Sea Duck Joint Venture
Annual Project Summary for Endorsed Projects
FY 2005 – (October 1, 2004 to September 30, 2005)

Project Title: Winter habitat use and selection of the Barrow's Goldeneye (*Bucephala islandica*), Eastern population, along the St. Lawrence River Estuary, Quebec, Canada (SDJV # 44; Year 2 of 3)

Principal Investigator: Magella Guillemette, Département de biologie, chimie et sciences de la santé, Université du Québec à Rimouski, P.O. Box 3300, 300 allée des Ursulines, Rimouski, Québec, Canada G5L 3A1 magella_guillemette@uqar.qc.ca

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
Our objectives for FY 2004-2005 addressed diet, trophic level, time budget and habitat requirements at the microhabitat scale. We focused our data collection at four 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; Franquelin, 49°17' N; 67°53' W; Godbout, 49°19' N; 67°36' W; Figures 1-4). Winter data collection took place from November 15, 2004 to May 6, 2005.

FLOCK POSITIONING AND TIME BUDGET: Direct observation using a laser binocular and a mapping-grade GPS receiver allowed us to accurately position a total of 802 flocks (mean size ±SD of 25 individuals ±48) of wintering Barrow's Goldeneyes. In cases where weather conditions precluded the use of laser binoculars (snow, fog, rain), we positioned the flocks directly on an

aerial photograph. Flock positioning and time budget data collection were conducted from the beginning to the end of twilight and at every stage of tidal cycle.

Time-activity budgets were quantified using both scan and focal sampling methods. About 60 hours of observation were recorded, mainly through focal sampling. A total of 427 individuals were observed for over a minute (mean duration of 7 minutes ±8), while 23 periods of flock scanning were performed (mean duration 21 minutes ±20). 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 (prey availability *vs* habitat types) variables on Barrow's Goldeneyes' activity budgets.

MICROHABITAT DESCRIPTION: Examination of aerial photographs allowed the description of 729 hectares of coastal habitat in terms of substrate, topography and macrophyte communities. In-site habitat description in August allowed us to validate and refine our remote sensing work. Field investigation was conducted by snorkeling when required. In addition, 48 plots (area of 25 meters^2) randomly distributed in each type of habitat were used to evaluate the percent cover of macrophyte communities and classes of particle size. In each plot, benthic organisms were surveyed in 5 quadrats in order to compare diversity of available prey within the sites with prey ingested by collected specimens. Bathymetry was assessed with archived tide levels and with a bathymetric survey data-set (precision ±0.1 meter) provided by the Department of Fisheries and Oceans Canada. When required, the data-set was completed *in situ* with the use of an optic level.

Three sites are characterized by extended areas of soft substrate and by ridges of limestone and/or granite. Boulders are scattered over the sites. Macrophytes are present wherever they can attach to hard substrate. *Fucaceae* form dense communities below the high-water mark while *Laminaria* and *ulvaceae* are abundant below the low-water mark. One site (Godbout) is characterized by soft substrate only (sand and gravel) and lacks boulders and ridges of hard substrate. Macrophytes are therefore scarce.

HABITAT USE: Distribution of Barrow's Goldeneyes within a site seems to match that of dense *fucaceae* communities when present (Figures 1-3). Fewer locations were recorded over bare soft substrate. *Laminaria* communities are also used, mostly where *fucaceae* are absent or scarce (Fig. 4).

DIET AND TROPHIC LEVEL: We intend to assess diet and trophic level by direct gut content examination and stable isotope analyses. Twelve specimens were collected while feeding at various occasions during winter. Gullet (esophagus and proventriculus) and gizzard content of each specimen was sorted, and volume, biomass and frequency of occurrence were recorded for each type of prey. Samples of tissues (blood, muscle, bone collagen, feather) were collected from the specimens and analyzed, for δC13 and δN15 isotopes. Additional blood as well as feather and feces samples were obtained from ten individuals netted within our study area for the purpose of other studies. Preys sampled within the sites were also submitted for isotope analyses.

The most frequent prey taxa encountered in digestive tracts were gastropods (100% of occurrence), blue mussels (66%), amphipods (42%) and polychaetes (33%). The most important prey (% of volume) differs between sites and with blue mussel most important in 42% of specimens and gastropods in 25% of specimens. More detailed gut content analysis and identification of prey taxa are currently underway.

