Sea Duck Joint Venture
Annual Project Summary
FY2025 (October 1, 2024 – September 30, 2025)

Project Title:
Identifying demographic bottlenecks and habitat use to support the recovery and management of American common eider: a range-wide, full life-cycle telemetry project: 2025 (SDJV Project #162).

Principal Investigators:

Scott Gilliland
Canadian Wildlife Service (retired)
Biology, Acadia University,
33 Westwood Drive,
Wolfville, NS
B4N 3J2
sgg64@mac.com

Mark Mallory
Biology, Acadia University,
33 Westwood Drive,
Wolfville, NS
B4N 3J2
mark.mallory@acadiau.ca

Nic McLellan
Ducks Unlimited Canada
64 Hwy 6,
Amherst, NS
B4H 3Z5
n_mclellan@ducks.ca

Greg Robertson
Science and Technology Branch,
6 Bruce Street,
Mount Pearl, NL
A1N 4T3
greg.robertson@ec.gc.ca

Jean-François Giroux
Département des sciences biologiques,
Université du Québec à Montréal,
P. O. Box 8888, Stn Centre-ville,
Montreal, QC
H3C 3P8
giroux.jean-francois@uqam.ca

Alan Hanson
Canadian Wildlife Service
17 Waterfowl Ln.
Sackville, NB
Al.hanson@ec.gc.ca

Oliver Love
Department of Integrative Biology
University of Windsor
401 Sunset Avenue
Windsor, ON
N9B 3P4
olove@uwindsor.ca

Kelsey M. Sullivan
Maine Department of Inland Fisheries and Wildlife
Research and Assessment Section
650 State Street
Bangor, Maine 04401
Kelsey.m.sullivan@maine.gov

Lucas Savoy
Biodiversity Research Institute,
Portland, Maine 04103
lucas.savoy@briloon.org

Christine Lepage
Canadian Wildlife Service
801-1550 Ave
D'Estimauville, Québec City,
christine.lepage@ec.gc.ca

Partners:

Stéphane Lair
Université de Montréal
3200 Sicotte, Saint-Hyacinthe,
Québec, J2S 2M2
stephane.lair@umontreal.ca

Glenn H. Olsen
USGS
Eastern Ecological Science Center
12302 Beech Forest Road
Laurel, MD 20708
golsen@usgs.gov

Sarah Gutowsky
Canadian Wildlife Service,
Environment and Climate Change Canada,
Ottawa, ON
Sarah.Gutowsky@ec.gc.ca

Frances Buderman
Department of Ecosystem Science and Management, Pennsylvania State University, PA, USA

Scott McWilliams
Dept. Natural Resources Science
105 Coastal Institute in Kingston
University of Rhode Island
Kingston, RI 02881
srmcwilliams@uri.edu
FAX: (401) 874-4561
srmcwilliams@uri.edu

Jay Osenkowski
Department of Environmental Management
Rhode Island
jay.osenkowski@dem.ri.gov

Marie-Claude Roy
Mingan Archipelago National Park Reserve
340, rue de la Digue,
Havre-St-Pierre Québec, G0G 1P0
Marie-Claude.Roy@pc.gc.ca

Matt Dyson
Institute for Wetland and Waterfowl Research
Ducks Unlimited Canada
1 Mallard Bay at Hwy 220, PO Box 1160,
Stonewall MB R0C 2Z0
m_dyson@ducks.ca

Tori Mezebish Quinn
Dept. Natural Resources Science
105 Coastal Institute in Kingston
University of Rhode Island
Kingston, RI 02881
tmezebish@uri.edu

Project Description:
The target population for this project is the American subspecies of the common eider (*Somateria mollissima dresseri*). The project will address elements of Science Need 1 (Improve understanding of population delineation, migratory connectivity, and key habitat use of sea ducks by targeting geographic gaps from previous satellite telemetry studies), Science Need 6 (breeding propensity) and Science Need 11 (evaluation of body condition documented shifts in species distributions). This study will also contribute to future harvest assessments for this population.

