

This document was compiled by the Regional Assessment of Offshore Wind Development Secretariat. It includes excerpts from the submission:

Offshore Wind Regional Assessment Requests for Advice: Product Descriptions and Context for Interpretation

Provided by Environment and Climate Change Canada – Canadian Wildlife Service to the Committees for the Regional Assessment of Offshore Wind Development in Nova Scotia and Regional Assessment of Offshore Wind Development in Newfoundland and Labrador

November 30, 2023

The full submission was provided to the Committee in confidence, as per the Committee's [Confidentiality Procedures](#).

2.2.6.1 Waterfowl Relative Abundance

Product Objective

This series of maps show species-specific relative densities of waterfowl along coastal blocks in Atlantic Canada. Waterfowl Relative Abundance.

The following data source was used to produce the maps:

- CWS. 2023c. Coastal Waterfowl Block Observations. Internal database.

Methodology

Coastlines along Eastern Canada in the Atlantic Ocean and the Saint Lawrence River have been surveyed by the Canadian Wildlife Service which includes recorded observations of coastal waterfowl dating back to the 1960s. That data has been summarized into coastal blocks, following this historical survey method. To produce the map, the maximum number of individuals observed over all years was extracted for each species and each coastal block. From these values, the relative importance of blocks was calculated, between 0 and 1, for each species.

Context and Interpretation

Spatial Distribution: At-sea distributions are limited for many species. Coastal waterfowl block surveys were used to assess which areas could have more individuals of a waterfowl species.

Temporal Distribution: For waterfowl species nesting in the Atlantic Region, nesting calendars are for some species (Birds Canada 2023) were used to inform potential periods of higher risk for waterfowl. Movement related metrics for migrating waterfowl (e.g., snow geese) remain to be developed.

- Birds Canada. 2023. Nesting Calendar Query Tool.

Assumptions, Caveats, and Product Updates

- This information should be used alongside movement data (e.g., GPS, PTT, GLS) or at-sea surveys to understand potential areas waterfowl might be congregating, and the areas where waterfowl might transit/migrate within the rotor swept zone of offshore wind turbines.
- Data are historical and updated triennial surveys have taken place that do not use the coastal block system. This approach has thus been supplemented with more recent data from the triennial surveys and can be found in Section 3.5.
- The coastal blocks surveys focus on the non-breeding season only.
- Update: Relative abundance was updated to display a constant scale between all species (i.e., equal interval bins). The constant scale between species allows the relative patterns of abundance to be interpreted correctly.

2.2.6.2 Waterfowl Band Encounters

Product Objective

This series of maps show relative densities of regulated gamebird harvest around coastal areas of Atlantic Canada: Waterfowl Band Encounters.

The following data source was used to produce the maps:

- USGS. 2023. Game bird banding and encounter data release July 2023.

Game bird harvest density maps are provided for the following species:

- American Black Duck
- American Wigeon
- American Woodcock
- Bufflehead
- Blue-winged Teal
- Canada Goose
- Common Eider
- Common Goldeneye
- Common Merganser
- Common Murre
- Gadwall
- Greater Scaup
- Green-winged Teal
- Hooded Merganser
- Lesser Scaup
- Mallard
- Northern Pintail
- Northern Shoveler
- Red-breasted Merganser
- Ring-necked Duck
- Surf Scoter
- Thick-billed Murre
- Wilson's Snipe
- Wood Duck
- White-winged Scoter

Methodology

The maps were created using band recovery data from hunted birds in the study area using the United States Geological Survey (USGS) Game Bird dataset. The USGS game bird banding

database was queried for all band recoveries that resulted from ‘shooting’ that were not recovered the same year they were banded to reduce the importance of banding sites in density estimations. Regional relative densities were produced, but only displayed within coastal block areas. Point density kernel estimates were calculated using the “spstats” package (v 3.0-6) of the R programming language (v4.2.2). A cell size of 1,000 m and a search radius of 10 km were used in each analysis. Estimates were rescaled between 0 and 1 and values lower than 10e-4 were set to 0.

Context and Interpretation

Spatial Distribution: Includes harvest densities in Atlantic Canada (Nova Scotia, Newfoundland and Labrador, New Brunswick, and Prince Edward Island).

Temporal Distribution: Current harvest density maps reflect band recovery, so some timing information is available. However, harvest season timelines are set and therefore can represent when regulated harvest is happening within the region.

Assumptions, Caveats, and Product Updates

- The current assessment is incomplete, as it only includes datasets that were available to ECCC-CWS-ATL at the time of submission. Therefore, these densities do not reflect the true pattern of regulated hunting of game birds in Atlantic Canada.
- This dataset does not include any assessment of harvest by Indigenous Nations.
- Band recovery distributions are affected by the location and timing of banding, the distributions of hunters and hunter effort, reporting rates, and distributions of birds.
- National harvest survey results from ECCC-CWS-National Capital Region would help better represent gamebird harvest and could supplement data from band recoveries. ECCC-CWS-ATL has requested these data and will provide an updated product to the Committees if/when received and analyzed.
- Update: Using banding recoveries as indications of gamebird harvest densities is heavily biased by banding effort. Banding stations can appear as "hotspots" for all species in the vicinity of band recoveries. This would potentially mute other areas with high harvest because band recoveries would be lower despite harvest pressure likely being just as high in some cases. The recovery distributions are affected by the location and timing of banding, the distributions of hunters and hunter effort, reporting rates (which are known to be low in NL), and distributions of birds. To reduce these effects, only birds that were reported in a different year they were banded were used for the analysis.

3.4 Waterfowl Habitat Suitability

Product Objective

These maps present the results of waterfowl habitat suitability modelling for five species of sea ducks in eastern North America. The objective is to identify potential key areas and habitat

features where large numbers of individuals and species may congregate during various periods of the annual cycle. The areas between highly suitable areas within a season, and areas between different seasonal habitats, represent areas of directed movement, and therefore potential exposure risk to offshore wind. Waterfowl Habitat Suitability

The following data source was used to produce the map:

- Lamb et al. 2020. Assessing year-round habitat use by migratory sea ducks in a multi-species context reveals seasonal variation in habitat selection and partitioning. *Ecography*, 43(12), pp.1842-1858.

Methodology

Habitat suitability rasters were mapped for five species of sea ducks (Common Eider, Black Scoter, Surf Scoter, White-winged Scoter, and Long-tailed Duck) during three periods of the annual cycle (non-breeding, pre-breeding [spring] migration, post-breeding [fall] migration). The habitat suitability models used to create the maps were derived from individual tracking data (Argos PTT) deployed on sea ducks between 2002 and 2017. Only sedentary (non-transient) movements were used to develop the models. The individual species maps present species-specific habitat suitability scores projected across the 95% kernel density of individual locations across the project study area; the habitat suitability that include marine areas (winter, spring, fall) are shown only within the RA Study Areas and the Gulf of St. Lawrence. The suitable breeding areas are shown over terrestrial areas. Multi-species habitat suitability maps indicate the number of species with overlap between the top 10% and 25% of suitable habitat over all five species. The modelling approach used the outlying mean index as a measure of habitat suitability, which corresponds to a distance in multivariate space between a given grid cell and the mean of all the habitat variables in occupied grid cells. A distance of zero means that conditions in a cell are essentially identical to the average niche space occupied by the species, while larger values indicate cells that are farther from preferred habitat characteristics. Therefore, lower scores (in yellow) correspond to higher suitability. Conversely, higher scores (in purple) correspond to lower suitability. See the Materials and Methods section of Lamb et al. 2022 for additional details on data collection and modelling approaches.

Context and Interpretation

Spatial Distribution: In general, all species preferred shallow, nearshore habitats with high productivity. Sea ducks selected most strongly for preferred habitats during post-breeding migration, which includes a flightless molt period, and selected least strongly during pre-breeding migration and the breeding season. These species showed moderate selection for preferred habitats during the non-breeding period. Habitat selection during the breeding season was restricted to terrestrial habitats near or above the northern limits of boreal forest.

Temporal Distribution: Data include habitat suitability models for non-breeding, pre-breeding, breeding, and post-breeding periods.

Assumptions and Caveats

- Habitat suitability was assessed only within areas used by tracked individuals; it was not assessed across the full range of these species.
- Marine areas outside the study areas and Gulf of St. Lawrence are not mapped and available, upon request to ECCC-CWS-ATL.

3.5 Waterfowl Coastal Density

Product Objective

These maps provide waterfowl coastal densities derived from aerial survey data. The final maps give an indication of an area's potential to support a given population of birds, and in turn, identify areas with potential exposure risk to offshore wind. Waterfowl Density - Triennial Surveys

The following data source was used to produce the map:

- CWS. 2018. Triennial Common Eider Survey Data. ECCC-CWS Quebec Region. Internal Data.

