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ASSESSING THE VULNERABILITY OF AEROFAUNA TO THE EMERGING OFFSHORE WIND ENERGY INDUSTRY IN ATLANTIC CANADA

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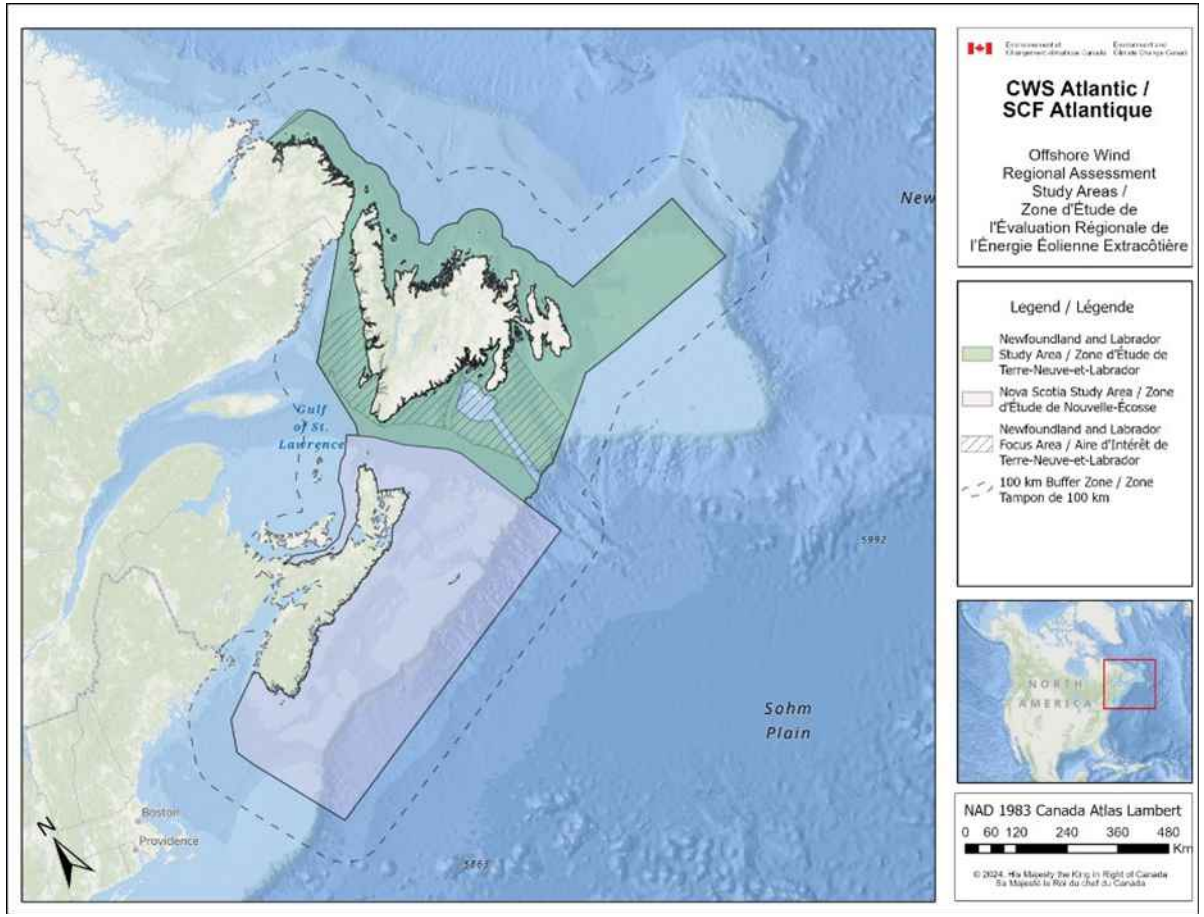
Canadian Wildlife Service

November 2024

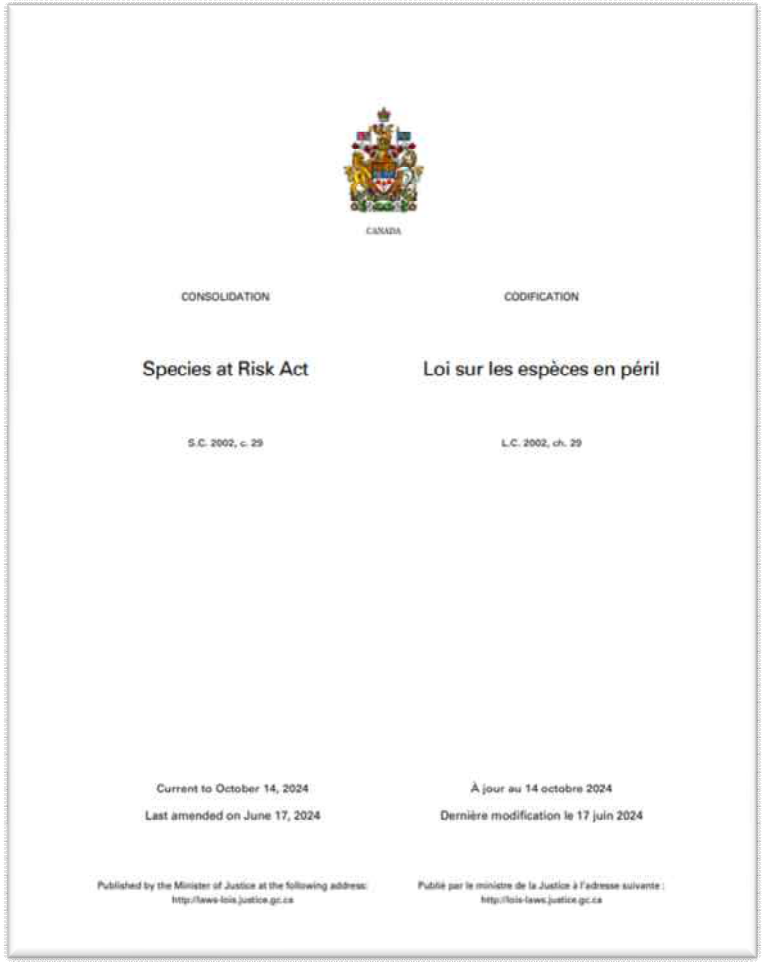
Canada

Offshore Wind Energy Regional Assessments - Overview

- Launched in March 2023
  - Appointment of two 5-member Committees, supported by IAAC Secretariats
- Interim Reports (March 2024)
  - Preliminary siting based on physical conditions, existing knowledge, and published data
- Final Reports (draft October 2024 final January 2025)
  - Proposed siting, recommendations for mitigations, monitoring, cumulative effects analyses, and follow-up



Environment and Climate Change Mandates



CANADA

CONSOLIDATION

CODIFICATION

Species at Risk Act

Loi sur les espèces en péril

S.C. 2002, c. 29

L.C. 2002, ch. 29

Current to October 14, 2024

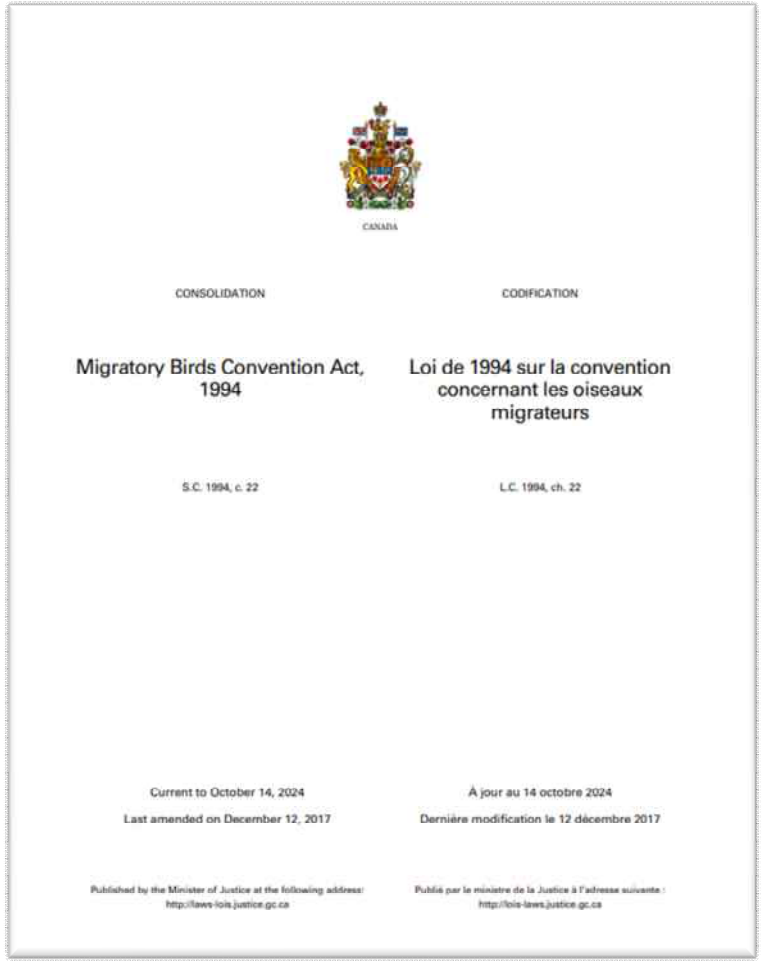
Last amended on June 17, 2024

À jour au 14 octobre 2024

Dernière modification le 17 juin 2024

Published by the Minister of Justice at the following address:
http://laws-lois.justice.gc.ca

