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

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

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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 these two 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 commercial fish populations despite the fact that its often separate role in coastal environments during the breeding and post-breeding periods is not well understood. Specifically, identification and 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 population dynamics, including nest and brood survival, of mergansers occurring in marine environments.

Studies of breeding mergansers occurred at Kouchibouguac National Park, New Brunswick, Canada from mid-May to mid-September 2002 to 2006. Here, a population of colonial Red-breasted Mergansers nested on 4 small coastal barrier islands. Investigations of molting male mergansers were held throughout the wing molt at 3 coastal bays at the western extremity of Anticosti Island, Quebec, Canada, from early July to mid-September 2005 and 2006.

Objectives: Our main goal was to describe and quantify habitat use by Red-breasted Mergansers during the breeding and post-breeding periods. Specifically, our objectives were:

Nest-site selection.-- 1) to determine patterns of merganser nest-site selection by comparing a) macrohabitat (*e.g.* 3 island vegetation classes) use with availability; and b) microhabitat characteristics (*e.g.* concealment, vegetation density) at nest sites with randomly located sites, as

well as these same microhabitat characteristics between successful and abandoned nests and; **2)** to investigate the importance of macro- and microhabitat at nest sites related to daily nest survival.

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.

Habitat-feeding ecology of post-breeding mergansers.-- 5) to identify post-breeding habitats and examine differences in microhabitat characteristics between foraging and non-foraging flock locations; **6)** to examine stomach contents of collected birds; and **7)** to estimate variation in daily energy expenditure throughout the wing molt by undertaking behavioral observations.

Preliminary Results:

Nest-site selection.-- In 2006, 87 Red-breasted Merganser nests were located and monitored from late May to early August on the 4 islands at Kouchibouguac. The study also includes 78 nests that were monitored at the same sites in 2005. Throughout the study, merganser nests were typically found in dense stands of Marram Grass (*Ammophila breviligulata*) (> 75 stems/40 cm^2), rarely in patches of Sea Lyme Grass (*Leymus mollis*) (n = 2 nests in 2006), and did not occur in mixed stands of Yarrow (*Achillea millefolium*) and Tumble Mustard (*Sisymbrium altissimum*). Microhabitat, including overhead and lateral concealment, live and dead vegetation heights, vegetation diversity and density, and distances to wrack line, habitat edge, and nearest conspecific nest, was recorded at nest and random sites. Merganser nest sites typically had more overhead and lateral concealment, greater live and dead vegetation heights, and greater vegetation density than randomly selected sites. We plan to use discriminant function analysis (DFA) to determine microhabitat characteristics that best discriminate between nest and random sites as well as between successful and abandoned nests. The information theoretic approach will be used for selection of competing nest survival models consisting of time dependent and macro- and microhabitat variables.

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 subcutaneous radio transmitters. 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 loafing sites amidst stands of emergent Saltwater Cordgrass (*Spartina alterniflora*). 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 (mid-July to mid-September).

Post-breeding habitat selection.-- In 2006, microhabitat, including tidal regime, distances to wrack line and intertidal reef, water depth and clarity, substrate type, and submergent vegetative cover and species composition were recorded by diving at randomly selected merganser flock locations (n = 76) positioned with a laser range finder from mid-July to early September. Flocks were observed near shore (< 850 m) in clear and shallow intertidal and subtidal waters (< 12 m depth) typically over a bedrock/sand and rock substrate that supported a variety of submergent vegetation, including *Fucus spp.* and Black whip Weed (*Chordaria flagelliformis*) at intertidal

areas, as well as *Laminaria spp.* and Sea Colander (*Agarum cribrosum*) at subtidal regions. Since flock behavior was typically synchronous, we recorded whether selected flocks were foraging (n = 34) or not (n = 42) (*e.g.* either loafing or undergoing comfort movements) in order to investigate differences in habitat use patterns between the 2 behavioral groups. We also performed over 58 hours of diurnal behavioral observations and collected 49 post-breeding birds (44 AHY males, 4 AHY females, 1 HY male) to help investigate habitat-feeding ecology relationships. Highest feeding intensities were observed for several hours both following sunrise and prior to sunset and flocks were regularly observed feeding in shallow bays and intertidal regions along bedrock reefs (< 2 m depth). Initial observations from stomach contents suggest that collected birds were primarily obtaining Grubby (*Myoxocephalus aenaeus*), an abundant inshore fish of little commercial importance.

Project Status: We met our main objectives in 2006, the final field season of this 5-year project, by collecting nest-site macro- and microhabitat data, and monitoring merganser reproductive success at Kouchibouguac. Also, following our efforts in 2005 to identify key molting sites at Anticosti Island, we were successful in 2006 recording microhabitat characteristics at flock locations, undertaking behavioral observations, and collecting a number of flightless birds for feeding habit analyses. Efforts to collect additional flightless mergansers may be made in 2007. Attempts were unsuccessful in driving flightless male mergansers into floating gill-nets for purposes of banding and molt studies. A Ph.D. dissertation will result from this research in late 2007.

Since duckling marker (nape tags) retention was low throughout the brood study, we plan to identify alternative marking methods that may be used in a future duckling survival investigation. Reproductive parameters, including nest success, will continue to be monitored annually in upcoming years at the Kouchibouguac breeding colony.

Figure 1. Red-breasted Merganser (*Mergus serrator*) nest amidst a stand of Marram Grass (*Ammophila breviligulata*) on a barrier island at Kouchibouguac National Park, New Brunswick, 2006.

Table 1. Project Funding Sources (US$).

SDJV	Other U.S. federal	U.S. non-federal	Canadian federal (CWS)[a]	Bishop's[b]	Delta Waterfowl[c]	NBWTF[d]	Parks Canada[e]
7930	0	0	1780	6188.29	5000	4005	2250

[a] Canadian Wildlife Service – Quebec Region
[b] Bishop's University research grant
[c] Delta Waterfowl student support
[d] New Brunswick Wildlife Trust Fund
[e] Kouchibouguac National Park in-kind support (e.g. lodging and boat use)

Table 2. Total expenditures by category (US$).

ACTIVITY	BREEDING	MOLTING	MIGRATION	WINTERING	TOTAL
Banding	0	0	0	0	0
Surveys	0	0	0	0	0
Research	6255[a]	12968.29[b]	0	0	19223.29
Communication	0	0	0	0	0
Coordination	0	0	0	0	0

[a] Breeding research supported by the New Brunswick Wildlife Trust Fund and Parks Canada.
[b] Molting research supported by the North American Sea Duck Joint Venture, Canadian Wildlife Service, Bishop's University, and Delta Waterfowl Foundation.