Methodology

Since 2003, a triennial winter coastal survey led by ECCC-CWS Quebec Region occurs along the east coast of Quebec and in the Atlantic Region. This survey targets Common Eider but also records incidental observations of other species encountered during the surveys. The following species were included in the analysis:

- Atlantic Brant
- Common Eider
- Goldeneye spp.
- King Eider
- Long-tailed Duck
- Red-breasted Merganser
- Scoter spp.
- White-winged Scoter

For each species with at least 10 recorded encounters, point data density rasters were calculated. If several encounters were recorded at the same location, only the maximum count recorded was retained for the analysis. Point density analysis was done using the density function of the spatstat package of the R programming language. Density estimates were calculated using a cell size of 500 m and a sigma of 5,000 m. Density values were rescaled between 0 and 1 and very low values ($< 10e-4$) set to 0 to remove modelling artifacts. Data

values of “0” were excluded from the classification and a colour ramp of blue to yellow was used.

Context and Interpretation

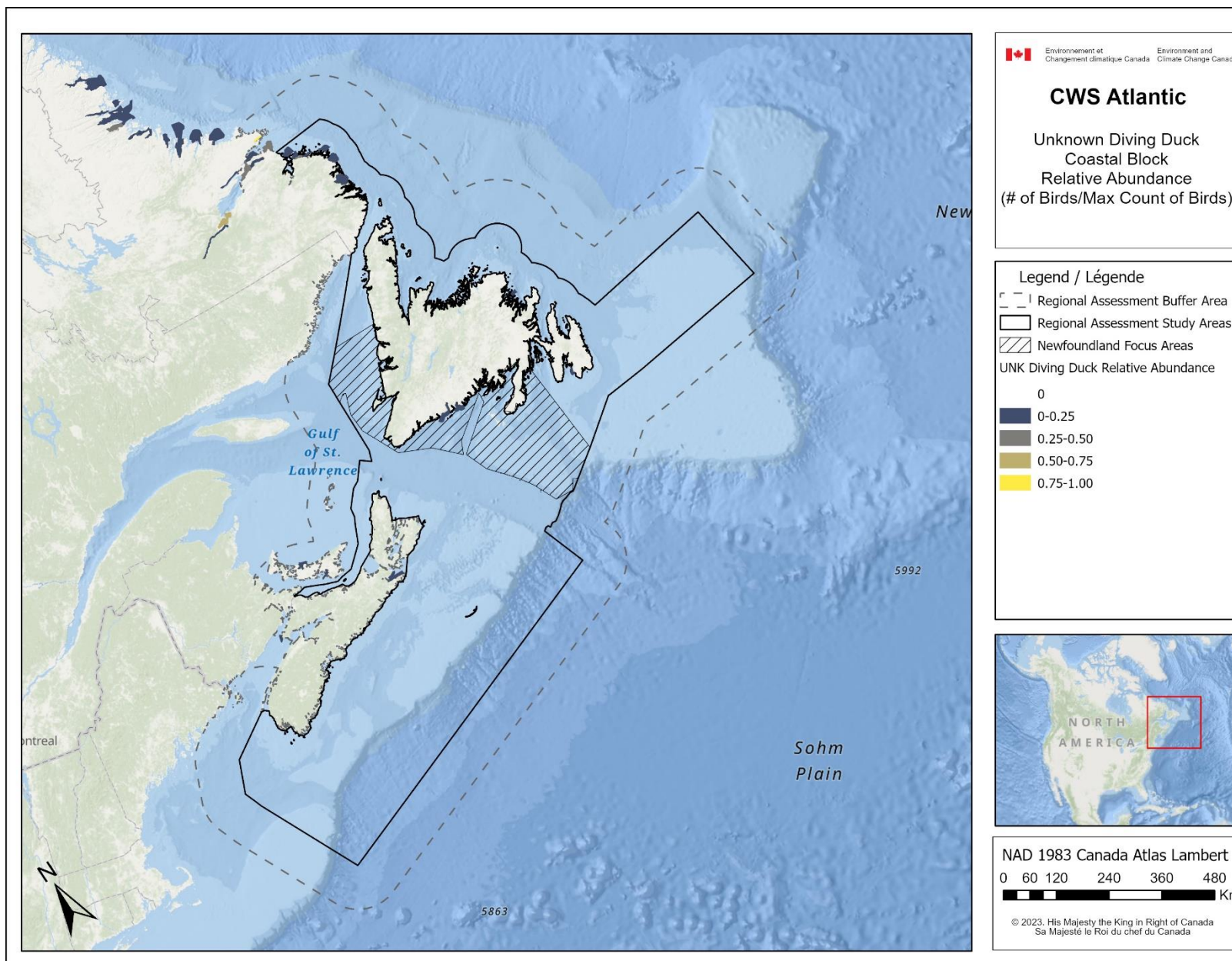
Spatial Distribution: The entire spatial extent of the Triennial Survey is included (eastern Quebec and Atlantic Canada). Common Eider were observed coastally throughout the study area, with higher densities in northern Newfoundland. Higher density areas for other species include northern Newfoundland; Eastern Coast of Labrador and Quebec; Estuary and Gulf of St. Lawrence; southern Nova Scotia; and the northeast coast of Cape Breton Island, Nova Scotia.

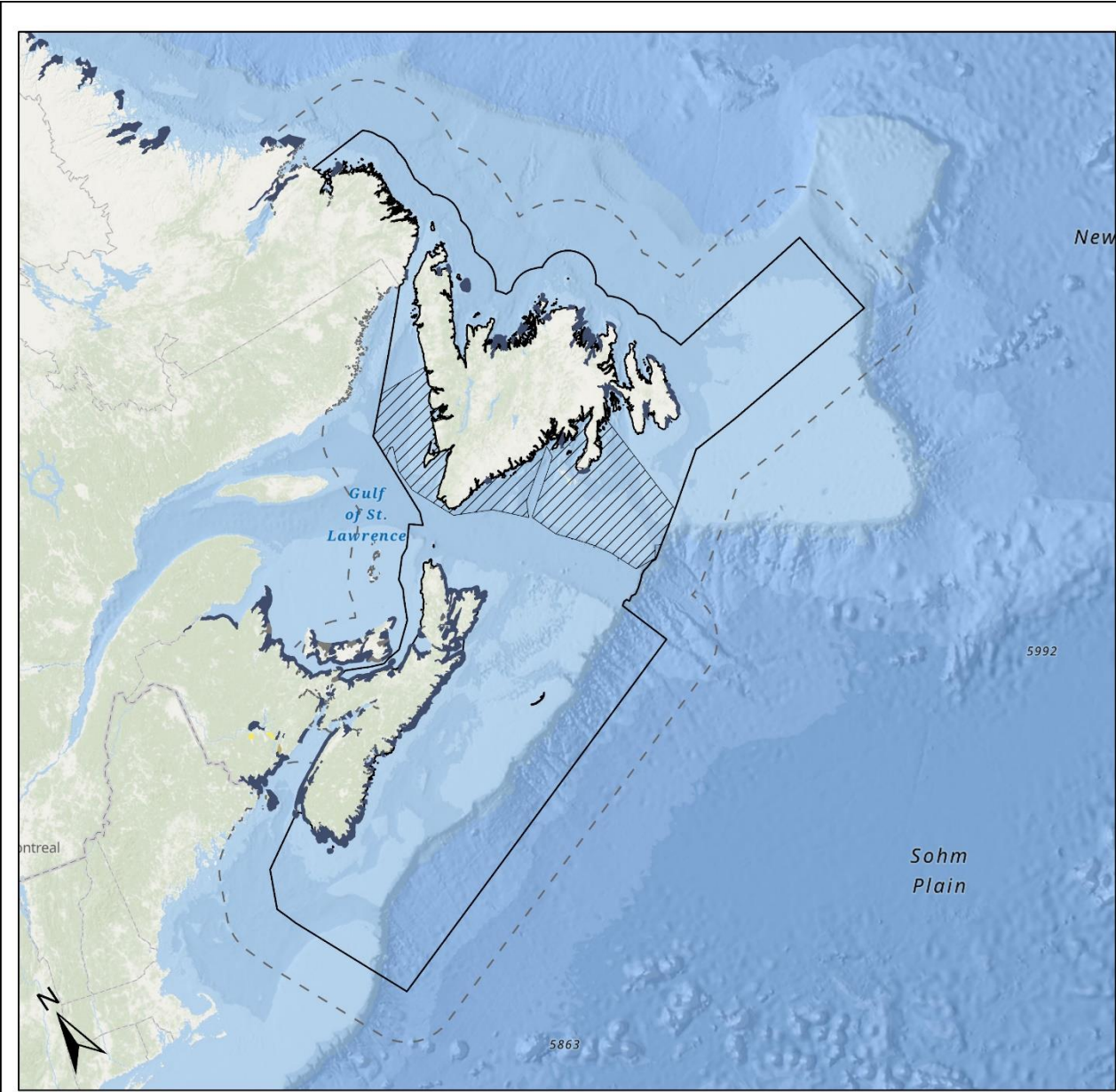
Temporal Distribution: Surveys are conducted in early February to early March. Data from 2003 to 2018 are included.