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. This atypical ice cover complicated localization and observation of Goldeneyes from ground stations. It also rendered specimen collection extremely difficult and hazardous.

Additional field data collection is scheduled for winter 2005-2006. Emphasis will be given to specimen collection and time budget in early and mid winter. Also, additional habitat description and invertebrate sampling are planned for summer 2006 in places requiring scuba-diving trips. Nocturnal observations will also be made in order to verify the importance of day length on foraging behavior.

Preliminary results for year 2004-2005 will be presented during the poster session at the Second North American Sea Duck Conference in Annapolis in November 2005.

Project Funding Sources (US$) for FY05 (May 01 2005 to April 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)
18826					SDJV
			12600		CWS
				17220	FQRNT
				3360	FFQ

FQRNT : Fonds Québécois de Recherche sur la Nature et la Technologie
FFQ : Fondation de la Faune du Québec

Total expenditures by Category (US $) for FY05

ACTIVITY	BREEDING	MIGRATION	MOLTING	WINTERING	TOTAL
Banding					
Surveys					
Research				52006	52006
Communication					
Coordination					

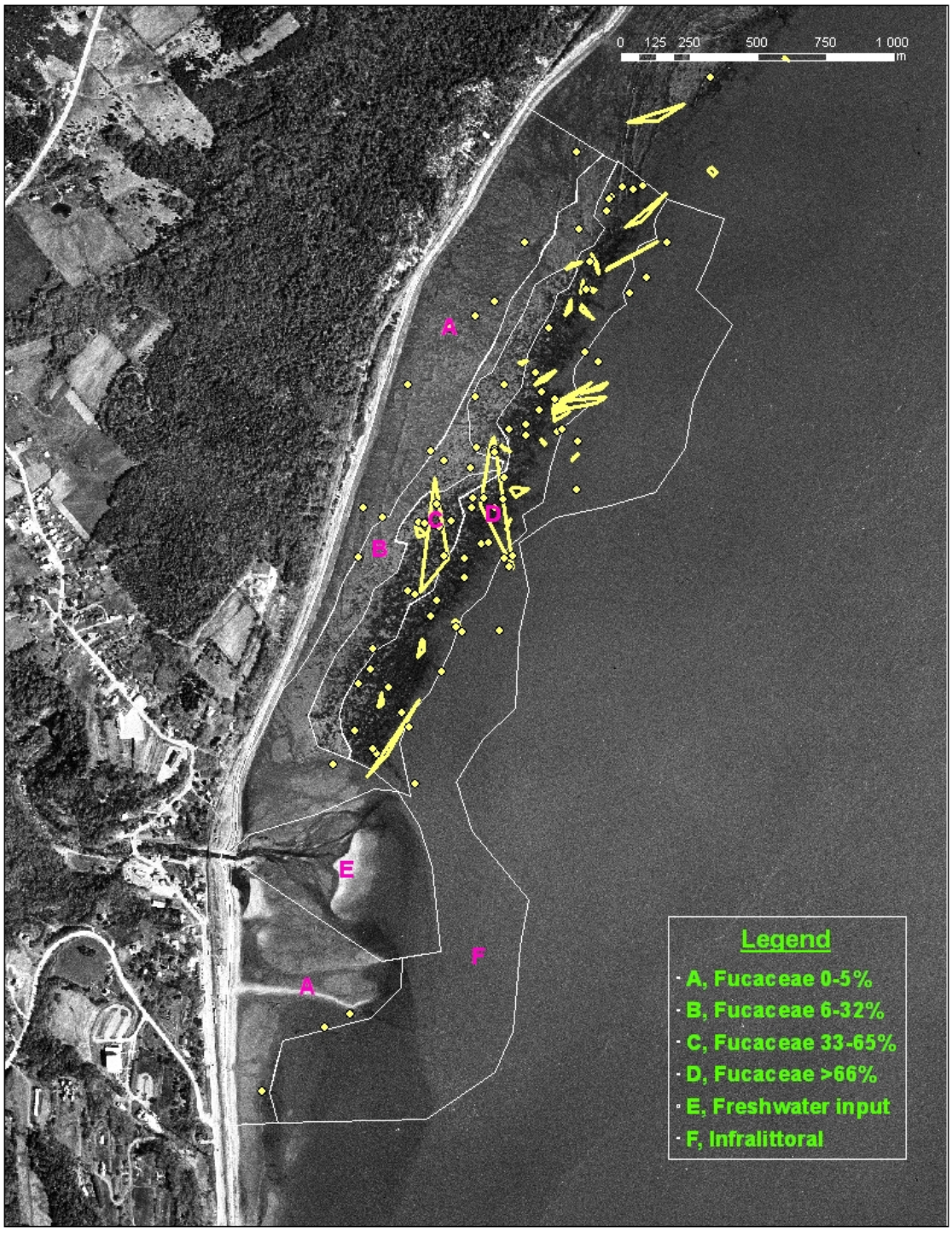

Figure 1. Positions of Barrow's Goldeneyes flocks in Saint-Irénée, QC (47°34' N; 70°12' W)

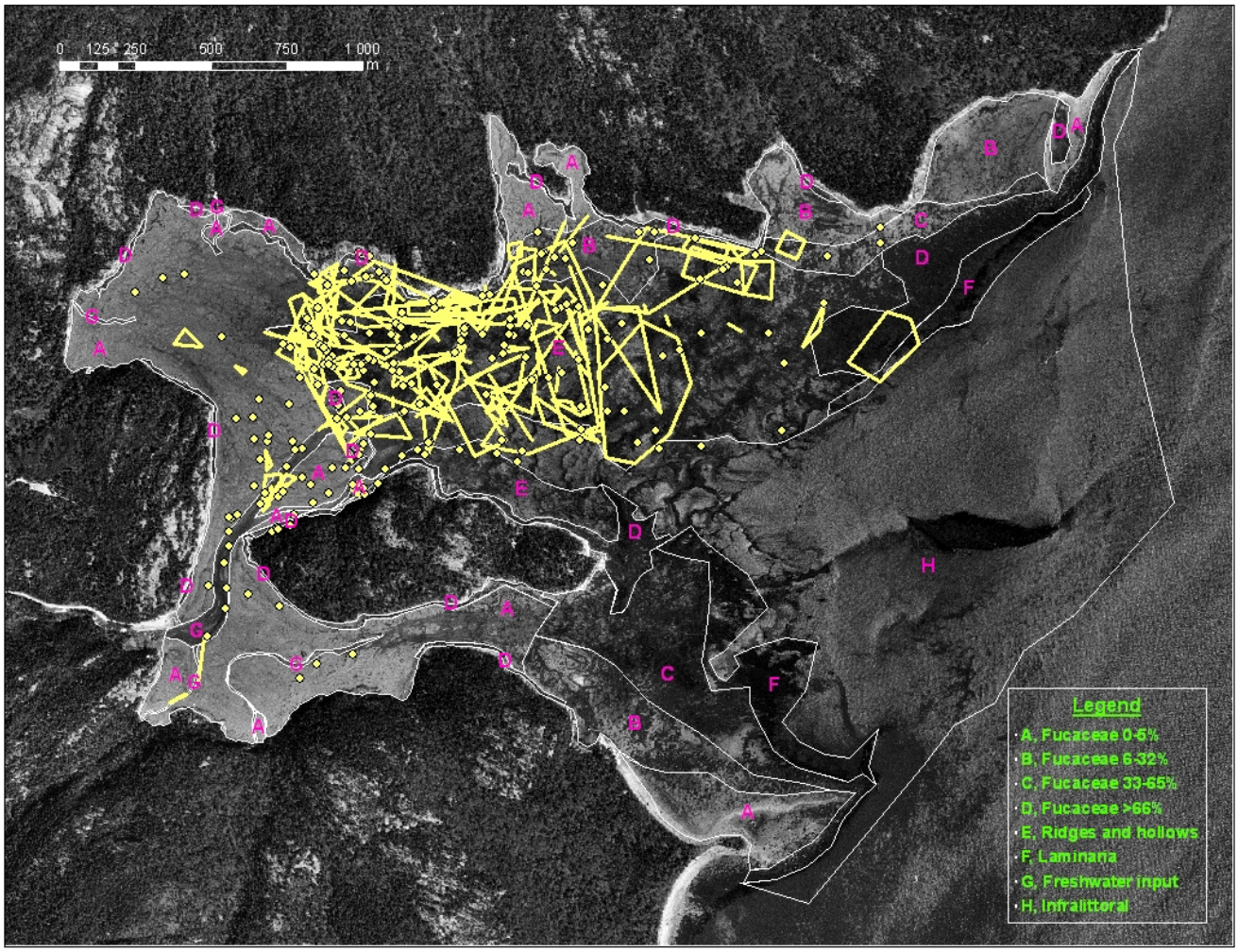

Figure 2. Positions of Barrow's Goldeneyes flocks in Baie-des-Rochers, QC (47°50' N; 69°51' W)