Project Objectives:
The primary objectives for this study are to document the current rates of non-breeding and pre-breeding body condition of American common eiders across their breeding range, and to establish a large geo-spatial database from tracking data with which we will examine multiple

aspects of the movement ecology of *S. m. dresseri*, but particularly their current habitat use throughout the annual cycle. Specifically, our objectives are:

1. Deploy up to 184 PTTs on adult female common eiders.
2. Develop new methodology to assess the breeding status of common eiders.
3. Estimate relative levels of breeding propensity and body condition across the breeding range of American common eider.
4. Identify the periods in the annual cycle when mortality of adult females occurs.
5. Using telemetry data to identify marine habitat use, assess marine ecosystem changes in eastern North America and identify drivers of altered abundance and habitat use by American common eiders.
6. Identify inshore benthic habitat used by common eiders to inform impact assessment and marine spatial planning processes, as well as coastal and marine protected area planning and establishment.

Project Status:

Field Component

The field component of the project was completed in May 2024. Between 2021 and 2024 we deployed 235 PTTs across the breeding range of American Common Eider (Fig. 1; Table 1). As of 27 September 2025, we've collected 415,550 locations that have tracked 1.4 million kilometers of eider movements. The tags have provided an average of ~900 days data per tag totalling ~480 bird-years of tracking data (Fig. 2). Currently 31 of the 235 tags we deployed are still transmitting and the data collection component of the project is near completion.

Data Management

We are developing a database to more easily access the data. We've used Filemaker Pro for the initial development of the database and are working with partners to implement the data on another platform. The database consists of 5 related tables (Fig. 3).

Tag Program – Documents the duty-cycles used on the project.
Tag Description – Tag specific information (transmitter ID, duty-cycle, mass, antenna type, presences of mesh covering, etc) are recorded in this table.
Field data – Includes all data collected in the field (band, age, sex, morphometrics, etc.).
Vet data – Includes all data collected in the by the (transmitter id, band, surgery times, drug dosages, etc.).
Deployment data – Includes all data relate to the deployment (deployment location, date, time etc.).

At least 2 more tables will be added to the database. 1) a table to track the types of samples, where the samples are stored and where and when they were used, and 2) a table to track the end-of-deployment that will record the final fate of the tag/bird and the date of last transmission. The tracking data are currently managed though Move Bank, and we are working with MoveBank, Microwave Telemetry and CLS to create an archive of the tracking data.

Currently the data are in FileMaker Pro. We will work with partners to find a data management system that will make the database available to all Principal Investigators. The data will also be made available to PI's in csv files with an r-script that will build the relationships between the files.

Objective 2: Develop new methodology to assess the breeding status of common eiders.

This aspect of the project has been completed as part of Asha Grewal's MSc thesis at Acadia University. Her project was overseen by Sarah Gutowsky, Mark Mallory and Franny Buderman. Asha has made a couple of presentations to the SDJV on her project. Her master's program was completed in June 2025 and a manuscript "Using movement data from satellite telemetry to infer nesting status and breeding propensity of a colonial breeder, the American common eider (*Somateria mollissima dresseri*)" was submitted to Movement Ecology in September 2025.

Characterizing the annual cycle spatial ecology of Common Eider to identify important areas, quantify migratory connectivity, and examine distribution shifts.

Ducks Unlimited Canada: With additional funding from Environment and Climate Change Canada, Ducks Unlimited Canada and Acadia University are working to develop a species distribution model to predict where eiders are likely to be present throughout the year. This work is being led by Matt Dyson and Brandon Edwards from DUC with support from other PIs as well as Sarah Gutowsky and Allison Paterson from ECCC. Given the high volume and complexity of Argos telemetry data, we are developing a reproducible data processing workflow that applies state-space modeling to generate standardized, error-informed movement tracks. This workflow includes post-processing steps to splice tracks across user-defined data gaps, improving the reliability of inferred locations. This has included collating potential spatial and temporal data to be used for distribution models and cleaning and filtering the eider telemetry data and associated metadata to be used for further modeling. Using individuals with full metadata over their tracking cycle continuous-time state space models were fitted. This allowed us to obtain predicted movements for individuals at regular time intervals throughout their tracking cycles (e.g. 24hrs). Movement persistence models (MPMs) were fitted to each of the predicted tracks from the state-space models to estimate changes in movement persistence through time. These models remain a work in progress and will be refined further. In addition to this on-going work a R Shiny App is being updated/developed to visualize individual movement and allow the selection of annual lifecycles periods (e.g. breeding, wintering, migration, staging, etc.).

