Sea Duck Joint Venture
Annual Project Summary
FY2021 (October 1, 2020 – September 30, 2021)

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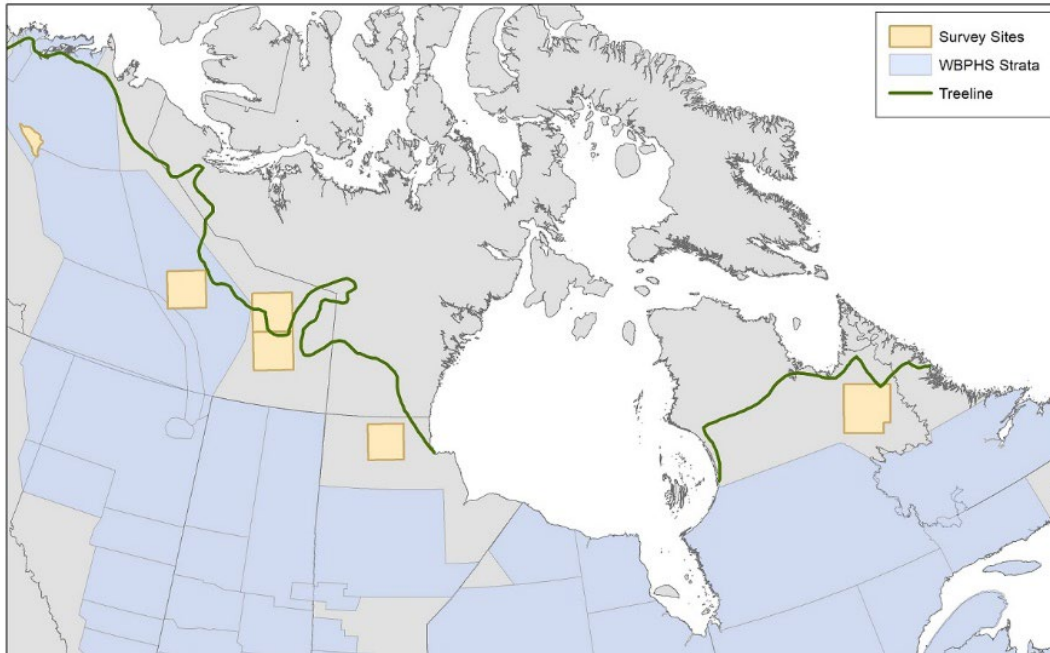
Figure 1. Locations of experimental surveys, 2017-2019 (Yellow areas). From east to west: George River QC, Little Duck Lake MB, Lynx Lake south NT, Lynx Lake north NT, Yellowknife NT, Ramparts River NT.

Project Status:

Progress towards survey objectives is as follow (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

2. We collected data using both fixed-wing and helicopter over the same areas in 2018 and 2019 such that we will be able to compare species composition from the different aircraft type and identify potential species identification issues. Preliminary 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.

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. In 2019-20, we analysed the fixed-wing data and identified issues with species-specific detection among observers. We are working on a new model using species groupings, which appears to be more robust. This work is in progress.

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.

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.

The project is on track to meet its overall objectives. 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 2021/22 will be to finalize data analyses, including the fixed-wing data, and writing of manuscripts on the breeding ecology of waterfowl in the Boreal-Arctic transition zone, integrated survey methodology, and approaches to estimate detection from aerial waterfowl surveys. A committee will be formed to develop monitoring recommendations for scoters and other waterfowl in the Boreal-Arctic transition zone. We expect this recommendation document to be completed in 2022.

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 FY21					

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					