

**Sea Duck Joint Venture
Annual Project Summary
FY2022 (October 1, 2021 – September 30, 2022)**

**SDJV Project #154: Integrating Fixed-Wing and Helicopter Survey Platforms to Improve
Detection and Species Identification of North American Breeding Scoters**

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Project Description:

Populations of North American breeding scoters appear to be declining although a large degree of uncertainty remains around estimates of population size and overall trends (Bordage and Savard 1995, Savard et al. 1998, Caithamer et al. 2000). We conducted experimental fixed-wing and helicopter integrated breeding surveys over portions of the core breeding range, in Québec-Labrador, northern Manitoba, and the Barrenlands of the Northwest Territories (fig 1), of all three North American scoter species. The overarching objective of the project is to produce recommendations for the development of breeding surveys for scoters and other Boreal/Arctic waterfowl.

Project Objectives:

There are 6 main objectives for this study:

1. Identify the optimal timing for breeding scoter surveys, based on data from previous nesting and productivity studies
2. Develop and evaluate methodology to accurately assess species identification and composition from an integrated fixed-wing and helicopter survey
3. Develop and evaluate methodology for estimating detection probabilities from an integrated fixed-wing and helicopter survey. This will address the perception bias component in both fixed-wing and helicopter components as well as availability bias from the fixed-wing component, allowing the estimation of visibility correction factors
4. Evaluate annual and geographic variation in species composition and detection probabilities to determine whether these components would need to be measured annually and/or across the range in an operational survey
5. Derive baseline abundance estimates for the experimental survey areas for all three populations of eastern scoters
6. Develop habitat selection models and test hypotheses about factors influencing scoter distribution across the survey area

Preliminary Results:

The study sites (fig 1) encompassed a variety of habitats ranging from tundra to treeline to boreal which resulted in a diverse assemblage of sea ducks observed on plots: all sites had all 3 species of scoters, Long-tailed ducks, 3 species of Mergansers, as well as Lesser and Greater scaup. The Ramparts River and Yellowknife sites were predominantly boreal and had a much higher proportion of scaup than the other sites. The Lynx Lake North site was predominantly above the treeline and allowed us to obtain important information on the extent of the breeding range for all three scoter species as well as other waterfowl. The George River site had much lower densities of waterfowl than other sites surveyed over the course of this project, typical of the less productive eastern Canadian boreal landscapes. We surveyed the Lynx Lake site for three consecutive years, which allowed for the quantification of annual variation in detection probabilities, breeding densities and habitat selection. The variety of habitats across the six sites resulted in a more robust analysis of habitat selection for all three species of scoters, Long-tailed duck, mergansers and scaup and therefore allow for better planning of future survey efforts in the region.

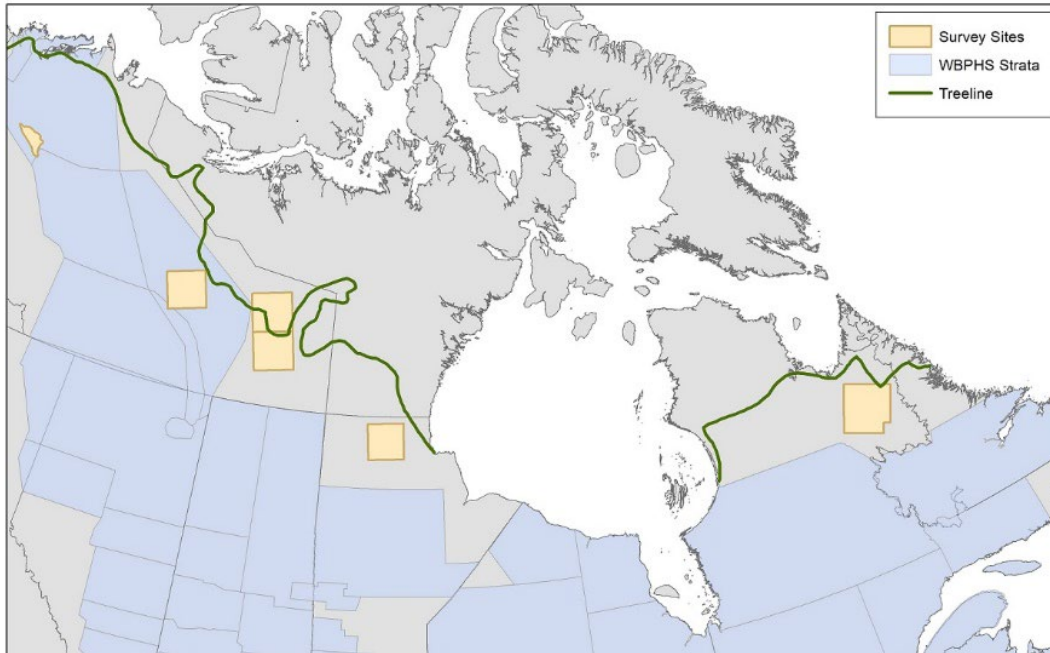


Figure 1. Locations of experimental surveys, 2017-2019 (Yellow areas). From east to west: George River QC, Little Duck Lake MB, Lynx Lake south NT, Lynx Lake north NT, Yellowknife NT, Ramparts River NT.