Publié par le ministre de la Justice à l'adresse suivante :
http://lois-laws.justice.gc.ca



CANADA

CONSOLIDATION

CODIFICATION

Migratory Birds Convention Act, 1994

Loi de 1994 sur la convention concernant les oiseaux migrateurs

S.C. 1994, c. 22

L.C. 1994, ch. 22

Current to October 14, 2024

Last amended on December 12, 2017

À jour au 14 octobre 2024

Dernière modification le 12 décembre 2017

Published by the Minister of Justice at the following address:
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Impacts of Offshore Wind Energy Developments

Direct Impacts

1. Bird collision with offshore turbines
2. Displacement from preferred foraging areas
3. Barrier to important flight pathway

Habitat loss and modification of seabed through:

4a. Construction of turbines
4b. Laying and burying of cabling and rock armouring
4c. Coastal habitat loss with construction of substation

Disturbance From

4. Increased boat traffic/human activity
5. Light pollution
6. Release of blue carbon stores, resulting from habitat disturbance
7. Subtidal noise, during construction and piling of foundations, impacting cetaceans and fish
8. Electromagnetic fields of cables impacting behavior of sharks and rays

Modified from RSPB, 2022. *Powering Healthy Seas.*

Requests for CWS & STB Advice

- Summary of Species
- Migratory Birds Density & Trends
- Seabird Colonies & Other Important Bird Areas
- Vulnerability & Areas of Higher Risk
- Bat Observations & Movements
- Other Species of Concern

- Effects of Climate Change
- Cumulative Effects
- Mitigations & Monitoring
- Knowledge Gaps
- Pathways of Effects
- Recommended Follow-up

Aerofauna Functional Groups

Marine Birds

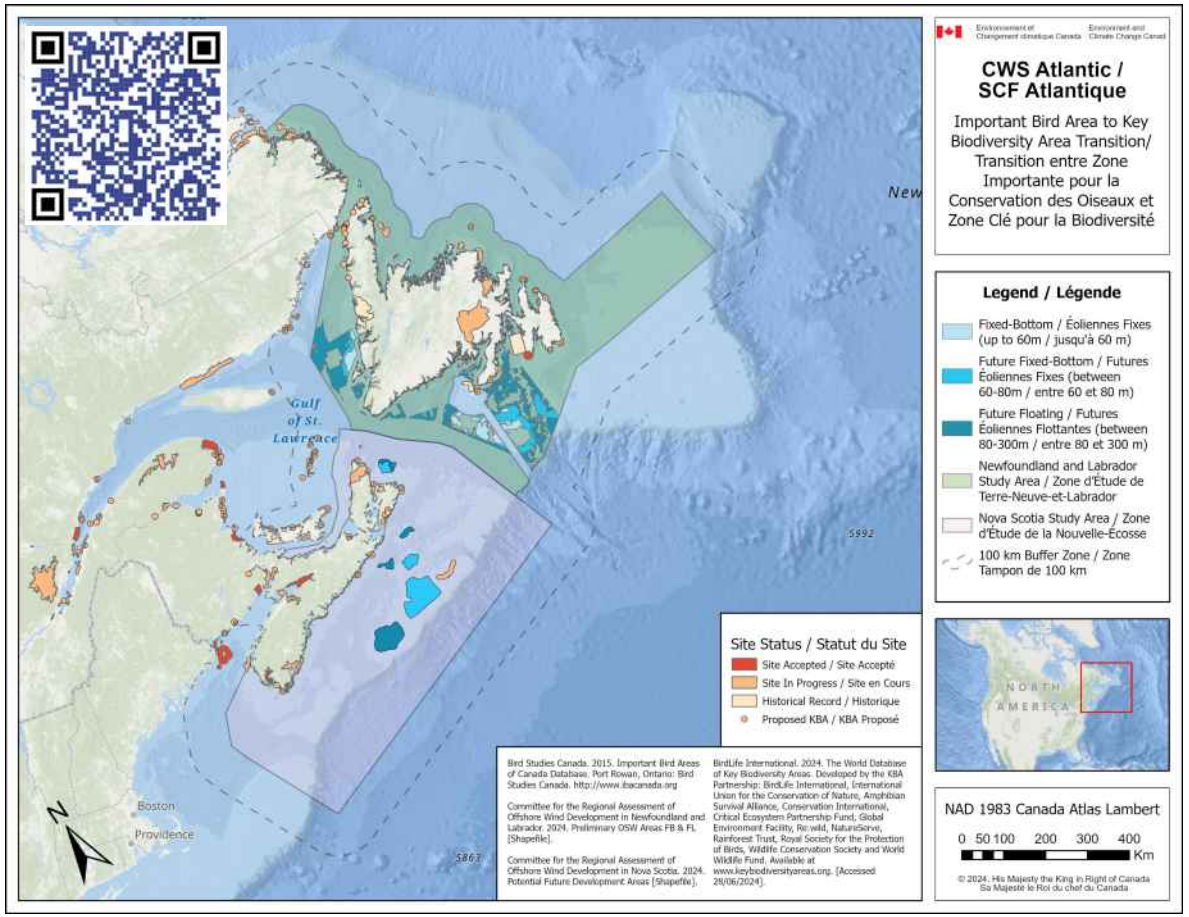
Coastal and Offshore Migrants

Bird Images: Under License from Cornell Lab of Ornithology | Macaulay Library, except Cape May Warbler from New Jersey Audobon
Bat Image: Eastern Red Bat from New Jersey Fish and Wildlife
Butterfly Image: Monarch from Hinterland Who's Who

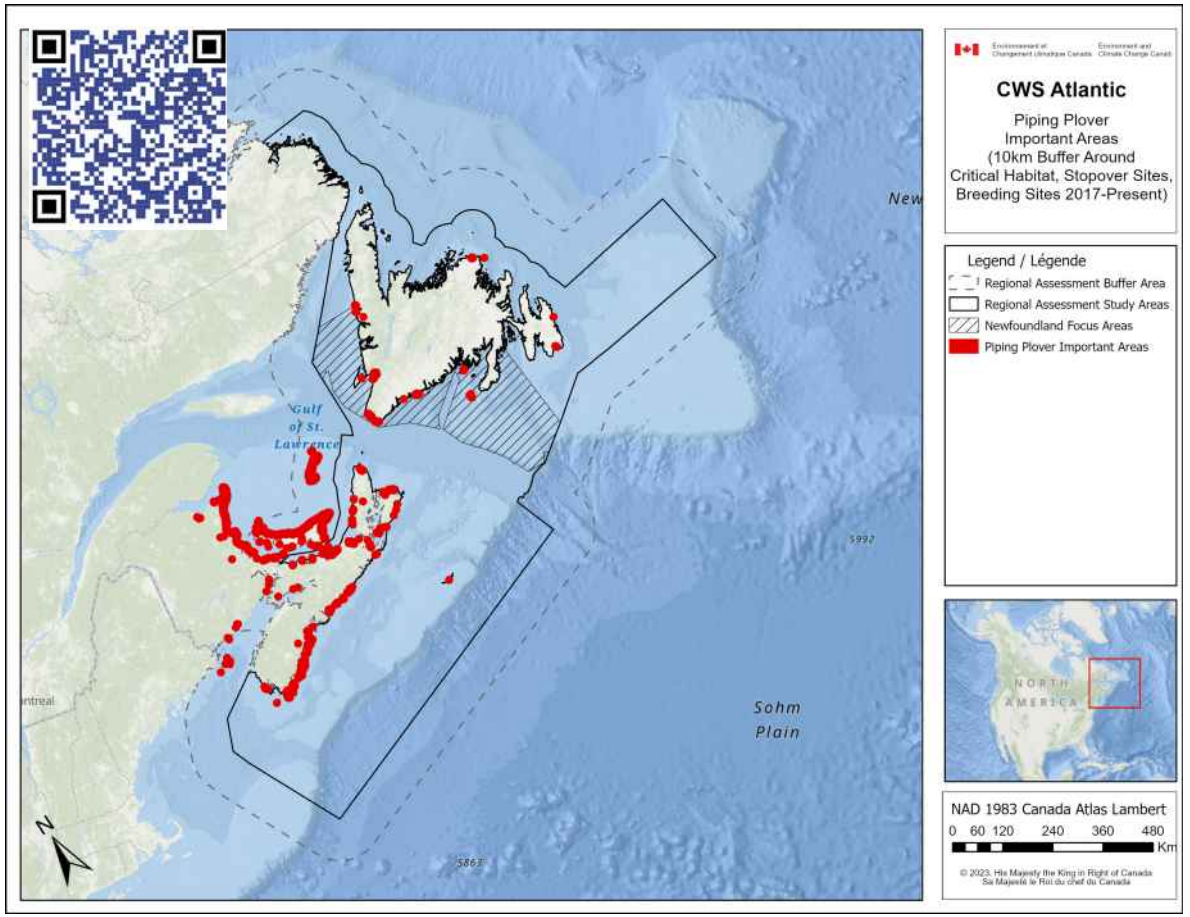
Areas of Resident Habitat Use

- Use marine areas for most of the year, or during critical periods
- Higher potential exposure to offshore developments due to repeated and/or frequent movements
- Breeding birds (maintaining nests) and non-breeding birds
- Potential for collision or displacement from offshore development is higher than coastal/offshore migrants.