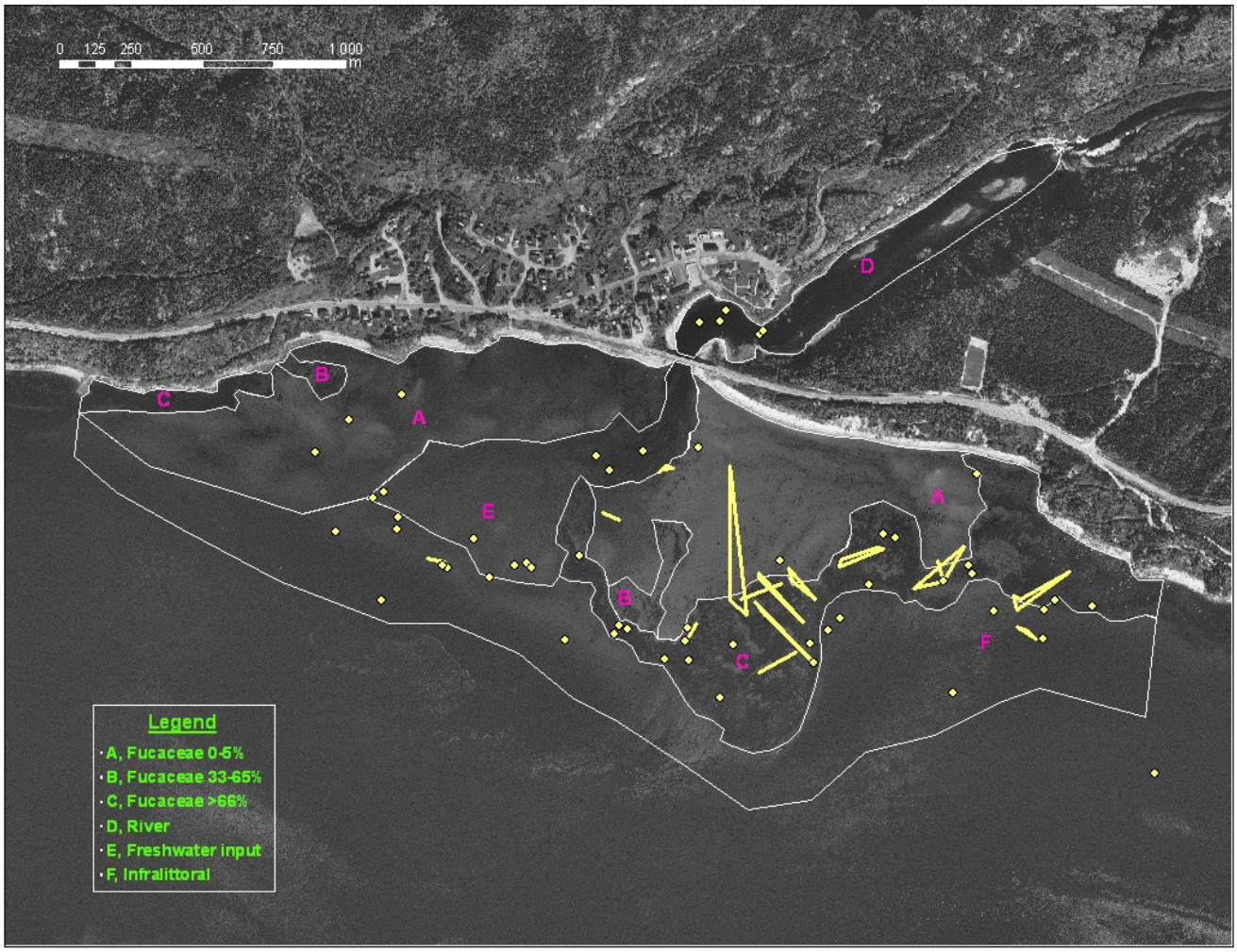

Figure 3. Positions of Barrow's Goldeneyes flocks in Franquelin, QC (49°17' N; 67°53' W)

