Sea Duck Joint Venture
Annual Project Summary for Endorsed Projects
FY 2005 - (Oct. 1, 2004 to Sept. 30, 2005)

Project Title: Habitat use by breeding and post-breeding Red-breasted Mergansers in the Gulf of St. Lawrence (SDJV project # 51)

Principal Investigator

RODGER D. TITMAN - Department of Natural Resource Sciences, Macdonald Campus of McGill University, 21,111 Lakeshore, Ste-Anne-de-Bellevue, Québec, Canada H9X 3V9.
Email: rodger.titman@mcgill.ca

Investigators

JEAN–PIERRE L. SAVARD – Canadian Wildlife Service (CWS), 1141 Route de l`Église, P.O Box 10100, Sainte-Foy, Québec, Canada G1V 4H5.
Email: jean-pierre.savard@ec.gc.ca

SHAWN R. CRAIK – Ph.D. candidate. Department of Natural Resource Sciences, Macdonald Campus of McGill University, 21,111 Lakeshore, Ste-Anne-de-Bellevue, Québec, Canada H9X 3V9. Email: shawn.craik@mail.mcgill.ca

Partners: McGill University, Canadian Wildlife Service (Québec Region), Parks Canada, New Brunswick Wildlife Trust Fund, Province of Québec Society for the Protection of Birds, Bishop's University

Project Description: Both Red-breasted (*Mergus serrator*) and Common (*Mergus merganser*) mergansers have historically been shot illegally in eastern North America while suspected of foraging on fry of Atlantic Salmon (*Salmo salar*). Descriptions of distribution and ecology for Red-breasted and Common mergansers have often been given together, with more emphasis on the more abundant Common Merganser. As a result, the Red-breasted Merganser has perhaps been unjustly accused of having an impact on local sport fish populations despite the fact that its often separate role in coastal environments during breeding and molting is not well understood. Specifically, identification and detailed characterization of coastal breeding (nest and brood habitat requirements) and molting habitats for Nearctic Red-breasted Mergansers are lacking. Also, little is known of the dynamics of merganser populations during the breeding and post-breeding periods. Factors affecting both nest and brood survival in saltwater environments have not been studied in detail. Age and sex ratios as well as molt chronology and feeding ecology at marine post-breeding sites have not been examined.

Studies of breeding mergansers were conducted at Kouchibouguac National Park, New Brunswick, Canada from mid-May to mid-September beginning in 2002. Here, a population of colonial Red-breasted Mergansers has nested on four barrier islands. Investigations of molting mergansers occurred along western Anticosti Island, Québec, Canada, from early July to mid-September in 2005. Over 3,000 post-breeding mergansers were studied at various coastal locations, indicating that Anticosti Island is a major molting area for mergansers in eastern North America.

Objectives: Our main goal is to describe and quantify habitat use by Red-breasted Mergansers during the breeding and post-breeding periods. We also aim to examine population dynamics of mergansers at Kouchibouguac and Anticosti Island. Specifically, our objectives relate to:

Nest-site selection.-- 1) to determine patterns of Red-breasted Merganser nest-site selection by comparing microhabitat characteristics (*e.g.* concealment, vegetation density) at nest sites with randomly located sites, as well as these same characteristics between successful nests versus abandoned nests and; **2)** to investigate the importance of microhabitat at nest sites related to daily nest survival rates.

Brood habitat selection.-- 3) to determine movements and patterns of habitat use by radio-marked Red-breasted Merganser broods at two spatial scales, including selection of home ranges (2^{nd} order) and selection for sites within home ranges (3^{rd} order); and **4)** to estimate daily survival rate of marked merganser young from hatching to fledging.

Post-breeding habitat selection.-- 5) to describe post-breeding microhabitats at two spatial scales: a) at flock locations; and b) at the scale of the bay using transect sampling. We plan to examine the relationship between feeding ecology and habitat use patterns; **6)** to examine temporal variation in age and sex composition of molting flocks; and **7)** to document the chronology of wing and body molts by males, as well as wing molt by females on breeding grounds.