To identify key seasonal habitats (e.g., breeding, molting, wintering), we are integrating the movement persistence models and spatial clustering algorithms to semi-automatically classify individual states. These classifications are reviewed and refined through a custom Shiny app interface, enabling expert validation in a user-friendly environment. The workflow is designed to be flexible and adaptable to both Argos and GPS-GSM telemetry datasets. Once behaviorally classified tracks are finalized, we will quantify movement metrics such as net-squared displacement, step length, and seasonal home ranges. In addition, we have collated a library of spatial data layers for consideration as environmental covariates to understand species habitat associations. These data will inform the development of seasonal resource selection models,

enabling us to predict current and future priority habitats for Common Eider and assess potential risks from coastal development.

Ultimately, we will provide actionable insights for the conservation and management of American Common Eider, with a scalable framework applicable to other species and regions. The entire workflow will be made available through GitHub for other users to access and apply to their use case.

University of Rhode Island: Jay Osenkowski with Rhode Island Dept. of Environmental Management secured funding for a post-doc at the University of Rhode Island. In summer 2025, Tori Mezebish Quinn started a one-year post-doc in Scott McWilliams' lab. Her objectives are to identify and quantify connectivity among important areas across the annual cycle and quantify distribution shifts from 2010-2024 for American Common Eider. As was done with Common Eider and other sea ducks (Lamb et al. 2019, 2024), she will use network analyses to address these objectives using platform terminal transmitter (PTT) data from ~90 individual Common Eider tagged between 2010-2015 and ~220 individuals tagged between 2021-2024. Preliminary analyses of tracking data for individuals tagged during 2021-2024 identified 20 important areas (i.e., network nodes) that extend latitudinally from 41.71-61.79°N (Figure 1). Taking a single rather than multi-species approach promoted the identification of network nodes that likely serve as important areas for Common Eider but not other sea duck species (for multispecies sea duck network see Lamb et al. 2019). Three nodes at the southern extent of the network in southern New England and the Gulf of Maine were heavily used by tagged individuals across seasons (Figure 1) and may serve as important mixing points for individuals that use distinct breeding areas. Alternatively, nodes at the northern extent of the network (e.g., Gulf of St. Lawrence, eastern coast of Newfoundland and Labrador, Hudson Straight) were primarily used during only the breeding season. Next steps in quantifying metrices of network centrality, connectivity, and modularity will provide insight into Common Eider population structure by revealing the degree to which these isolated important areas serve as genetic and social connection points for individuals from distinct areas. Moreover, incorporating telemetry data from individuals tracked earlier (2010-2015) than those depicted in Figure 1 will indicate the degree to which Common Eider distributions have shifted over 1.5 decades.

Communications

Radio Canada – Canada's French public television. A 12–15-minute piece on American Common Eiders air on Radio Canada's program "*La Semaine Verte*" (*The Green Week). La Semaine Vert*is is the oldest program on agriculture and the environment in Canada and presents weekly reports, portraits or news files in the fields of agriculture, food, forestry, fisheries, wildlife and environmental management. This episode will review the status and trend of American Common Eiders with a focus on Québec and feature interviews with Jean-Francois Giroux, Francis St. Pierre, Mark Mallory and Scott Gilliland.

La Sainte Paix – is an 8-episode series on culture and passion of hunters and fishers in Québec led by Emile David, broadcast on Telemag, a Quebec general broadcaster. Episode 7: L'Eider, l'Science, l'Amour (The eider, the science, the love) will explore the conservation, science and harvest of eiders and eiderdown in the St. Lawrence Estuary. It will feature the

Thibault/Lapointe family that has been harvesting eiderdown for three generations and Scott Gilliland.

CHMA Radio Station – A common eider story was featured on the Sackville, NB community radio station news page. It includes an ~12min interview with Nic McLellan talking about the project. Tracking project helps understand what's happening to common eiders in the Maritimes » CHMA