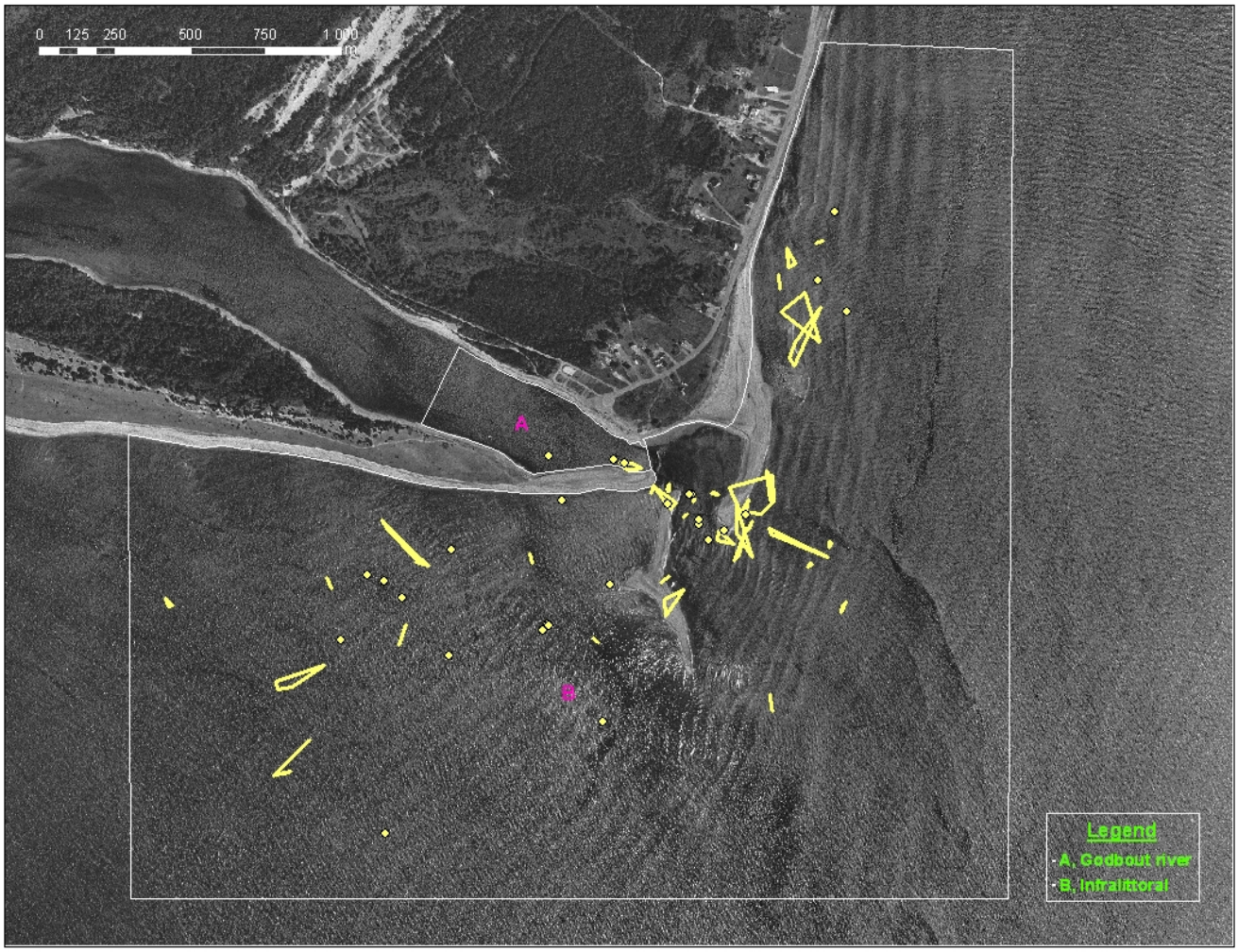

Figure 4. Positions of Barrow's Goldeneyes flocks in Godbout, QC (49°19' N; 67°36' W)