Areas of Resident Habitat Use – Important Areas



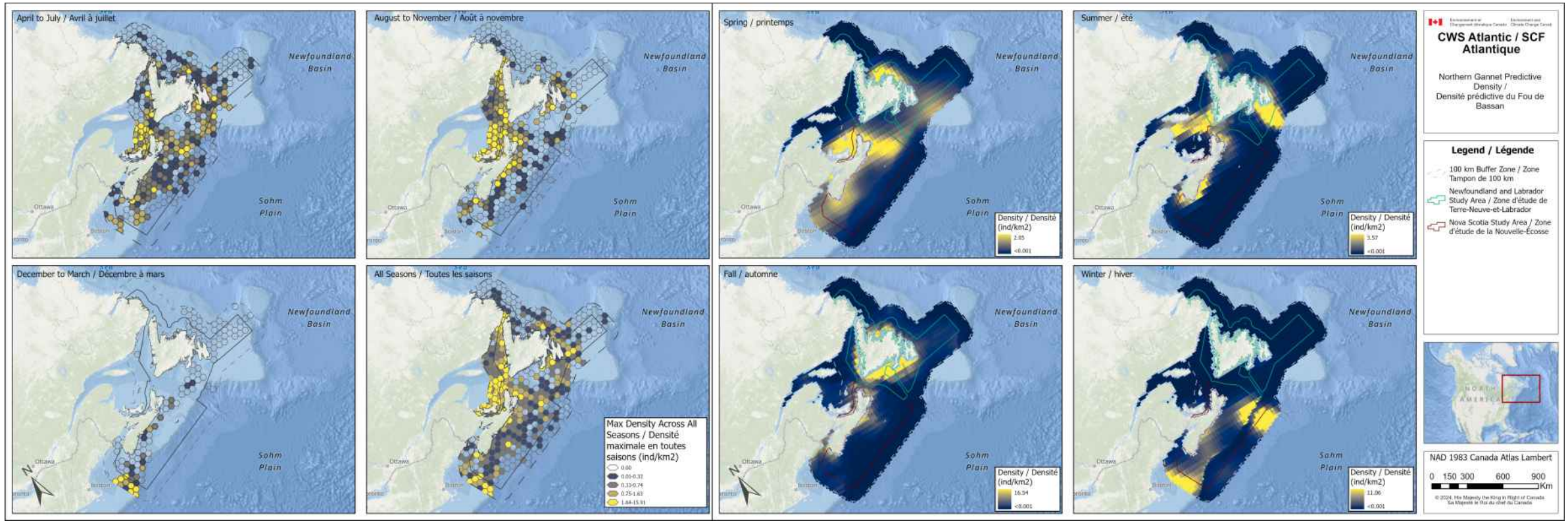
Important Bird/Key Biodiversity Areas



SAR Critical Habitat & Important Areas

Other Data: Sea Duck Key Habitat Site (SDJV), NWA and MBC (CPCAD), Important Shorebird Sites (ECCC CWS and WHSRN)

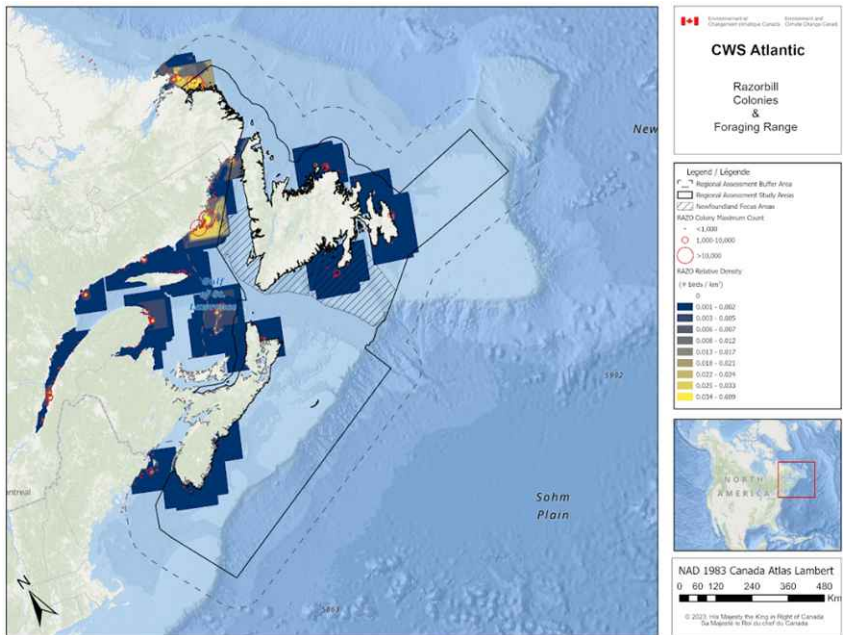
Areas of Resident Habitat Use – Pelagic Densities



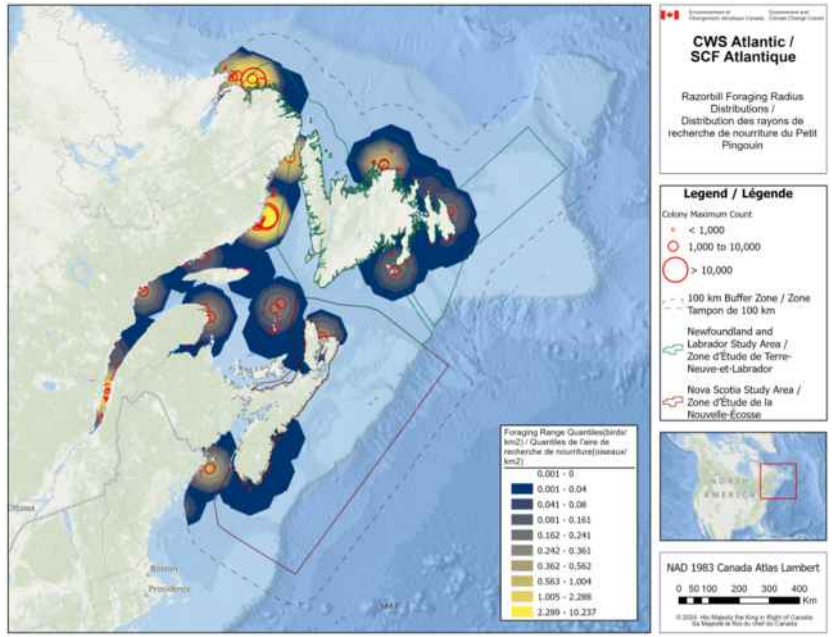
Eastern Canada Seabirds at Sea
(C. Gjerdrum – ECCC CWS)

Predictive Density
(D. Fifield – ECCC STB)

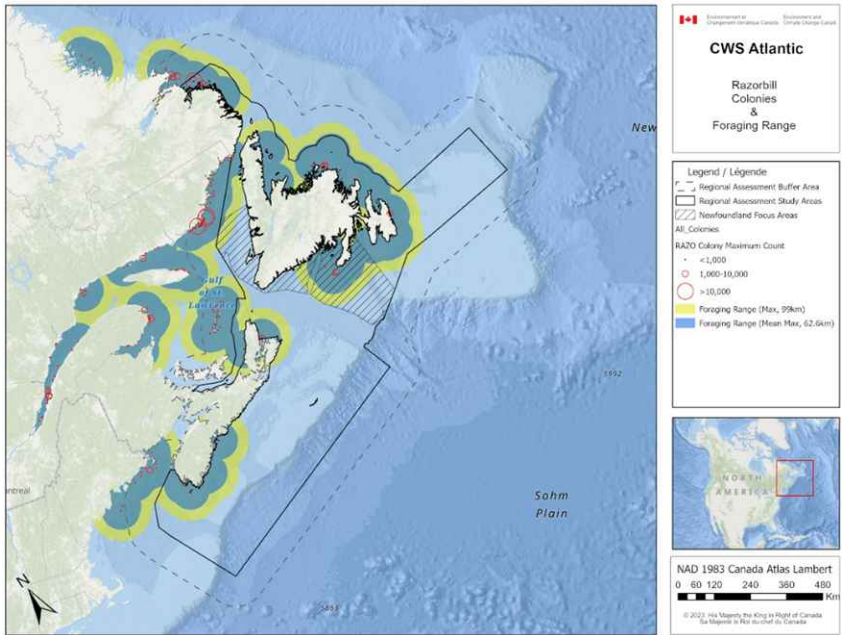
Areas of Resident Habitat Use – Foraging Areas



Predictive Foraging Distribution
(R. Ronconi et al. 2018)



Theoretical Foraging Distribution
(C. Frapin & K. Kingdon - ECCC CWS)