Assumptions and Caveats

- These maps include data collected during the non-breeding (winter) period only. They do not include densities during other important periods of the annual cycle (breeding, pre-breeding [spring] migration, and post-breeding [fall] migration)
- Coastal blocks are no longer searched using a standard methodology (see Section 2.2.6.1 for historical data using the standardized approach). Rather, coastal areas are surveyed and locations and counts of sea ducks are recorded.
- Survey tracks were not available and are therefore not depicted on the map. Consequently, areas with low sea duck densities or areas where sea ducks appear to be absent could be an artifact of sampling effort.
- Common Eider are prioritized during these surveys. Densities of other species are based on incidental observations and therefore may be less accurate.

Waterfowl Relative Abundance





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CWS Atlantic

Unknown Duck
Coastal Block
Relative Abundance
(# of Birds/Max Count of Birds)

Legend / Légende

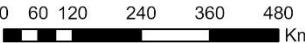
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- Regional Assessment Study Areas
- Newfoundland Focus Areas

UNK Duck Relative Abundance

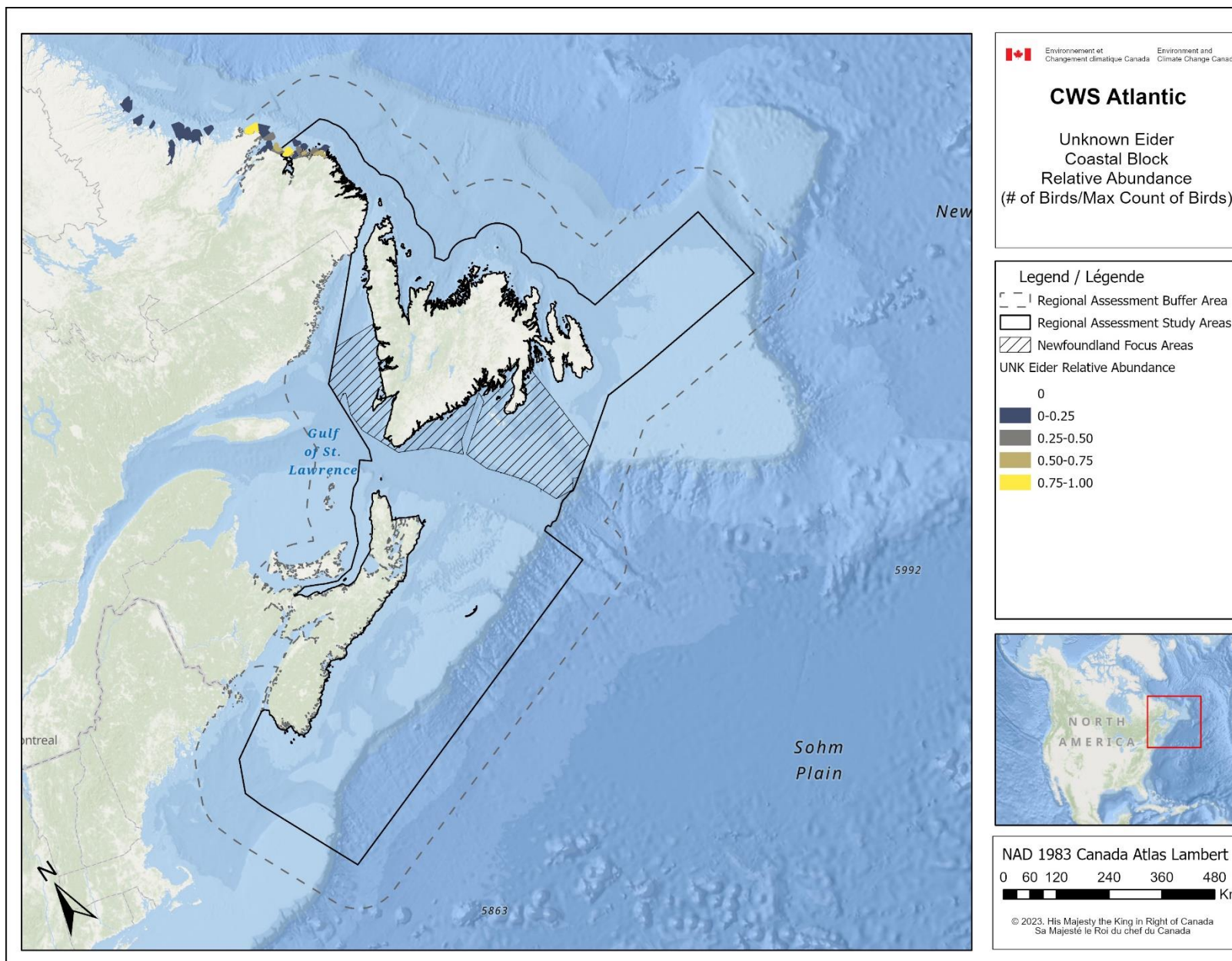
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- 0-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00