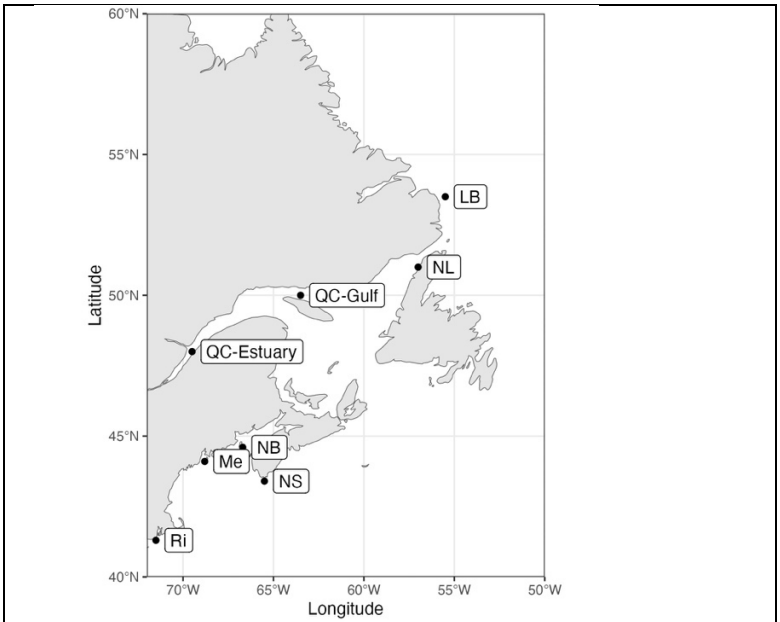

Figure 1. Deployment locations for satellite tags on Common Eiders, 2021 to 2024.

Figure 2. Class 3 ARGOS locations for Common Eiders tagged with PTTs between 2021 and 2025. Map courtesy of ARGOS - Collecte Localisation Satellite.

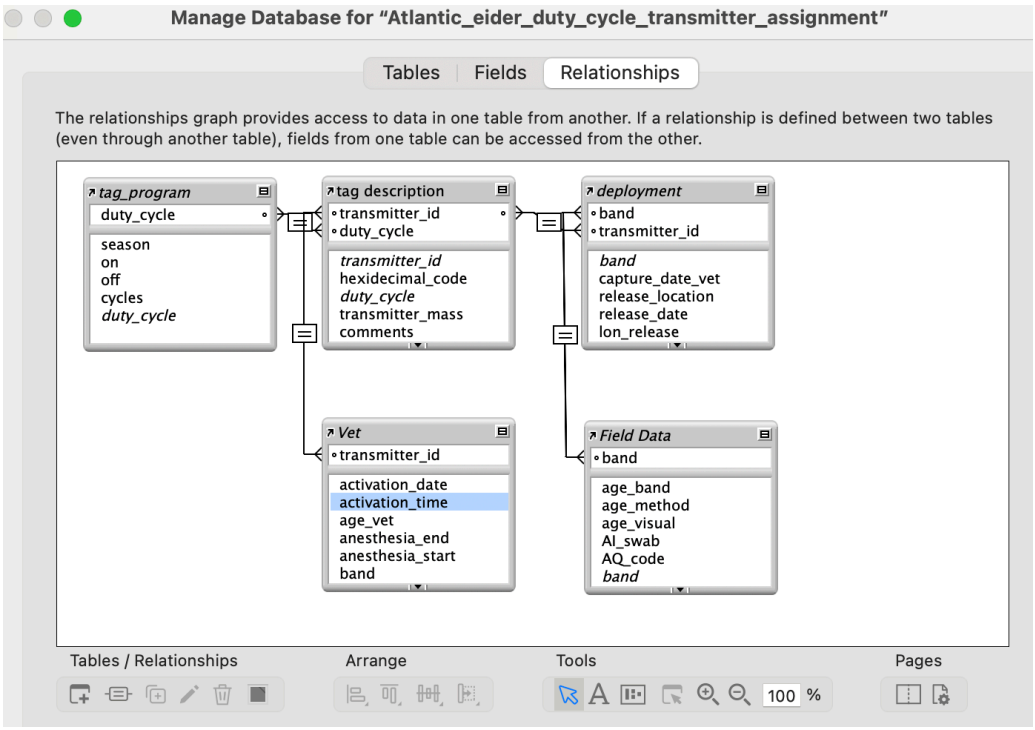

Figure 3. Structure and relationships among tables for the Atlantic Common Eider telemetry project.