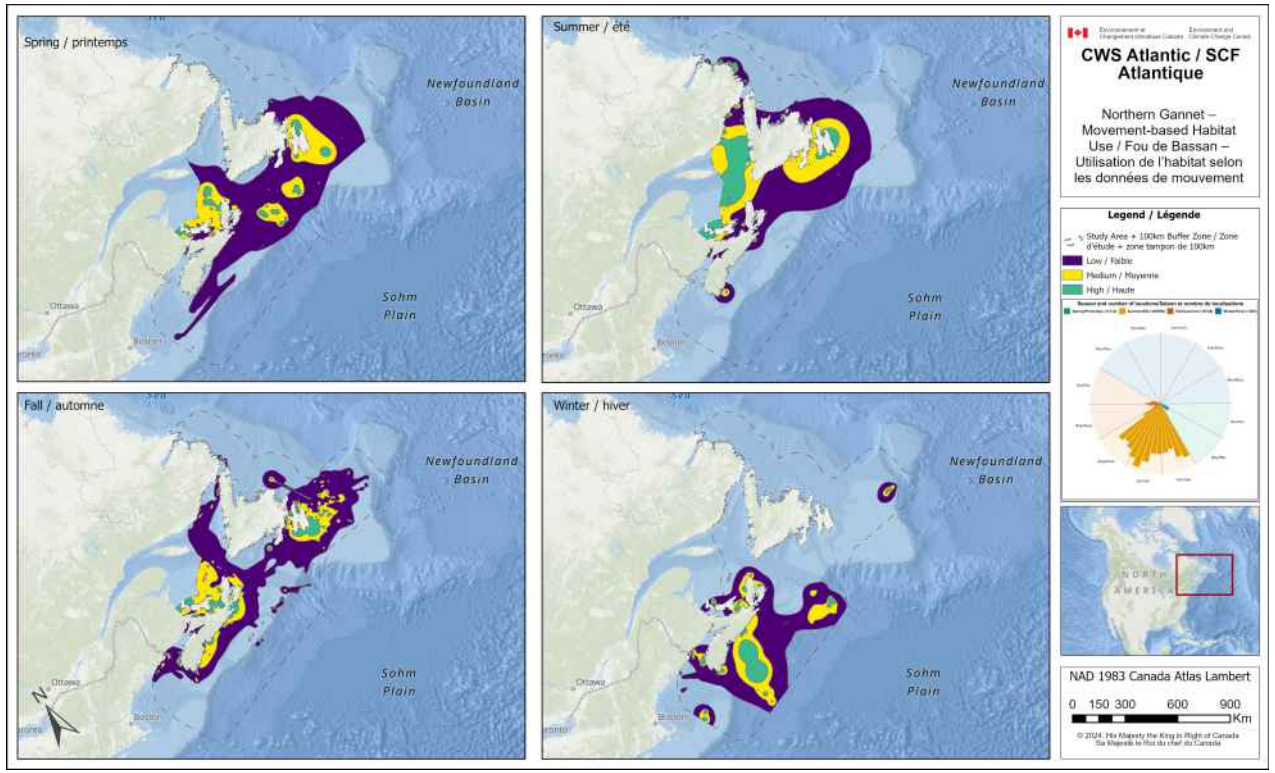


Foraging Location and Buffer
(P. Knaga & K. Kingdon – ECCC CWS)

Areas of Migratory Habitat Use

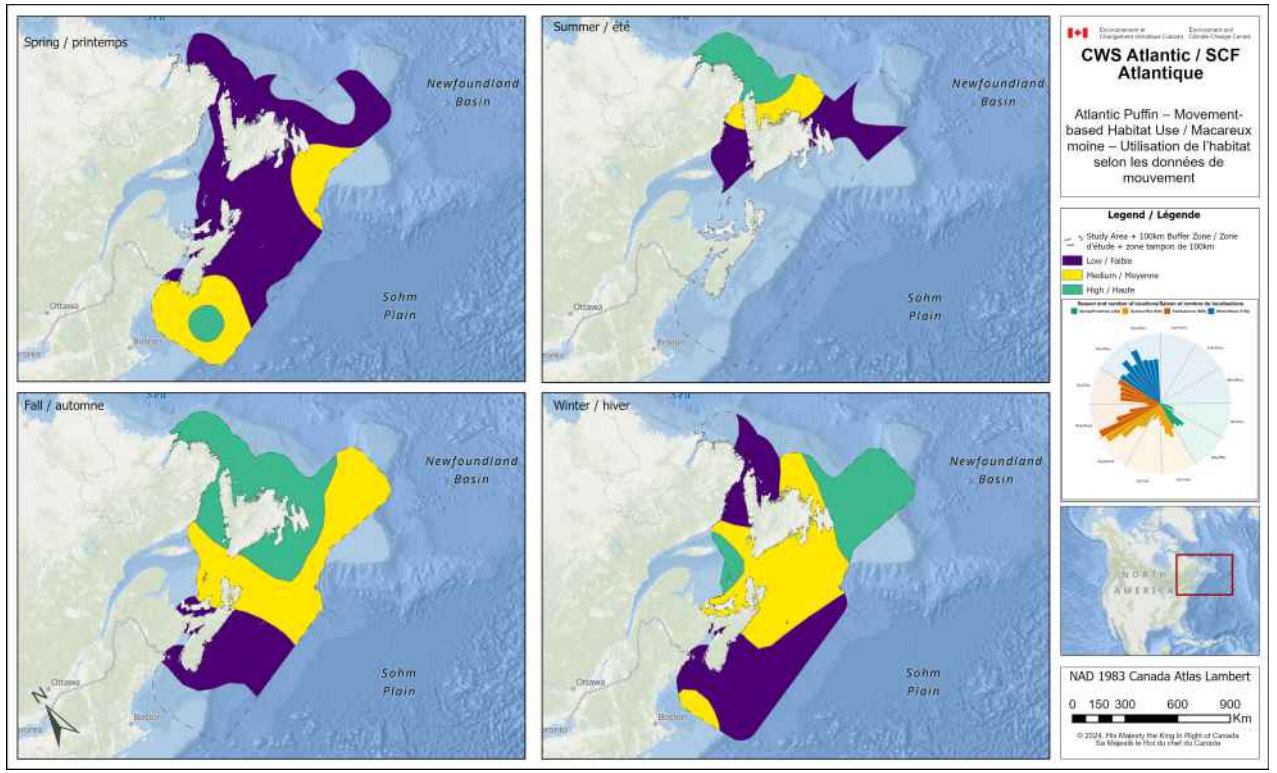
- Use marine areas for one or both annual migrations
- Birds follow flyways that offer favorable topography and wind conditions
- Regional geography: move south directly over marine areas between Québec/Labrador and Newfoundland; Newfoundland and Nova Scotia; southern Nova Scotia across the Gulf of Maine
- Marine areas in Atlantic flyway provide direct, short hops between landmasses, potential high-risk areas for offshore development

Aerofauna Movement - Seasonal



Dynamic Brownian Bridge Movement Models

(ECCC CWS – S. Christin)