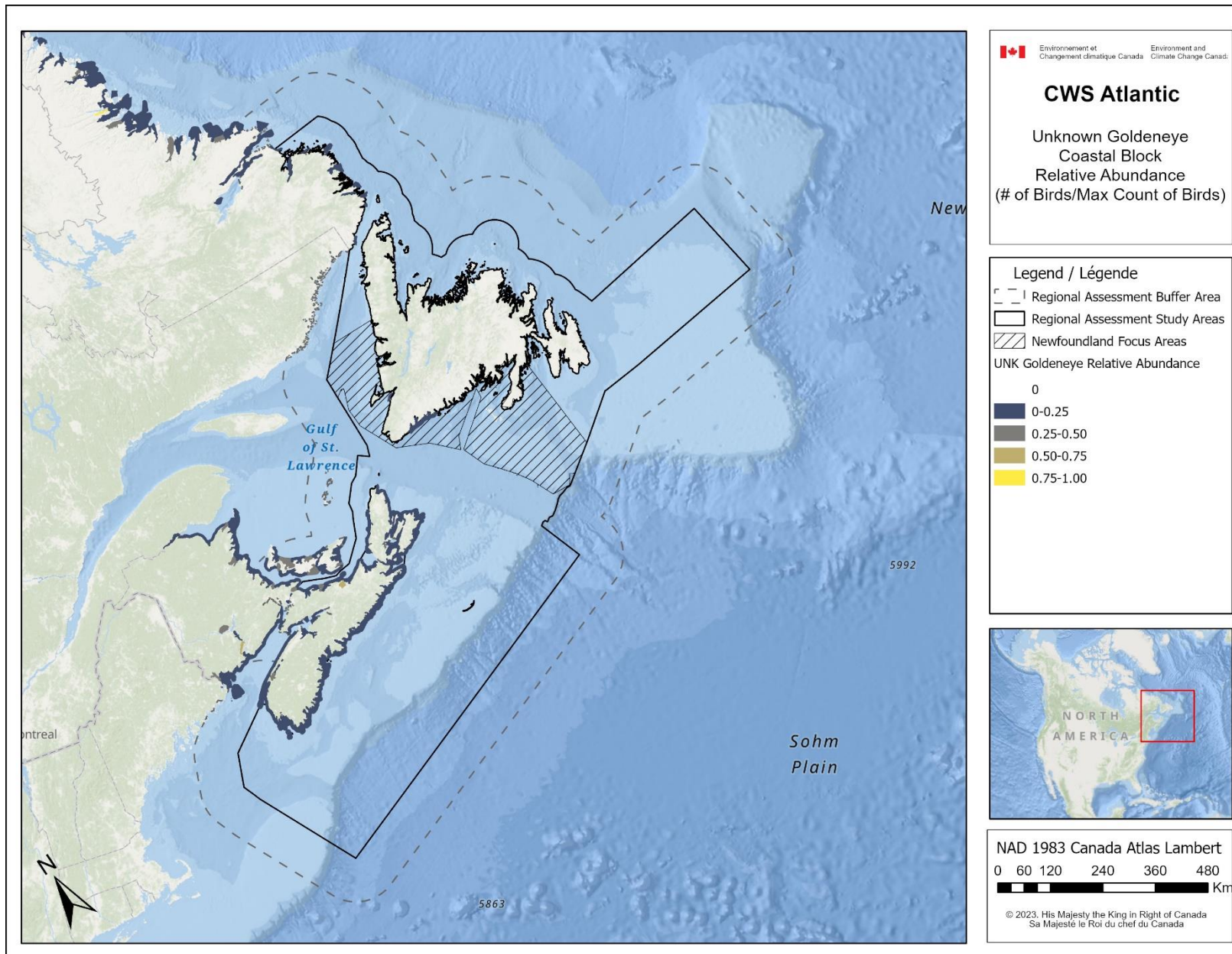


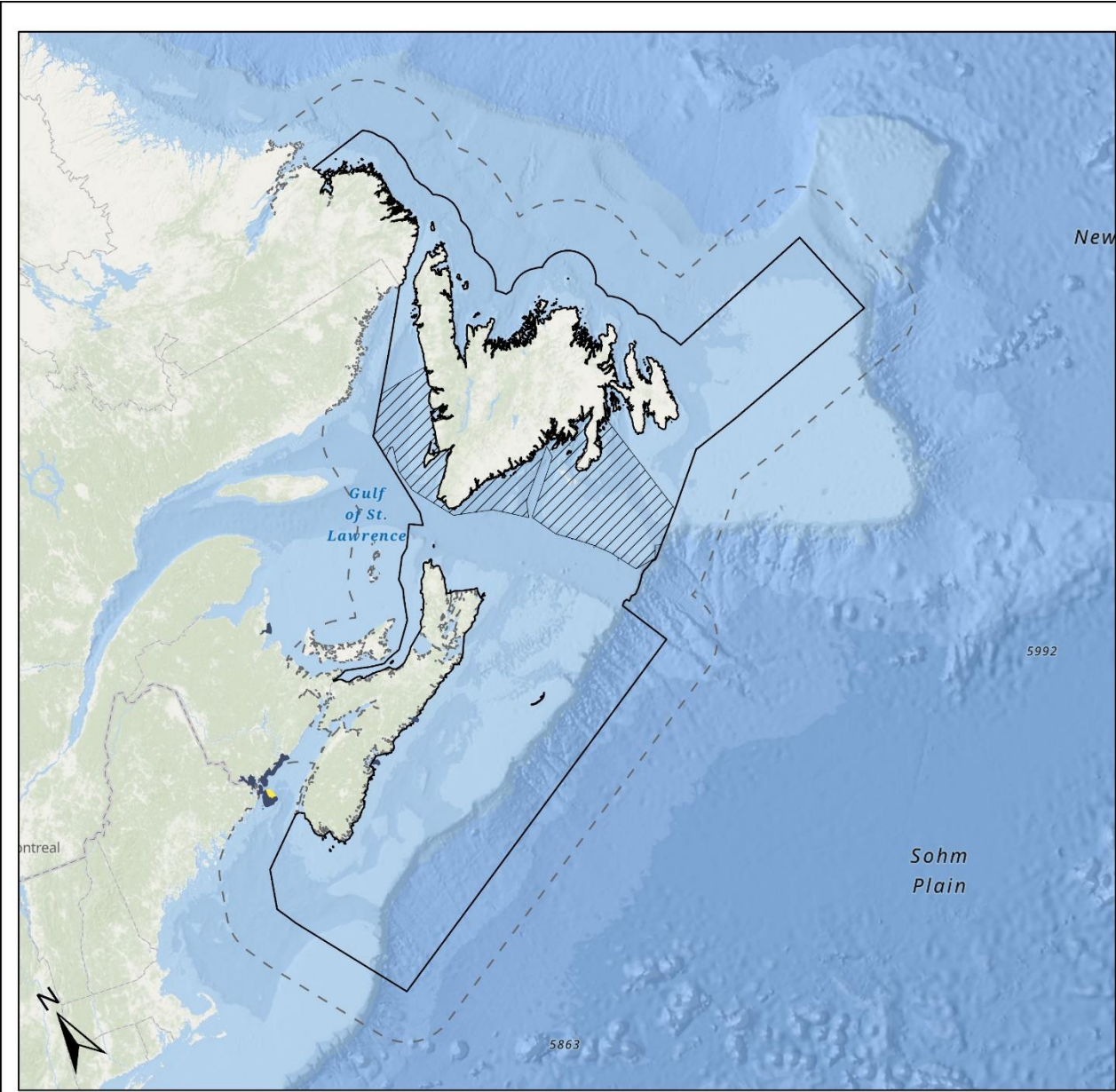
NAD 1983 Canada Atlas Lambert



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






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CWS Atlantic

Unknown Grebe
 Coastal Block
 Relative Abundance
 (# of Birds/Max Count of Birds)


Legend / Légende

-  Regional Assessment Buffer Area
 -  Regional Assessment Study Areas
 -  Newfoundland Focus Areas
- UNK Grebe Relative Abundance
- 0
 -  0-0.25
 -  0.25-0.50
 -  0.50-0.75
 -  0.75-1.00

