as a high priority need in SDJV Strategic Plan 2001 – 2006.

Preliminary results
In FY 2006, emphasis was given to specimen collection for diet analysis and to habitat description in the sub-tidal zone. Our objectives also addressed time budget and habitat use at the microhabitat scale. We focused our data collection at three sites distributed in the core of the wintering grounds of the species on the North Shore of the St. Lawrence River Estuary (Saint-Irénée, 47°34' N; 70°12' W; Baie-des-Rochers, 47°50' N; 69°51' W; Godbout, 49°19' N; 67°36' W). Winter data collection took place from November 22, 2005 to April 20, 2006.

FLOCK POSITIONING AND TIME BUDGET: Direct observation using a laser binocular and a mapping-grade GPS receiver allowed us to accurately record a total of 290 locations of flocks of wintering Barrow's Goldeneyes (mean size ±SD of 78 individuals ±159). In cases where adverse weather conditions precluded the use of laser binoculars (snow, fog, rain), we positioned the flocks directly on aerial photographs. Flock positioning and time budget data collection were conducted from dawn to dusk and at every stage of tidal cycle. Time-activity budgets were quantified using focal sampling; about 35 hours of observation were recorded. A total of 376 focal individuals were observed for over a minute with a mean duration of 5 minutes ± 4 (maximum 10 minutes). A feeding activity level index will be used to analyze the influence of daily rhythms (tide and time of day), season (day length, period of winter, temperature), and habitat (habitat types, water depth) variables on Barrow's Goldeneyes' activity budgets.

MICROHABITAT DESCRIPTION: In FY 2006, microhabitat description was conducted through scuba sampling in the subtidal zone of three sites. A systematic design of 31 transects allowed the semi-quantitative description of 293 ha of coastal habitat between the low-water mark and the 5 meter isobath. Habitats surveyed were mostly characterized by sea-lettuce fields over soft substrate (sand, clay), by kelp forests over pebble beds and boulders and by urchin barrens. Most abundant benthic invertebrates were green sea urchins, sponges, polychaetes and whelks. Blue mussels were rare in all sites. *Fucaceae* were nearly absent below the low-water mark in all sites.

HABITAT USE: Distribution of Barrow's Goldeneyes within a site seems to match that of dense *fucaceae* communities when present. Fewer locations were recorded over bare soft substrate and over sub-tidal zone.

DIET AND TROPHIC LEVEL: We intend to assess diet and trophic level by direct gut content examination and stable isotope analyses. 27 specimens were collected while feeding at various occasions during winter. Samples of tissues (liver, blood, muscle, bone, kidney, gall blader) were dissected from the specimens and prepared for δC_{13} and δN_{15} isotope analysis and/or contaminants analysis. Invertebrates sampled within the sites were also prepared for stable isotope analyses. Detailed sorting of gizzard and gullet contents and prey taxa identification are currently underway. The most frequent prey taxa encountered in digestive tracts are gastropods (100% of occurrence) and amphipods (75%).

Project status

A combination of wind and low temperatures resulted in an unusually wide extent of land-fast ice in our study area from late January to early March. Just like the year before, ice cover complicated localization and observation of Goldeneyes from ground stations. It also rendered specimen collection extremely difficult and hazardous.

Preliminary results for year 2004-2005 were presented during the poster session at the 2nd North American Sea Duck Conference held in Annapolis in November 2005.

Most data are now arranged into data base and the analysis of data has started.