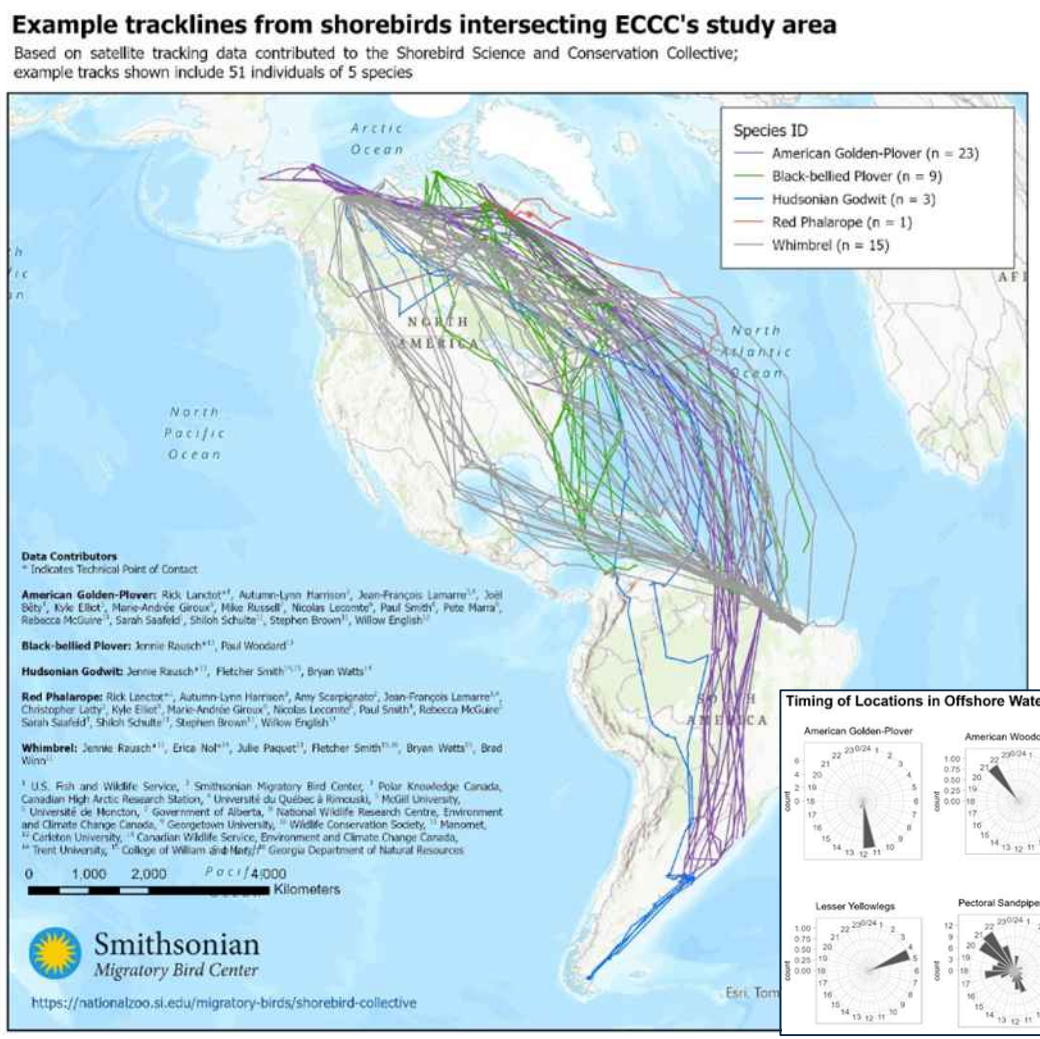


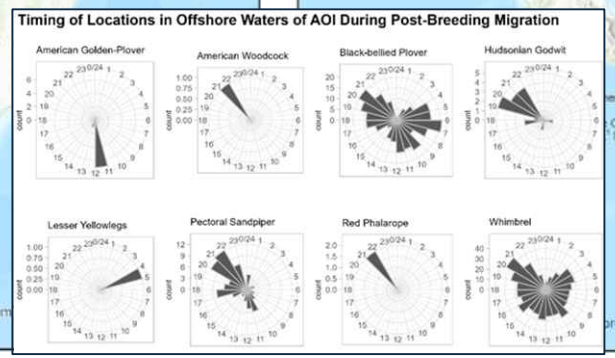
Kernel Density

(ECCC CWS – S. Christin)

Tracking Data From Many Sources – ECCC STB, ECCC CWS, MoveBank

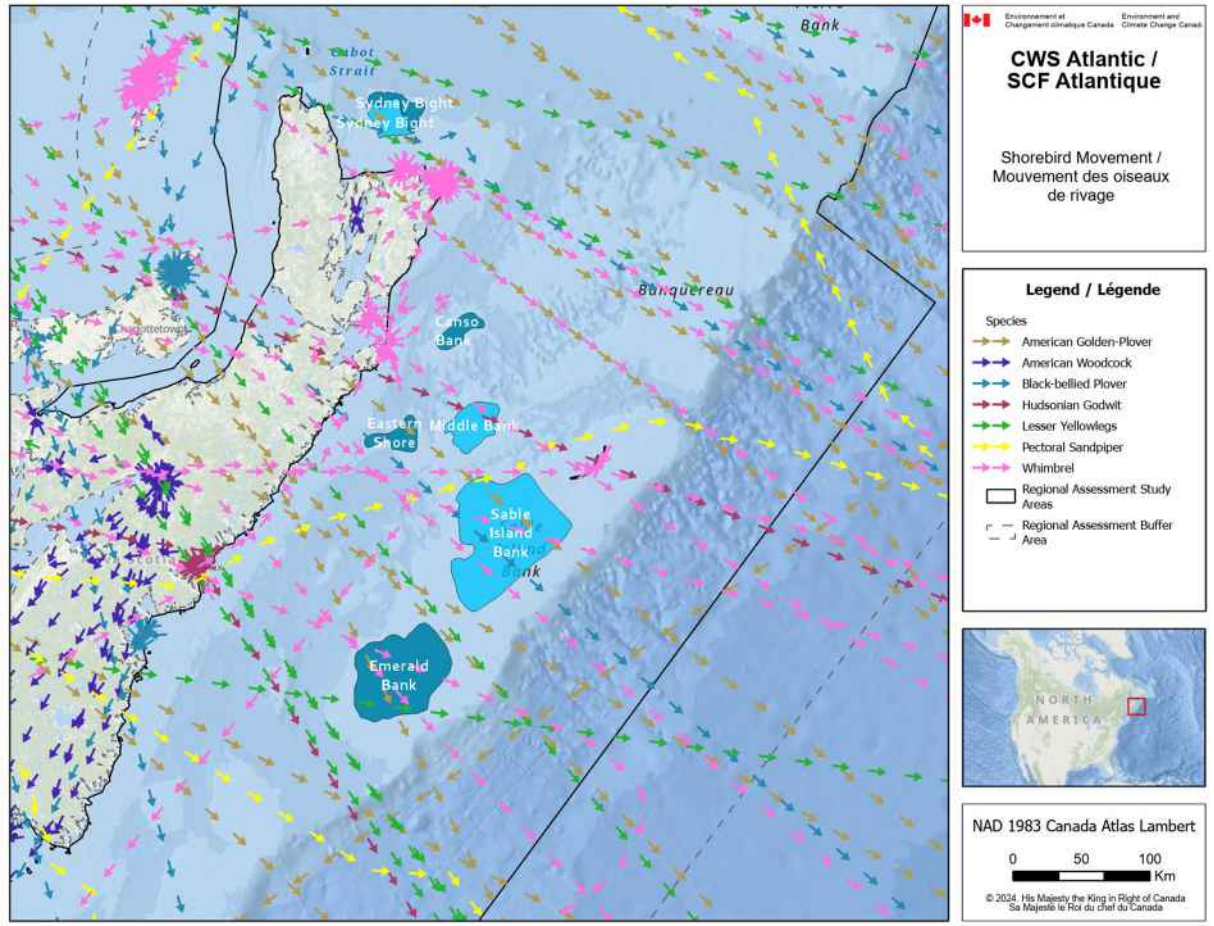
Aerofauna Movement - Shorebirds



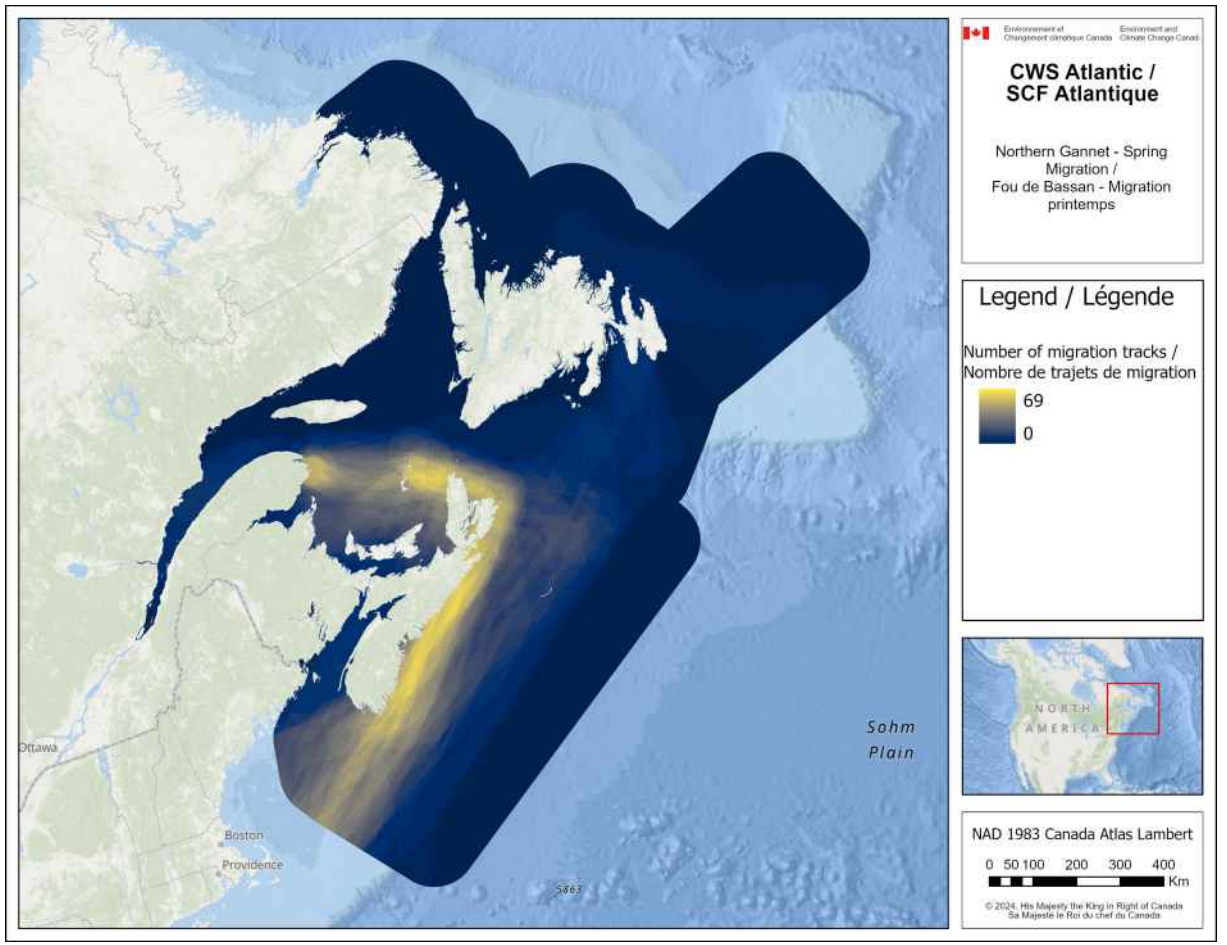


Tracking Data From Many Sources, Collated and Managed by the Shorebird Conservation Collective

