

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

Project Title: No 13: Contaminants in surf scoters wintering in the Strait of Georgia, British Columbia, Canada.

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Project Description: Breeding and wintering populations of several species of sea ducks, including surf scoters, have declined over recent decades in the Pacific Northwest, and there are no clear reasons for those declines. Large congregations of scoters winter in bays and harbours along the Pacific coast, including Puget Sound and the Strait of Georgia, and many of the sites are highly polluted. Scoters are long-lived birds and, therefore, have the capacity to accumulate contaminants. They feed principally on molluscs and other benthic organisms such as echinoderms, a food chain known to accumulate specific endocrine disrupting substances, such as butyltins. Our research assessed the role of contaminants acquired during the winter from polluted areas of the Strait of Georgia on reproductive success.

We collected surf scoters in December and again 4 months later (March) from Howe Sound (harbour) and Baynes Sound (reference site) to determine accumulation of contaminants during the winter period. Surf scoters were also collected from two other harbour sites (Burrard Inlet, Esquimalt Harbour) in late winter (February/March). Collections involved either immediate retrieval of shot carcasses (Baynes Sound, Howe Sound), or live trapping in urbanized areas where shooting is not an acceptable collecting technique (Burrard Inlet, Esquimalt Harbour). Birds were assessed for body condition and tissues collected for histology (gonads, renal tissue, adrenal glands), biomarker assessment (EROD, vitamin A, porphyrins, metallothionein) and residue analysis (chlorinated hydrocarbons (OC/PCBs, PCDD/Fs, no-PCBs, PAHs), heavy metals (Cd, Zn, Hg, Se, Cu, Pb), butyltins, alkylphenols, phthalates).

Objectives: The objective of this study was to determine the exposure and effect of surf scoters to endocrine disrupting compounds acquired during the winter from the Strait of Georgia and assess the role of contaminants in population declines along the Pacific Coast.

Preliminary Results: Surf scoters were collected Howe Sound and Baynes Sound in December 1998 and March 1999, Burrard Inlet in February 1999, and Esquimalt Harbour in March 2000. Approximately 10 birds, predominantly adult males, were collected from each site and sampling time.

Contaminant residues in surf scoters from Howe Sound, Burrard Inlet and Baynes Sound have been analyzed. Results determined that butyltins (predominantly metabolites mono-BT and di-BT) were significantly elevated in Burrard Inlet compared to other sites. However, butyltin concentrations in adults appear to have declined by 76% in Burrard Inlet since 1992 (Kannan et al, 1998, Arch Environ Contam Toxicol 35:64-69), likely a result of the 1989 regulations of TBT anti-fouling uses. Hepatic EROD levels were significantly higher at Howe Sound compared to other sites. A possible source could be PAHs because traces of pyrene glucuronide were detected in the bile of a scoter from that area. With the exception of Cd, low levels of metals and chlorinated hydrocarbons were measured in scoters from each site. Body condition and subcutaneous fat reserves declined over the winter. Preliminary results suggest significant relationship between heart weight and butyltin burdens ($r^2=0.553$, $p<0.0001$). However, thorough analysis of the relationships between chemistry, biochemistry and morphology will be conducted when all analyses are completed.

Project Status: Detailed assessment of the relationships between chemistry, biochemistry and morphology will be conducted this winter, now that all analyses were recently completed.