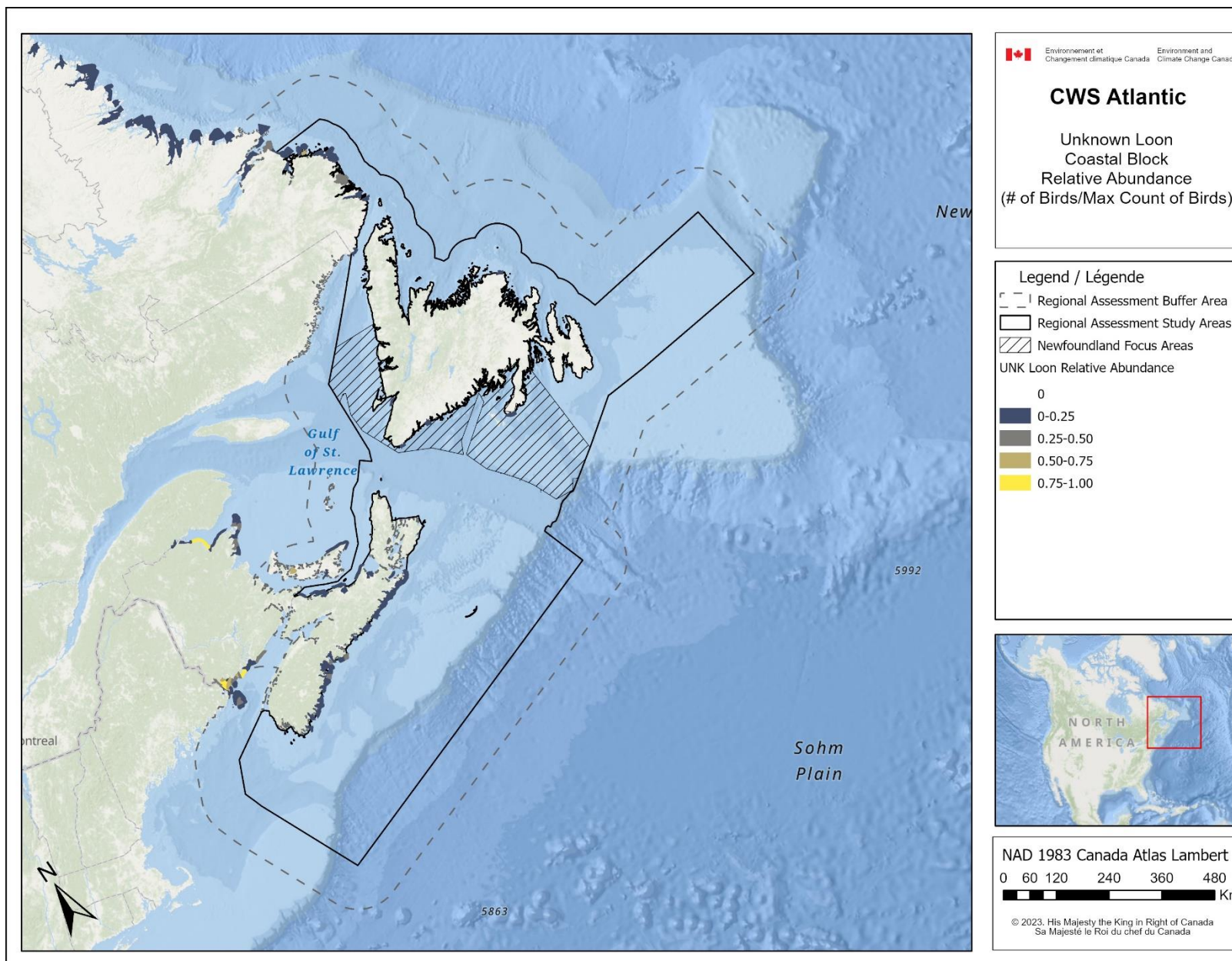


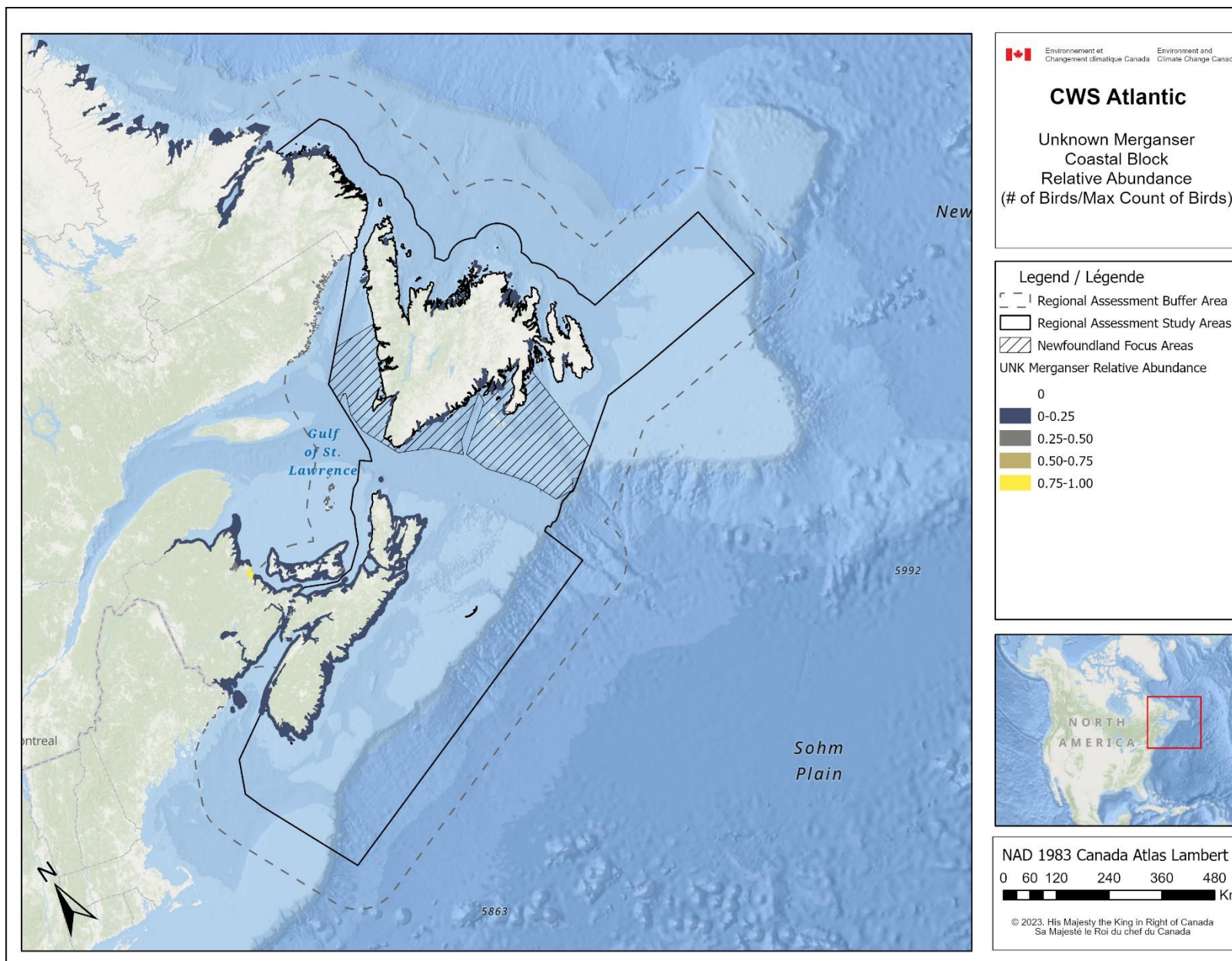
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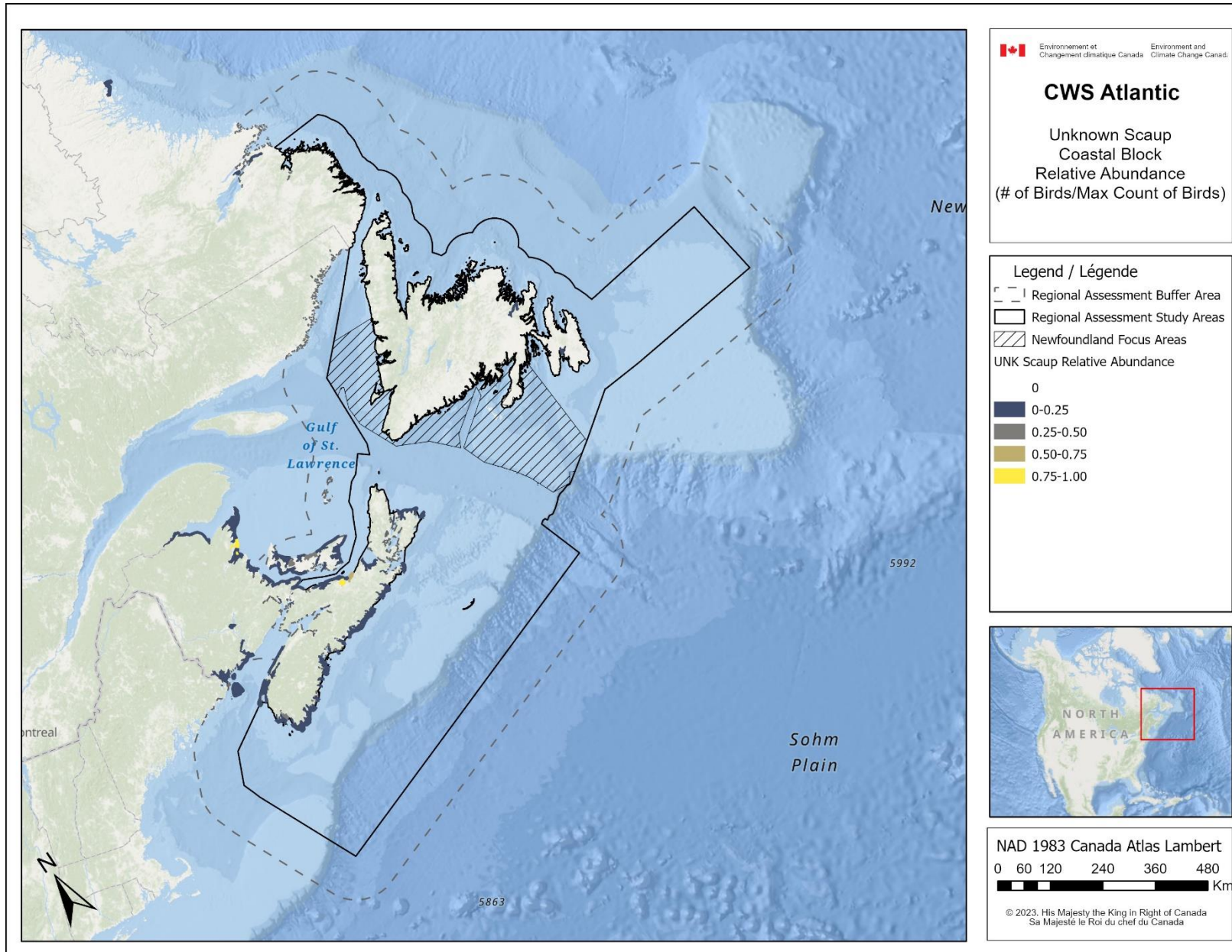
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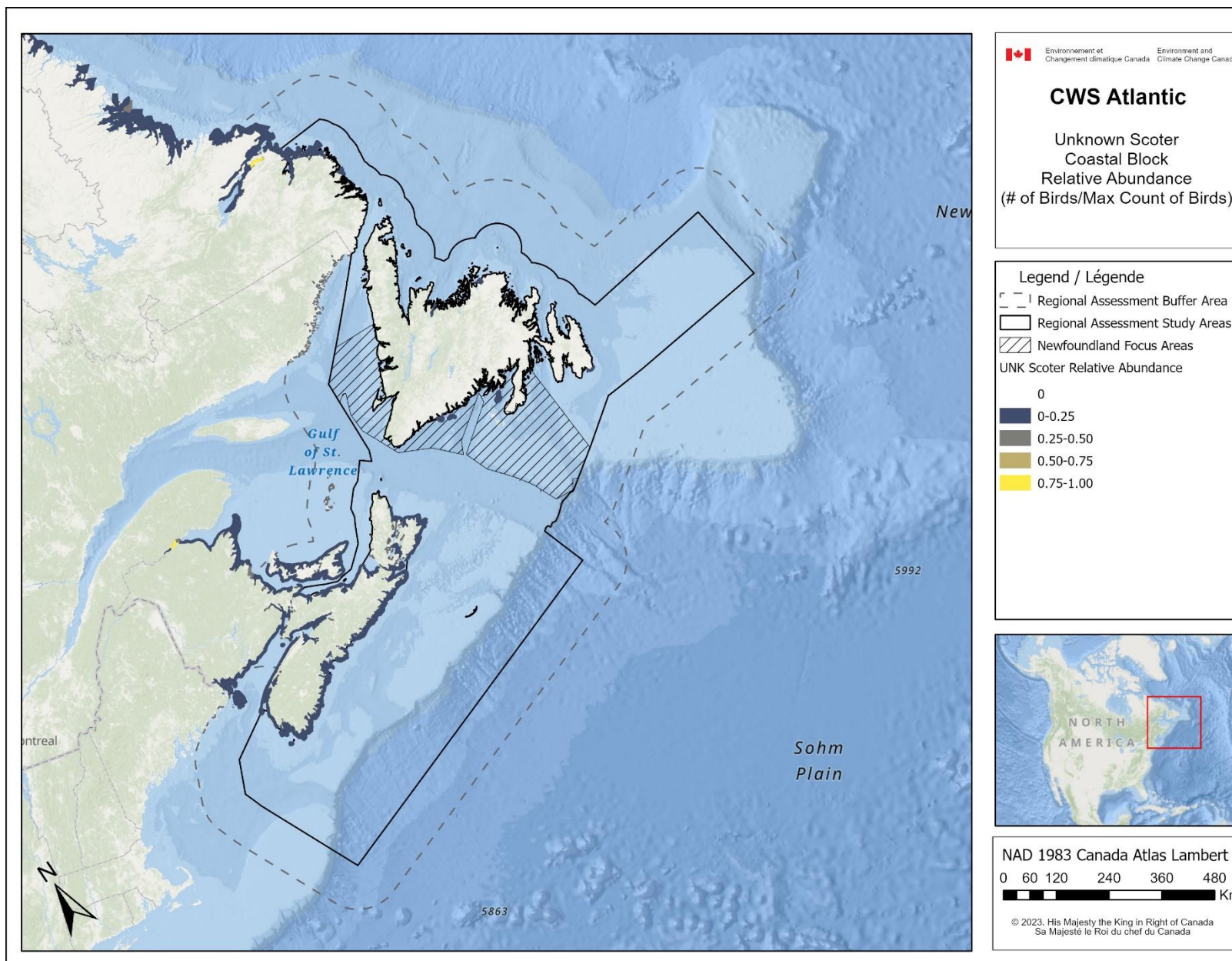