Aerofauna Movement – Migratory Paths

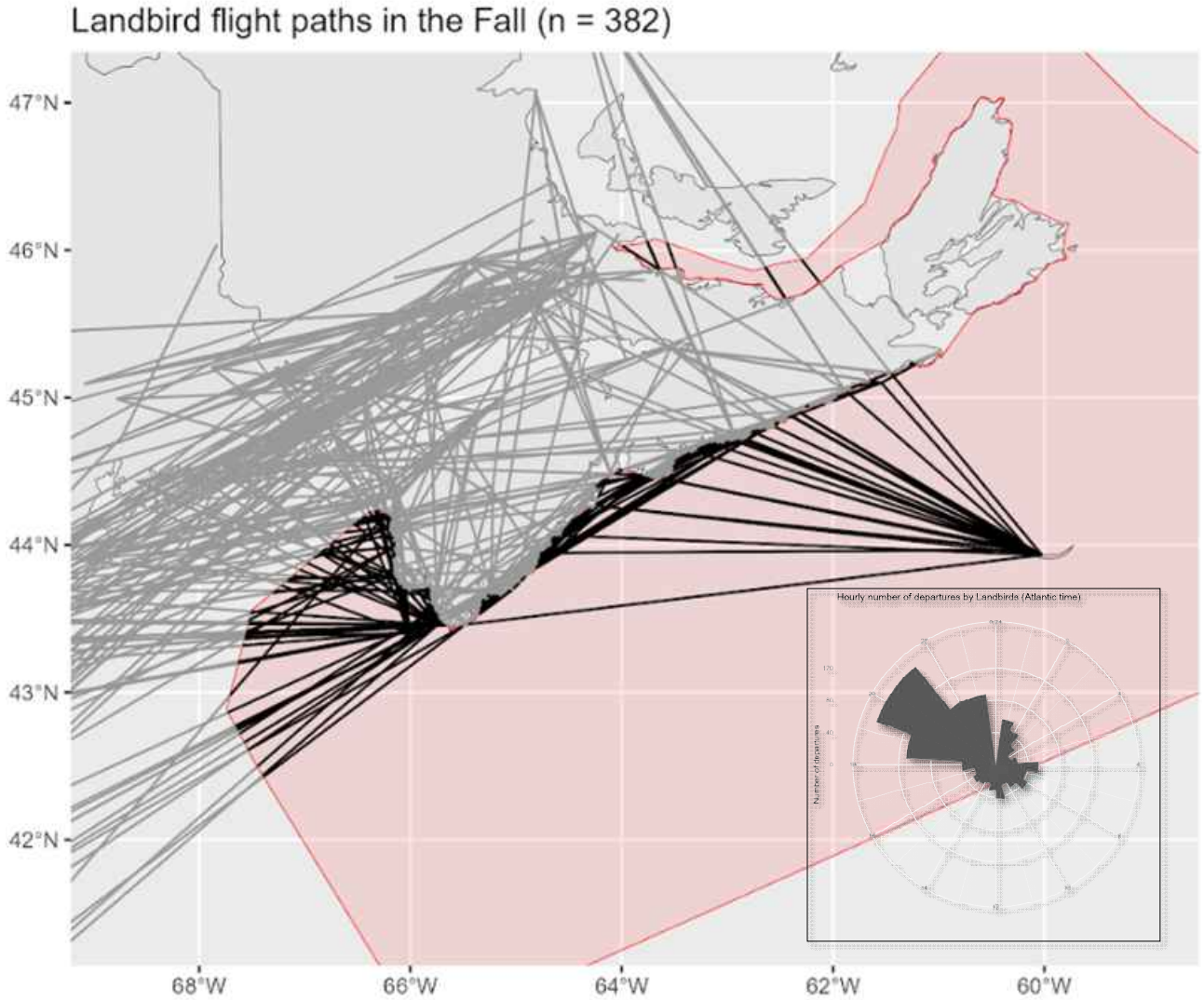


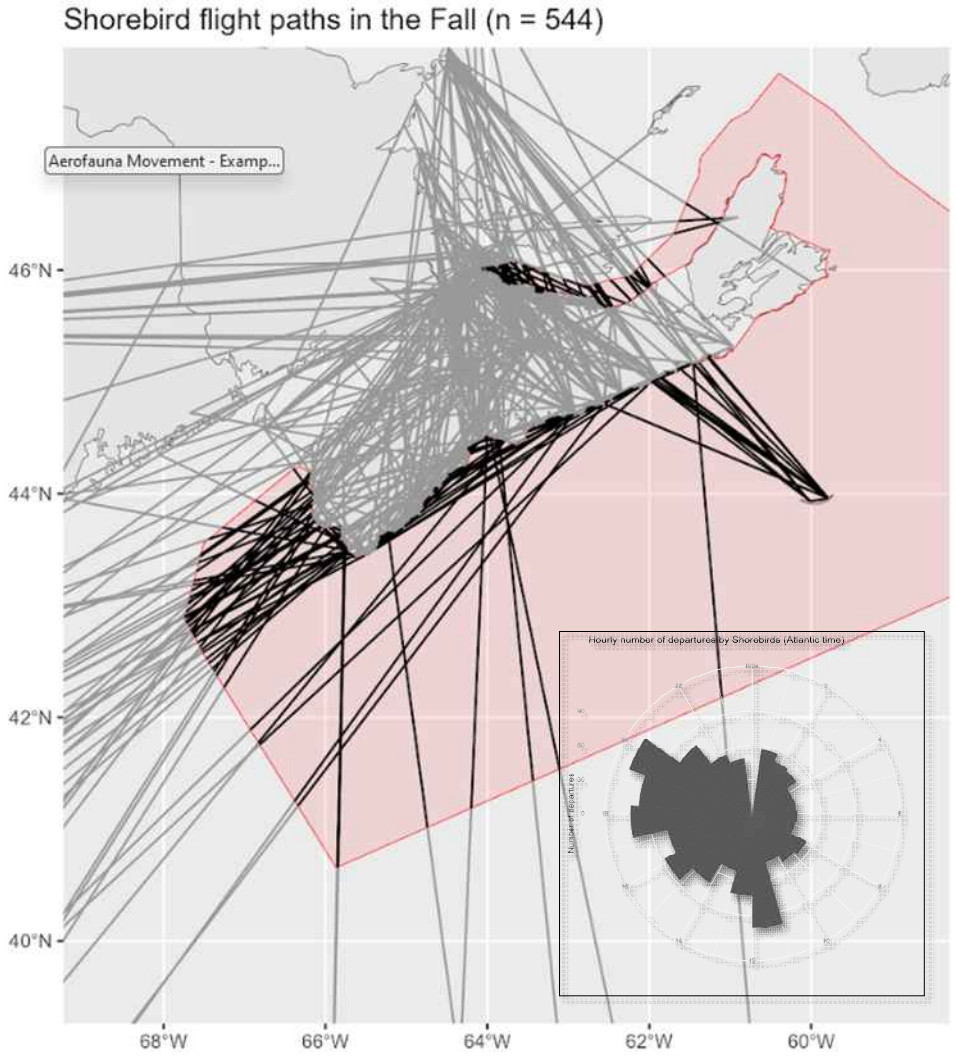
Shorebird Movement Tracks
(Shorebird Conservation Collective)



Seabird Migration Corridors
(S. Christin – ECCC CWS)