Preliminary Results:

Nest-site selection.-- In 2005, a total of 77 Red-breasted Merganser nests were monitored on four barrier islands at Kouchibouguac. Apparent nesting success was 60%. Microhabitat, including overhead and lateral concealment, live-and dead vegetation heights, vegetation diversity and density, and distances to wrack line, edge, and nearest conspecific nest, was recorded at nest and random sites. Merganser nests were located in dense stands (>75 stems/40 cm^2) of marram grass (*Ammophila breviligulata*). Both overhead and lateral concealment scores were typically higher at nest sites than at random sites which often occurred in sparsely vegetated regions of the islands. Discriminant function analysis (DFA) is being used to determine microhabitat characteristics that best discriminate between nest and random sites, as well as between successful and abandoned nests.

Brood habitat selection.-- From 2002 to 2004, 27 female mergansers at Kouchibouguac were captured at the nest during the final week of incubation and equipped with a subcutaneous radio transmitter immediately posterior to the nape. Upon leaving the nest, radio-marked broods were located daily from a sea kayak or small motorcraft. We used a landscape-level approach to habitat selection where nine coastal habitats were delineated from the Maritime Provinces Wetlands Inventory. Habitat types were determined and digitized on georeferenced 1996 ortho photographs. At both the 2^{nd} and 3^{rd} orders of selection, radio-marked broods preferred continental and barrier island estuarine intertidal flats. Adjacent tidal wetlands of estuarine intertidal flat habitat provided young broods with concealed loafing sites amidst emergent salt water cordgrass (*Spartina alterniflora*). Preliminary fish sampling evidence has suggested that the intertidal regions of Kouchibouguac's estuarine system support a diversity of small fish species, including Atlantic Silversides (*Menidia menidia*), in high abundance throughout the late summer brood-rearing period.

Post-breeding habitat selection.-- In 2005, a total of 12 merganser post-breeding sites were identified along the south, west, and north coasts of western Anticosti Island. Observation sites primarily occurred within shallow bays or along linear coastlines characterized by an extensive

intertidal bedrock reef. Our objectives in 2005 addressed habitat requirements at the scale of flock locations. Microhabitat, including water depth, water temperature, sea surface temperature, tidal stage, tidal regime (intertidal or subtidal), distance to high tide line, diversity and percentage of submergent vegetation, and substrate type, was determined from kayak at sampling plots in sites used by 76 flocks. Foraging mergansers were often observed feeding in shallow marine intertidal zones characterized by sand-rock substrate and stands of submergent rockweed (*Fucus spp*.). Diet composition of six collected males will be used to explore food-habitat relationships.

Flocks of post-breeding mergansers were almost exclusively composed of immature and adult males. Many males were undergoing prebasic body molt upon arrival at post-breeding sites at Anticosti. Flightless males were first observed 1 August but most birds had lost flight feathers and were in basic plumage by the second week of August. Although full-grown primaries were observed on several birds as early as the second week of September, most birds had regained flight by early September.

Project Status: We met our main objectives in 2005 by collecting nest-site microhabitat data and monitoring merganser reproductive success at Kouchibouguac, as well as collecting microhabitat, flock composition, and molt chronology data at post-breeding sites at Anticosti Island. We had originally planned to collect 45 post-breeding male mergansers in 2005 to facilitate food-habitat and molt chronology studies. Nevertheless, reliable collection techniques were eventually identified and in 2006 a total of 60 flightless male mergansers will be collected from mid-July to mid-September (20 birds/month).

Brood movement and habitat use data analyses are ongoing. Since duckling marker (nape tags) retention was low in 2003 and 2004, we are attempting to identify alternative marking methods that may be used in a future study. Nesting and post-breeding ecology datasets will be completed during the spring and summer of 2006, the final year of this five-year study. Efforts will also be made in 2006 to identify other major merganser breeding sites along the eastern shorelines of New Brunswick, including Bouctouche and Miramichi river estuaries. A Ph.D. dissertation will result from this research in late 2007.

Figure 1. Flock of post-breeding Red-breasted Mergansers (*Mergus serrator*) at Baie Ste-Claire, Anticosti Island, Québec, 9 September 2005. Adult males are in basic plumage.
Photo taken by S. Craik.