

Sea Duck Joint Venture
Annual Project Summary for Endorsed Projects
FY 02 – (October 1, 2001 to Sept 30, 2002)

Project Title: No. 15: Evaluating Effects of the Shellfish Industry on Scoter Populations in Coastal British Columbia

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Partners: US Fish and Wildlife Service, US Geological Survey, Nestucca Oil Spill Fund, NSERC Strategic Grant

Project Description: Coastal British Columbia supports important concentrations of surf scoters and white-winged scoters. The habitats used by scoters also support shellfish aquaculture, an industry that has the potential to expand dramatically. Our research investigates the interactions between scoter populations and the shellfish industry, with the intent of evaluating potential effects, either detrimental or beneficial, of shellfish aquaculture on scoter population sustainability, at local and regional scales and short- and long-term time frames.

The research is designed to use several approaches at three coastal sites (Baynes, Barkley, and Desolation Sounds) to: (1) answer questions about basic scoter biology that will indicate potential mechanisms by which shellfish aquaculture (or other activities) could have population-level effects, (2) directly evaluate relationships of shellfish aquaculture to behaviour, survival, and habitat quality, (3) provide information necessary to set appropriate management goals for scoters, and (4) provide implications for management of shellfish aquaculture optimizing long-term sustainability of both the industry and scoter populations.

Specific research directions include: (1) documenting scoter abundance and distribution in relation to habitat attributes, proximity to shellfish aquaculture, and seasonal and annual variation, based on intensive surveys and habitat sampling; (2) describing movements and foraging behaviour of radio-marked individuals; (3) quantification of survival rates of radio-marked birds; (4) evaluation of various radio-marking packages on scoters; and (5) describing scoter trophic interactions with their primary prey.

Objectives: This work will lead to a clearer understanding of non-breeding biology of these poorly species, as well as an explicit conclusion about the population-level effects of shellfish aquaculture. Further, this work will allow us to estimate effects of other forms of habitat change.

Preliminary Results: Findings and results to date include:

1. Surveys (n=21) were conducted throughout the study site from October through March, and scoter locations were mapped for subsequent GIS analyses of variation in bird densities over time and space.
2. We radio-marked 99 scoters (58 WWSC, 41 SUSC) in Baynes Sound during 10-21 December 2001. We monitored the radioed birds through 25 April 2002 to determine locations, diving behavior, and survival.
3. We generated 975 precise locations of radioed birds, with corresponding information of whether they were actively feeding.
4. We found that survival during the 30 days post-marking did not differ among radio types.
5. Survival of radioed birds was high after the 30 day post-marking period.
6. Most of the marked birds did not move beyond Baynes Sound during winter and, in fact, many stayed within relatively small areas within the sound. Dispersal increased in association with herring spawn.
7. Foraging occurred primarily in intertidal habitats and almost all foraging occurred during daylight hours.
8. Diet of captured scoters was inferred from analysis of shell fragments in fecal samples; varnish clams (*Nuttallia obscurata*) and manila clams (*Venerupis philippinarum*) were the taxa most abundant in the fecal samples (based on dry mass of shell fragments).
9. Clams were sampled throughout Baynes Sound during summer 2002. Nineteen transects, spaced 3 km apart, were sampled with quadrats at 50m intervals from high tide line to low tide. 237 quadrats were dug, yielding 8852 clams > 10mm.

These results are preliminary as data preparation and rigorous analysis have not been applied. However, we are confident that the data gathered this winter will be valuable for understanding scoter interactions with aquaculture (and other forms of habitat change), as well as lending new insight into wintering biology of these poorly known species.

Based on the successes of the first winter, we intend to repeat the first winter's research approach in Baynes Sound during winter 2002-03, providing replication over time and increasing sample sizes. Also, we foresee adding specific research objectives, including direct observations of scoter behavior, capture of scoters at the end of the winter to document variation in body mass, and intensive sampling of bivalve diversity, distribution, size class, growth rates, and energy density. Accomplishment of this work will be enhanced by participation of 1 M.Sc. student and 1 post-doctoral fellow from the SFU Centre for Wildlife Ecology, as well as technical support, infrastructure, and funds from the NSERC industrial grant.

Also, we intend to expand the geographic scope of the project, initiating studies in Barkley and Desolation Sounds. During winter 2002-03, work in these areas would primarily consist of surveys of distribution and abundance of scoters; these will serve to familiarize us with the study sites and provide a general sense of how and where we can proceed with more intensive work in subsequent years (following the same protocol as the Baynes Sound work). Also, these surveys will be used to understand habitat associations of scoters and potential influences of aquaculture. In a general sense, expansion to these sites is important for broadening the inference of the research from Baynes Sound to the southern coast of British Columbia. These sites encompass a

diversity of coastal habitats, as well as a range of intensities of aquaculture, and hence allow a widened understanding of the influence of aquaculture on scoter populations.

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Project Funding Sources (US\$):

SDJV (USFWS) Contribution	Other U.S. federal contributions	U.S. non-federal contributions	Canadian federal contributions	Canadian non-federal contributions	Source of funding (agency or organization)
\$15000					
	\$10000				USGS (in kind)
			\$50000		CWS

Total Expenditures by Category (US\$):

ACTIVITY	BREEDING	MOLTING	MIGRATION	WINTERING	TOTAL
Banding					
Surveys					
Research				\$75000	
Communication					
Coordination					