Aerofauna Movement – Motus Network

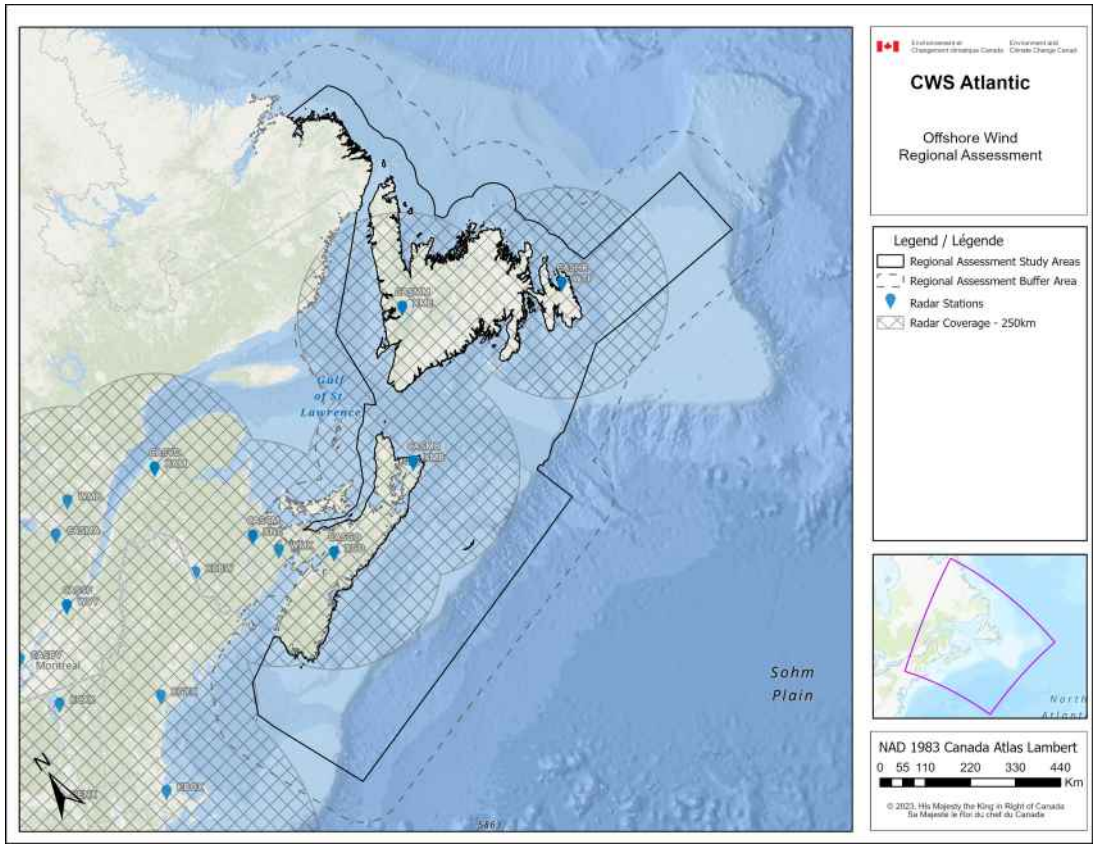




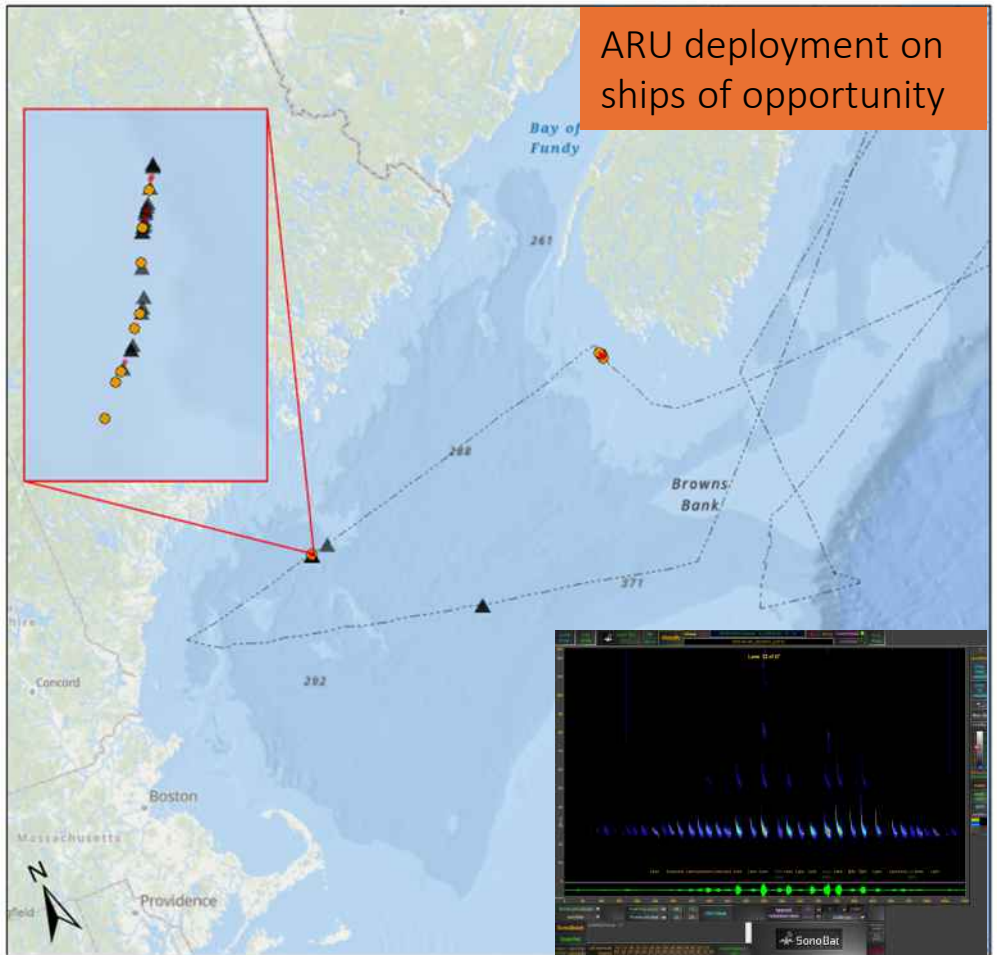
Source: Birds Canada

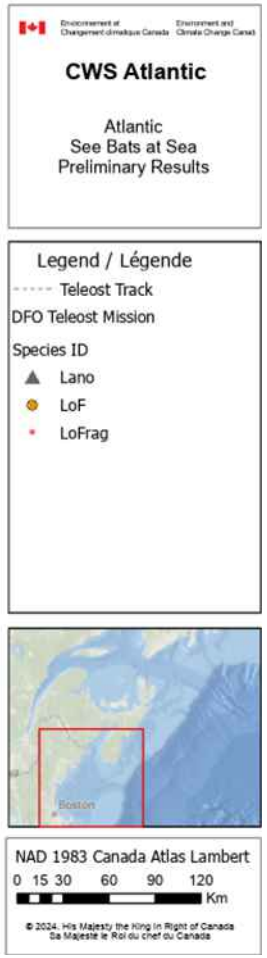
Aerofauna Movement – Weather Radar

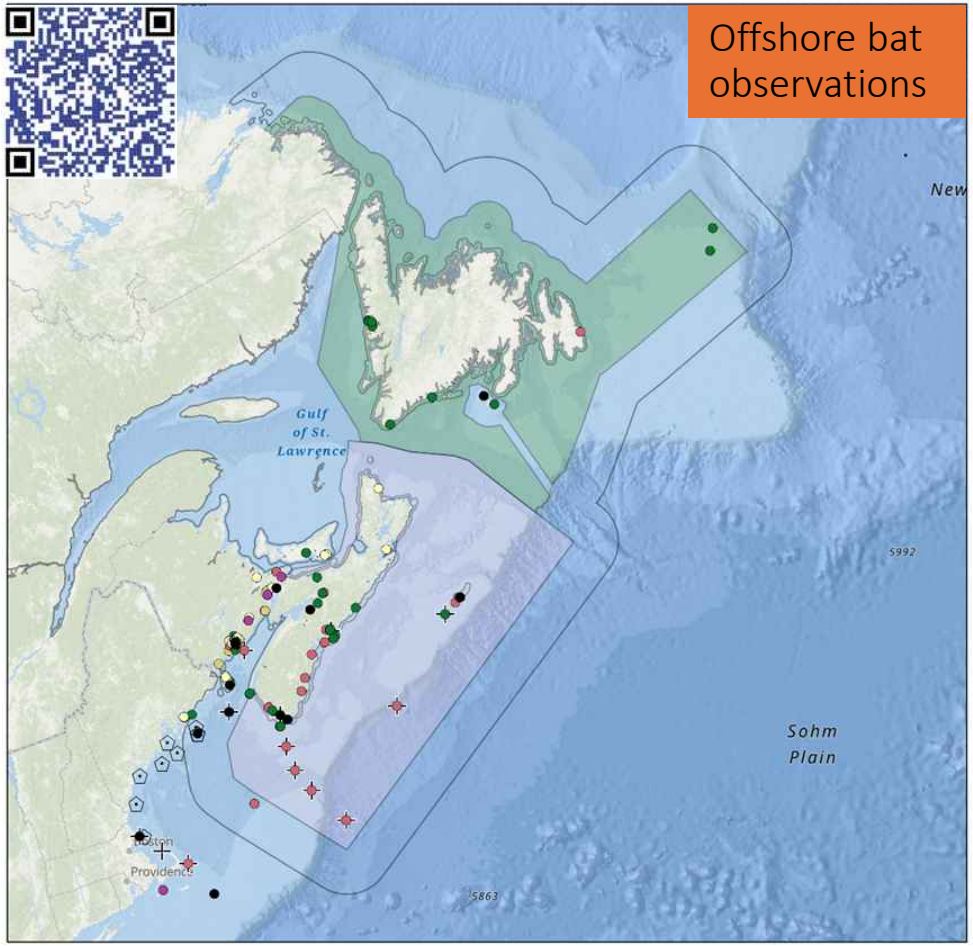
- Prepare, reformat, and process Canadian S-band radar data, focusing on stations in Atlantic Canada
- Create vertical profiles for each radar station
- Model/analyze biomass density by altitude:
  - Develop land vs. marine profiles
  - Density and altitude data, including summaries
  - Animations for modeled areas (where possible)
- Datasets and Final Report
  - Report and required code for in-house analyses, including considerations for interpretation and sources of error/limitations