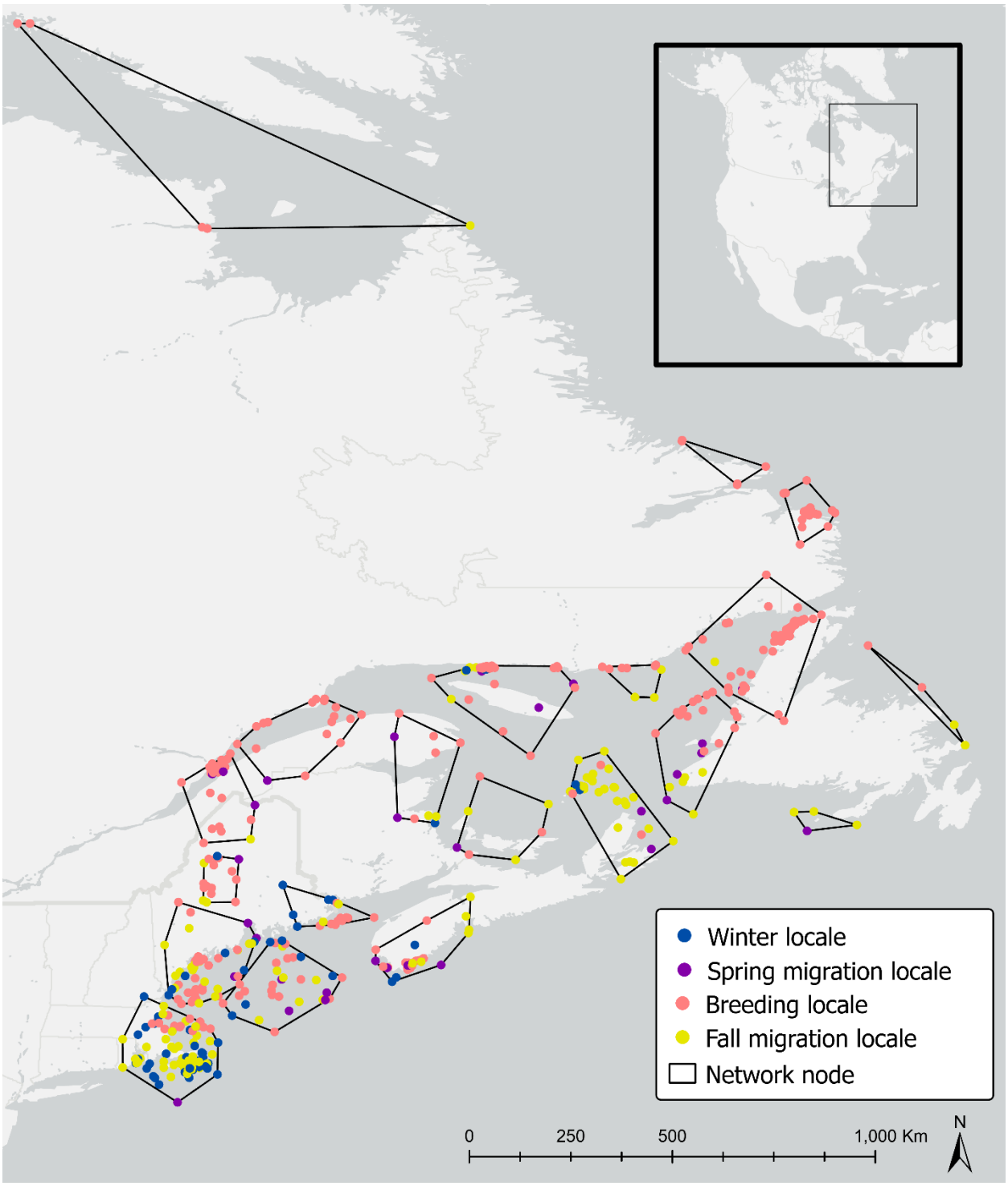

Figure 4. Important areas (i.e., network nodes) identified for Common Eider (n = 153) implanted with platform terminal transmitters from 2021-2024. Color of locales (i.e., areas of resident behavior) indicates season within the annual cycle.

Project Funding Sources (US$). Complete only if funded by SDJV in FY25. 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)
		20K			RI-DEM
			6K		URI
			8K		Parks Canada
			117K		ECCC
$86K					SDJV Funding
				5K	USGS
				5K	Acadia University
				2.5K	Ekuanitshit

Total Expenditures by Category (SDJV plus all partner contributions; US$). Complete only if project was funded by SDJV in FY25; 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	**114.5**	**22.95**	**45.9**	**45.9**	**229.5**