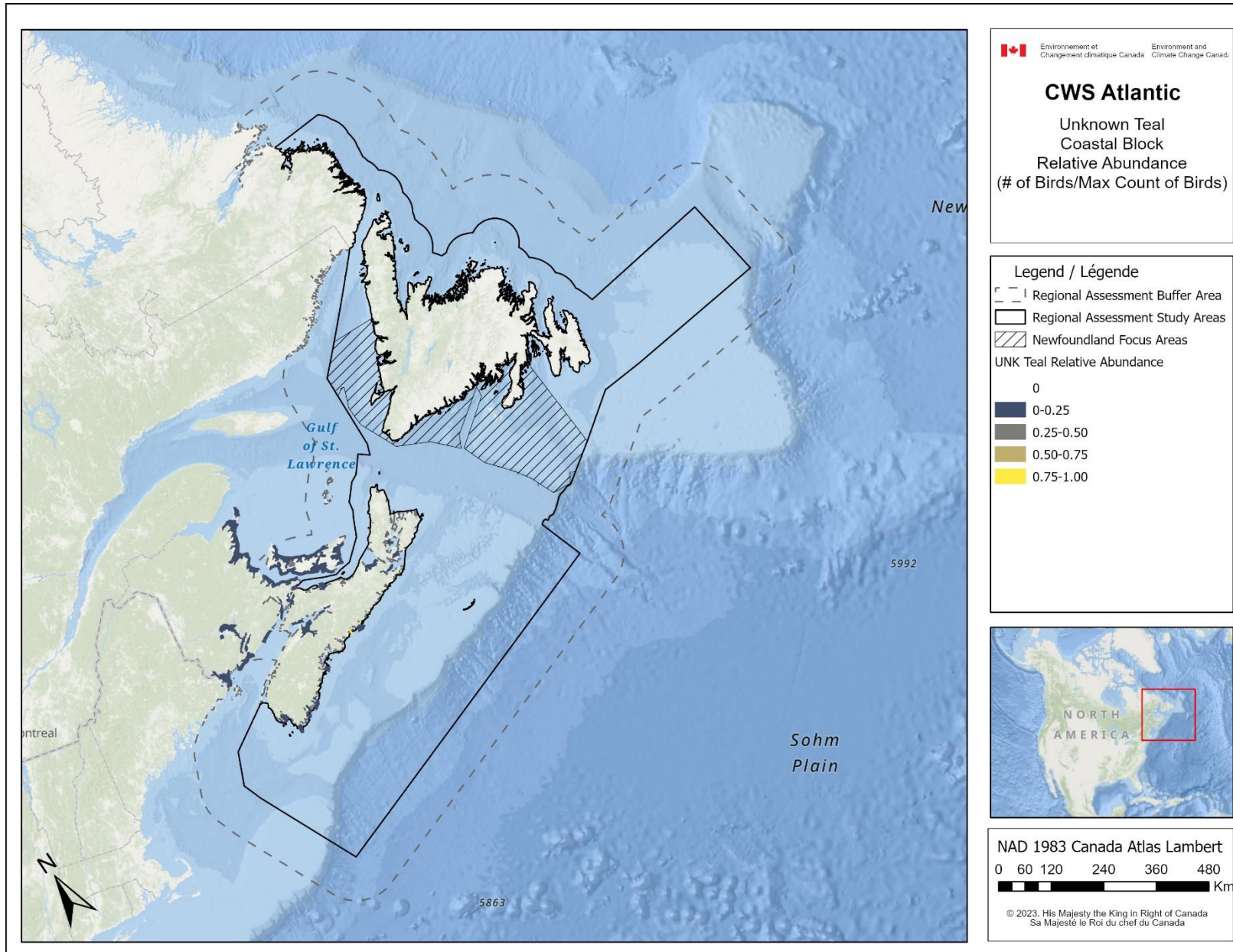
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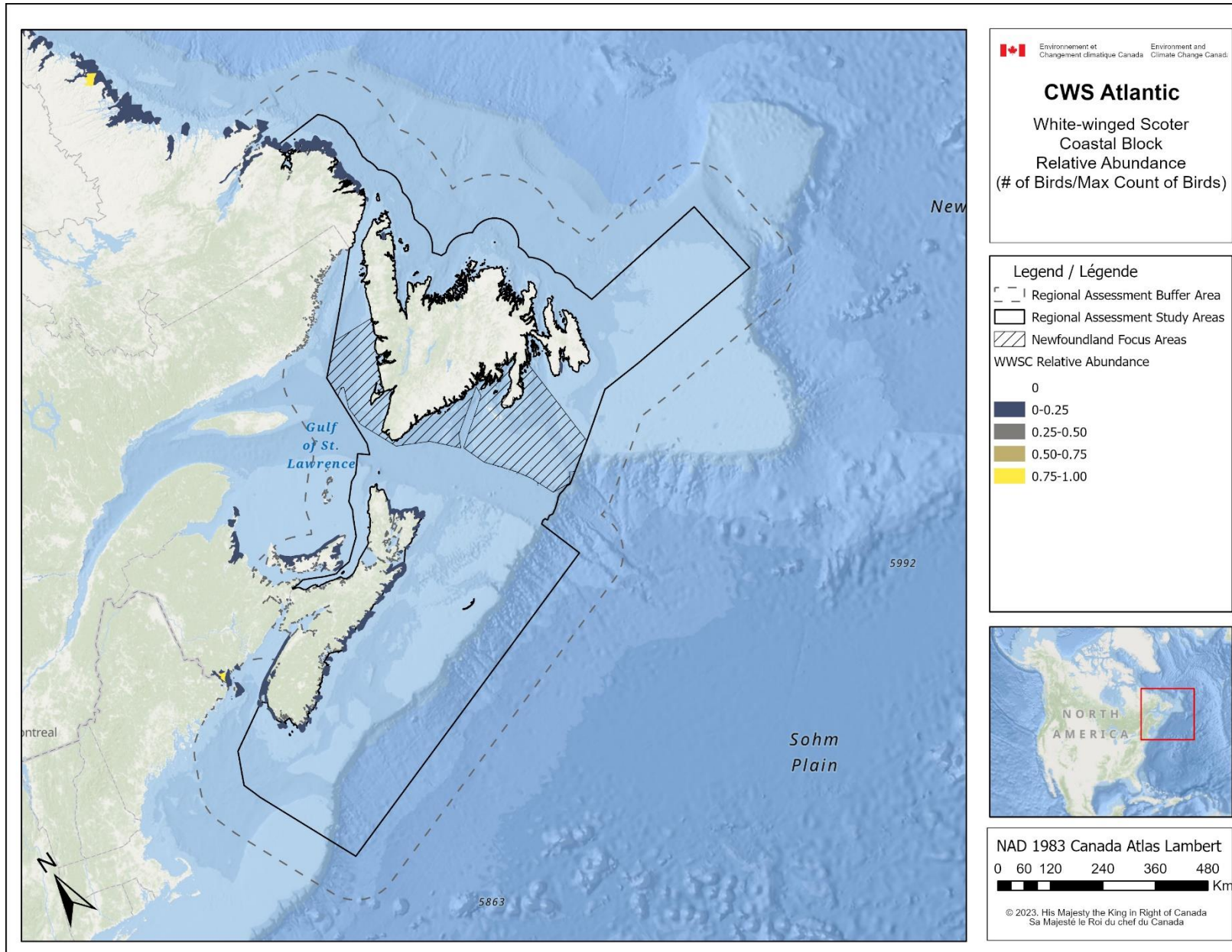


