

Sea Duck Joint Venture
Annual Project Summary for Endorsed Projects
FY 05 – (October 1, 2004 to Sept 30, 2005)
Reporting Deadline: September 30, 2005

Project Title:

SDJV # 60: **GIS Analysis of Habitat Use by Surf Scoters and White-winged Scoters**

Principal Investigator(s):

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Project Description :

Numbers of Surf and White-winged Scoters are in decline. Because these species spend most of their annual cycle in wintering areas, identification of important winter habitats is critical for appropriate management and consideration of factors underlying observed population changes. This is reflected in the SDJV Strategic Plan, which emphasizes the need for identification of important coastal habitats. We conducted a detailed, GIS-based analysis of Surf and White-winged Scoter winter habitat use in coastal BC.

This study was designed to examine the spatial correlation between Surf and White-winged Scoter distributions and attributes of the environment in Baynes Sound, British Columbia, an important coastal wintering area. From this we can infer which aspects of the habitat are particularly beneficial or detrimental for scoters.

Field material collected.—The abundance and distribution of wintering scoters were surveyed biweekly from October until April during three recent winter seasons (2001/2002 - 2003/2004) covering coastal waters of Baynes Sound. Survey data were collected in a spatially explicit manner; that is, all scoter observations were linked to a specific site, in this case contiguous bird survey polygons that covered the entire study area coast line averaged 1.5 km of shore each, and extended 800 m from shore. The total length of regularly surveyed shoreline was ~70 km. In addition to bird surveys, bivalves, as the main scoter food resource, were sampled in 2002 and 2003 across the entire study area. Information on intertidal sediment types and shellfish aquaculture type and extent also were collected in 2004.

Other available environmental data.—A number of GIS layers representing different environmental features were assembled through the Canadian Wildlife Service, including: TRIM coastline and islands (M 1:20,000), georeferenced nautical charts (M 1:40,000; 1:80,000), digitized bathymetry lines (M 1:40,000; 1:80,000), Pacific estuary database (PECS, 2004), orthophotos (1999, M 1:20,000), high resolution aerial photos of the coastal zone (still to be obtained), and physical and biological shorezone data (available, but not officially proofed and released).

GIS analysis.—We used GIS analyses to evaluate spatial relations of scoter abundance and distribution to different habitat attributes. Bird survey polygons were used as sampling units, and scoter densities were the response variable in multiple regression models. Boundaries of these polygons were digitized and used as an intersecting layer to obtain environmental information characterizing each survey polygon. GIS layers containing environmental information often had to be manipulated to be ready to use for data extraction. Prepared environmental data layers were intersected with bird survey polygons, resulting in a number of environmental descriptors attributed for each polygon: intertidal area, polygon area, depth zones, bivalve data, dominant sediments, aquaculture type and extent, shoreline exposure, proximity to estuaries, etc. Finally, extracted data were transferred to a standard statistical package (SAS) and analyzed in a multiple regression context using an information-theoretic approach to model selection (Burnham and Anderson, 2002).

Objectives :

Identify attributes of winter habitats that correspond to observed variation in densities of Surf Scoters and White-winged Scoters, through application of GIS and detailed analysis of existing data.

Results:

Findings for this study are presented in the following peer-reviewed publication:

Ydelsis, R., D. Esler, W. S. Boyd, D. Lacroix, and M. Kirk. 2006. Habitat use by wintering surf and white-winged scoters: effects of environmental attributes and shellfish aquaculture. *Journal of Wildlife Management*: in press.

In brief, we found that, despite the extensive clam and oyster farming in our study area, densities of wintering surf scoters and white-winged scoters were determined primarily by natural environmental attributes, particularly intertidal area, clam density, and sediment type; shellfish aquaculture variables were generally poor predictors of bird densities. We conclude that current levels and forms of shellfish aquaculture in our study site were not an important determinant of scoter distribution and abundance, suggesting that winter scoter populations and the shellfish aquaculture industry may be mutually sustainable. We caution that intensification or further industrialization of shellfish aquaculture in British Columbia could eventually lead to detrimental effects if some threshold level of habitat modification is exceeded.

Project Status (e.g., did you accomplish objectives, encounter any obstacles, do you have plans for the future?)

This project is completed.