Project Status:

Progress towards survey objectives is as follows (numbers refer to objectives described above):

1. We have completed data analyses and determined breeding phenology for scoters. Survey data from 2017-2019 has confirmed that the survey timing falls within the early nesting period for scoters, scaup and other sea ducks, which is ideal timing for breeding pair surveys. A manuscript has been submitted to a peer-reviewed journal and is currently in review (see below)
2. We collected data using both fixed-wing and helicopter over the same areas in 2018 and 2019 such that we are able to compare species composition from the different aircraft type and identify potential species identification issues. Analyses have identified some discrepancies in the proportions of species counted from the different aircrafts. Integration of helicopter and fixed-wing data are in progress and a manuscript is being drafted (see below).
3. We developed an approach and derived estimates of species-specific detection probabilities from the helicopter in three years at six sites. We also collected data from the fixed-wing in two years at three sites. We completed data analyses and published two manuscripts in 2022 (see below)
4. We collected data from six sites over three years. We quantified variation in species composition and detection across part of the range and the addition of the 2019 data allowed us to expand the analysis to eastern North America. We surveyed Lynx Lake NT for the third consecutive year in 2019 allowing for a robust evaluation of short-term variation in species composition and detection probabilities. A manuscript is in the final stages of write-up and will be submitted for publication in early 2023 (see below)

5. We derived baseline population estimates for all surveyed areas, using helicopter data.
6. We developed habitat models for scoters, scaup and Long-tail Ducks and expanded our models to include other species of interest including mergansers, Bufflehead, Canada Geese, Common Loons, Red-throated Loons, Ringnecked Ducks, Northern Pintails, Mallards, and Green-winged Teals based on 2017-2019 survey data. Results show consistent patterns in habitat selection across years. We extracted habitat data across the Taiga Plains and Shield ecozones to make ecozone-wide density predictions. Analyses are completed and we are preparing a manuscript for publication, to be submitted in spring 2023.

The project is on track to meet its overall objectives, however travel restrictions due to the covid pandemic have prevented us from holding a workshop to develop monitoring recommendations. Our results to date confirm that the surveyed regions are core scoter breeding areas and are important for a number of other sea ducks and other waterfowl. The focus in 2022/23 will be to develop monitoring recommendations for scoters and other waterfowl in the Boreal-Arctic transition zone and hold a workshop to discuss monitoring options. We expect this recommendation document to be completed in fall 2023.

Manuscripts produced in 2022-23:

Roy et al. 2022. *A hierarchical dependent double-observer method for estimating waterfowl breeding pairs abundance from helicopters.* *Wildlife Biology*, 2022(1).

Cox et al. 2022. *Comparing waterfowl densities detected through helicopter and airplane sea duck surveys in Labrador, Canada.* *Avian Conservation and Ecology* 17 (2):24.

<http://www.ace-eco.org/vol17/iss2/art24/>

Bianchini et al. In Review. *Continental evaluation of breeding chronology and distribution of North American scoters in relation to population monitoring and breeding ground surveys*

Reed et al. in prep. *Towards the development of a sea duck monitoring strategy: using helicopter plot surveys to estimate waterfowl abundance in northern boreal Canada*

Cox, Roy, Gilliland, Reed et al. in prep. *Comparing species identification in fixed-wing and helicopter surveys*

Project Funding Sources (US\$). Complete only if funded by SDJV in FY21. This is used to document: 1) how SDJV-appropriated funds are matched, and 2) how much partner resources are going into sea duck work. You may include approximate dollar value of in-kind contributions in costs. Add rows as needed for additional partners.

SDJV (USFWS) Contribution	Other U.S. federal contributions	U.S. non-federal contributions	Canadian federal contributions	Canadian non-federal contributions	Source of funding (name of agency or organization)
Not funded by SDJV in FY22					

Total Expenditures by Category (SDJV plus all partner contributions; US\$). Complete only if project was funded by SDJV in FY21; total dollar amounts should match those in previous table.

ACTIVITY	BREEDING	MOLTING	MIGRATION	WINTERING	TOTAL
Banding (include only if this was a major element of study)					
Surveys (include only if this was a major element of study)					
Research					