Atlantic See Bats at Sea







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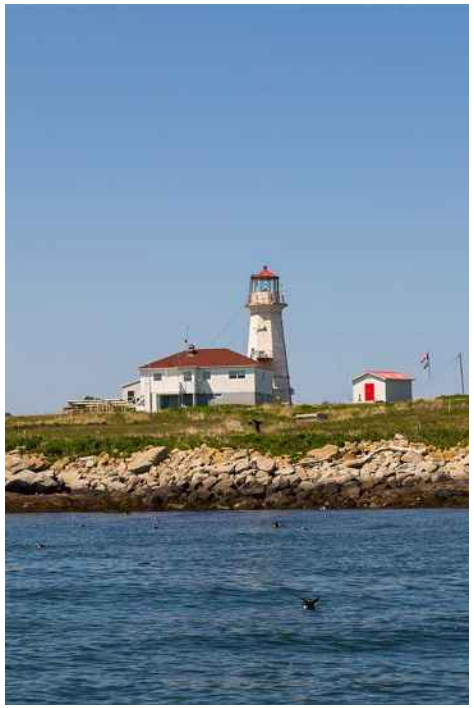
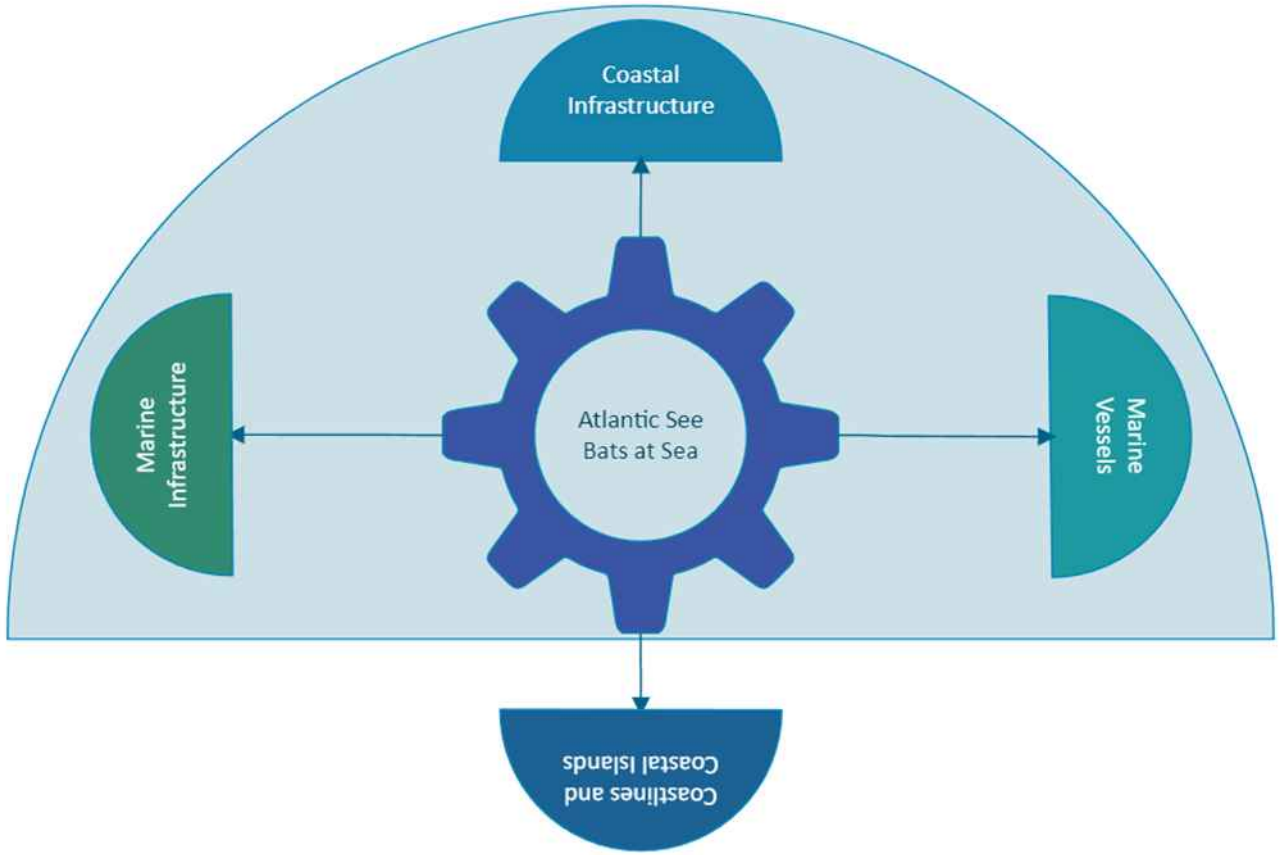


Machias Seal Island Lighthouse

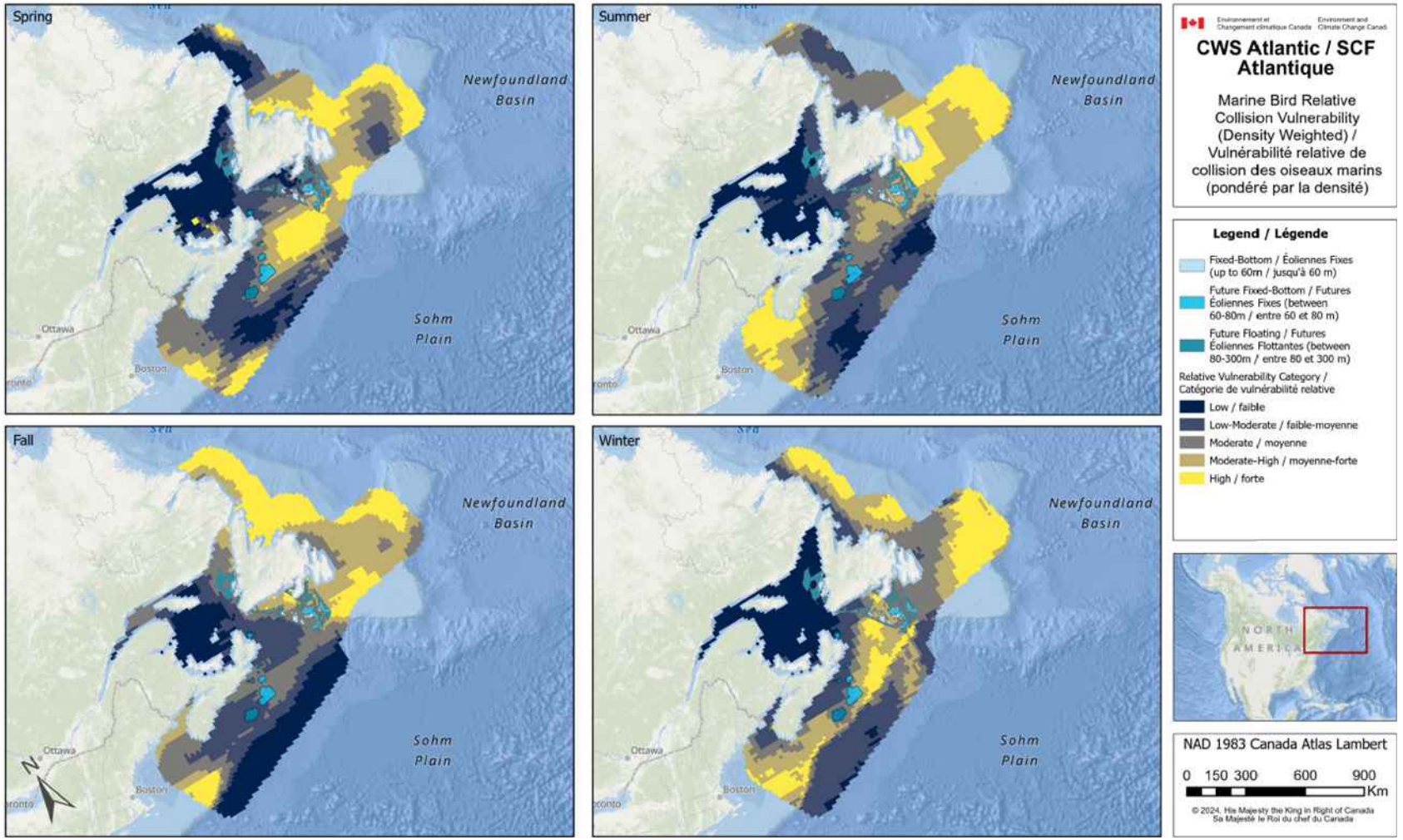


NRCAN – Discovery Mission

Aerofauna Relative Vulnerability

- Population Vulnerability (PV) assesses a species' vulnerability in the absence of OSW. PV is comprised of three metrics: PiF CCS, Conservation Rank, and Adult Survival
- Collision Vulnerability (CV) refers to species' sensitivity to injury or mortality from colliding with offshore wind turbines. CV is comprised of four components: Time spent in Rotor Swept Zone, Diurnal and Nocturnal Activity Budgets, and Avoidance Rates.
- Displacement Vulnerability (DV) reflects a species' susceptibility to displacement in the presence of OSW turbines, forcing a species into locations of less quality habitat or unlikely occurrence. DV used two components: Avoidance Rates and Habitat Flexibility

Spatial Relative Vulnerability



Summary

- Resident marine birds have higher exposure to offshore wind development than migratory species.
- Some species are more vulnerable to collisions (i.e. large-bodied gulls) while other species are more vulnerable to displacement (i.e. alcids).
- Vulnerability of migrant species needs to be considered and assessed.
- Some species are attracted by the presence of offshore wind turbines.
- Additional movement data needed for high exposure and high vulnerability species with relatively low tagging effort.
- Altitudinal data needed for marine birds to inform collision risk.

Questions & Discussion

CWS-ATL RA Contact: SCF-ATLERVent-CWS-ATLRAWind@ec.gc.ca