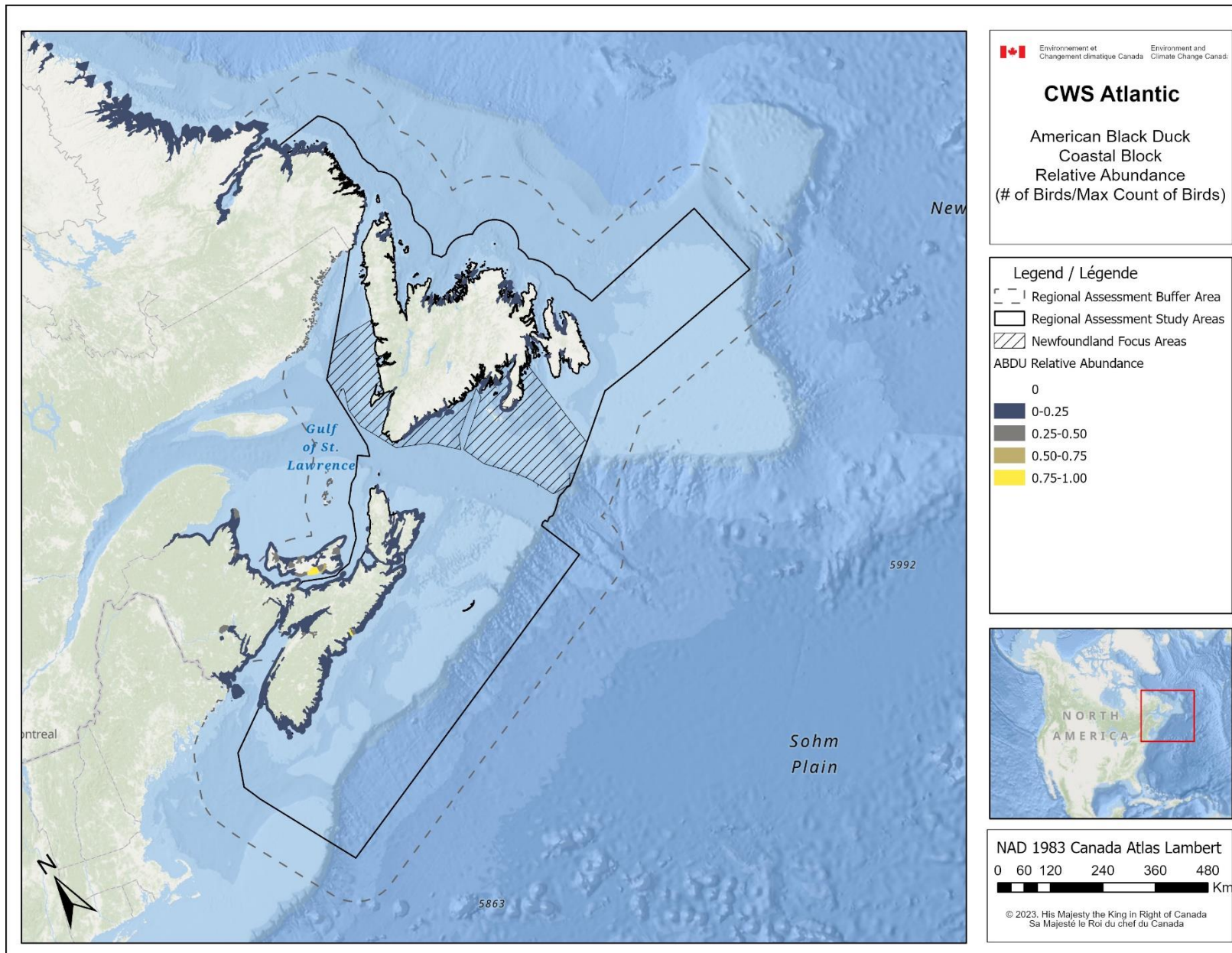


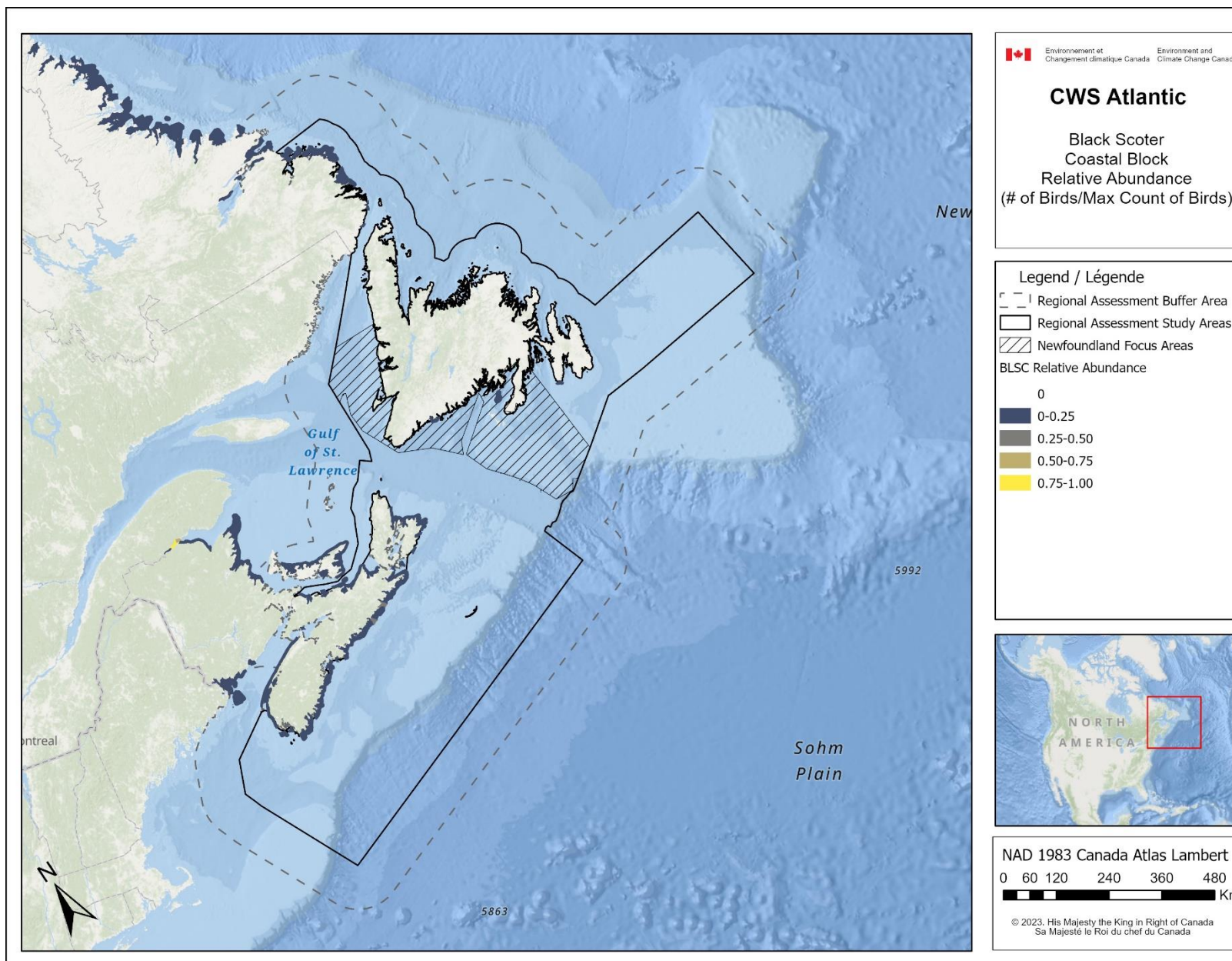


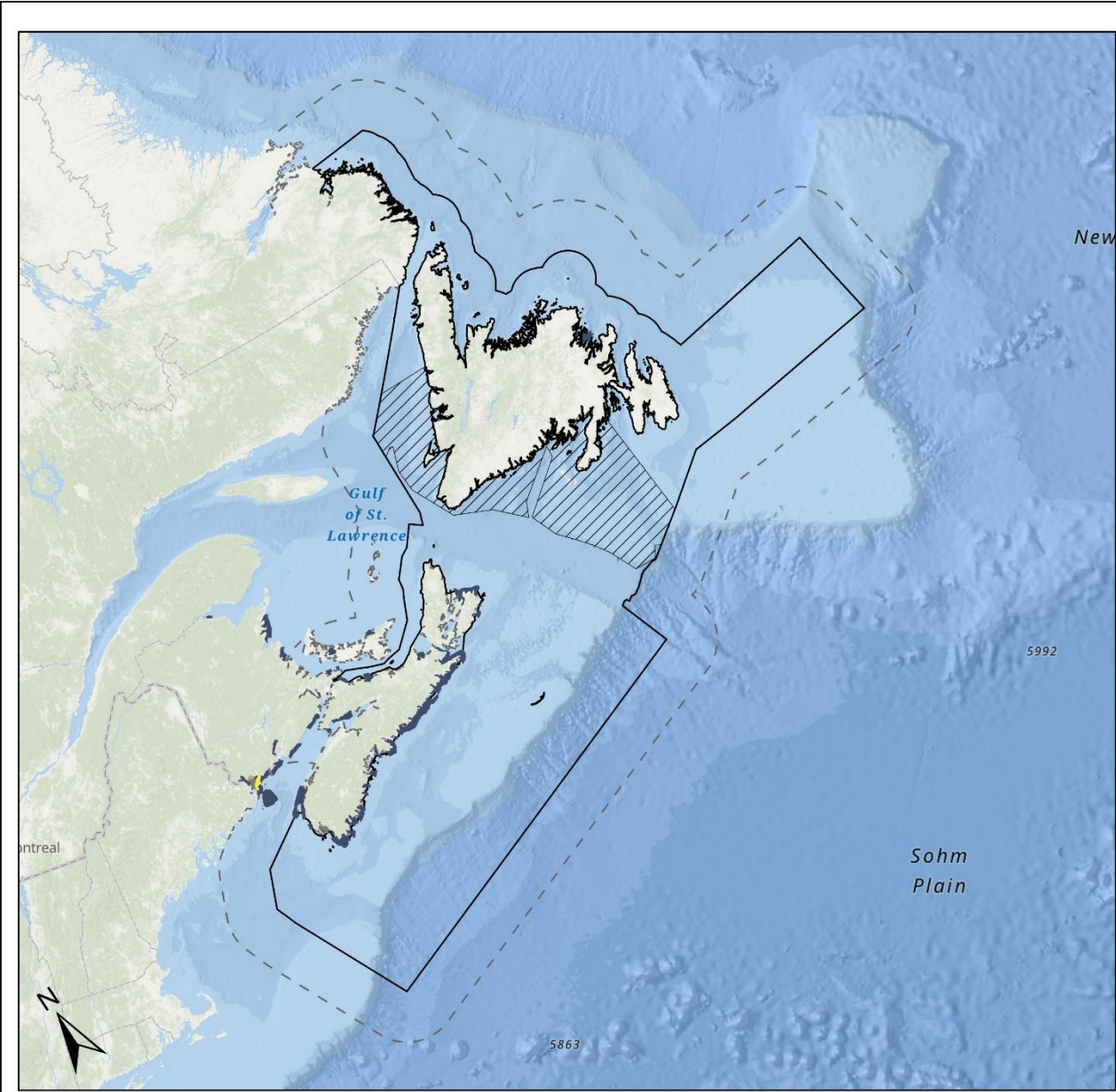




















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CWS Atlantic

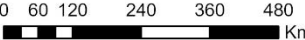
Bufflehead
 Coastal Block
 Relative Abundance
 (# of Birds/Max Count of Birds)

Legend / Légende

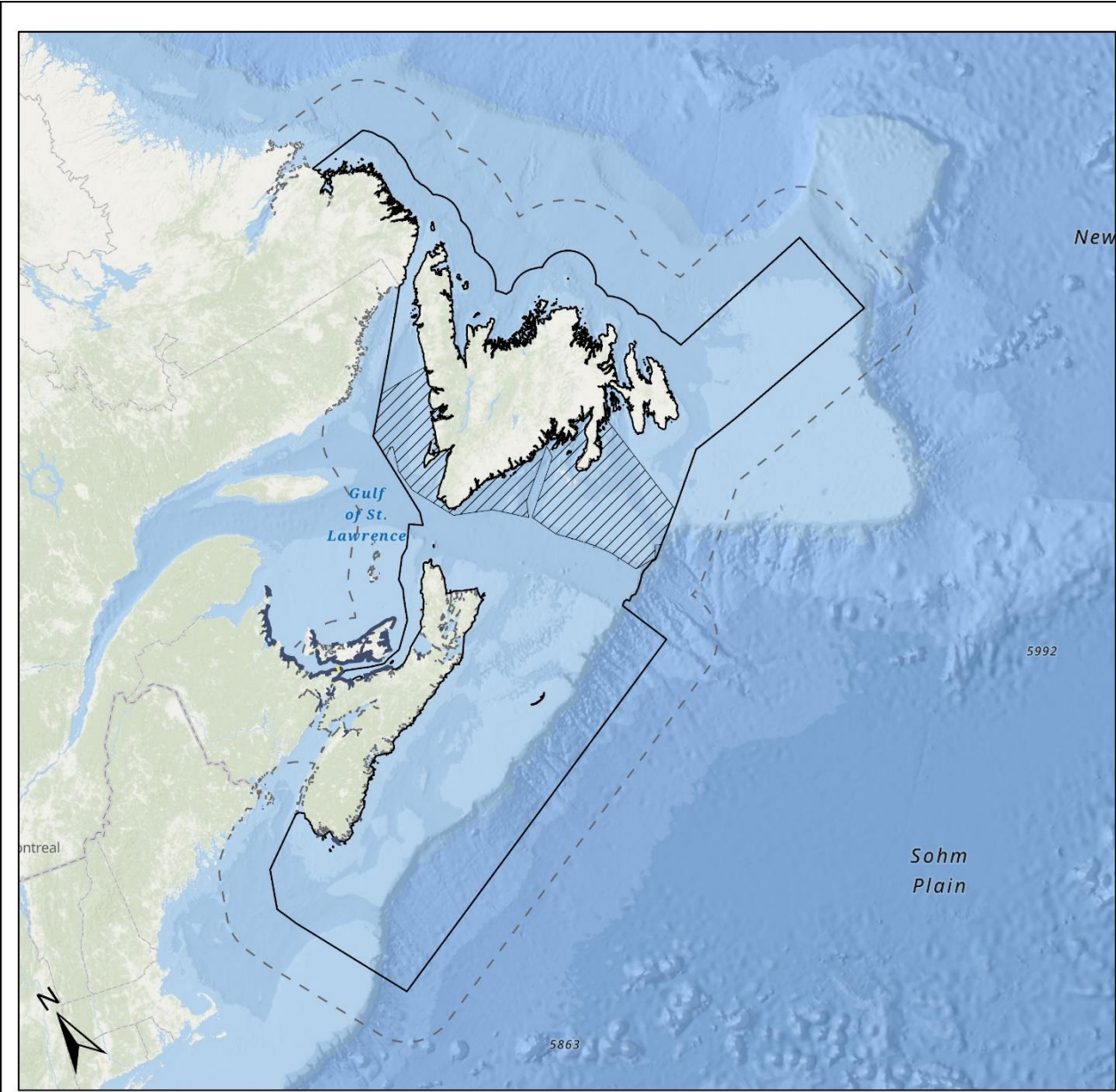
-  Regional Assessment Buffer Area
 -  Regional Assessment Study Areas
 -  Newfoundland Focus Areas
- BUFF Relative Abundance**
- 0
 -  0-0.25
 -  0.25-0.50
 -  0.50-0.75
 -  0.75-1.00



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








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CWS Atlantic

Blue-winged Teal
Coastal Block
Relative Abundance
(# of Birds/Max Count of Birds)

Legend / Légende

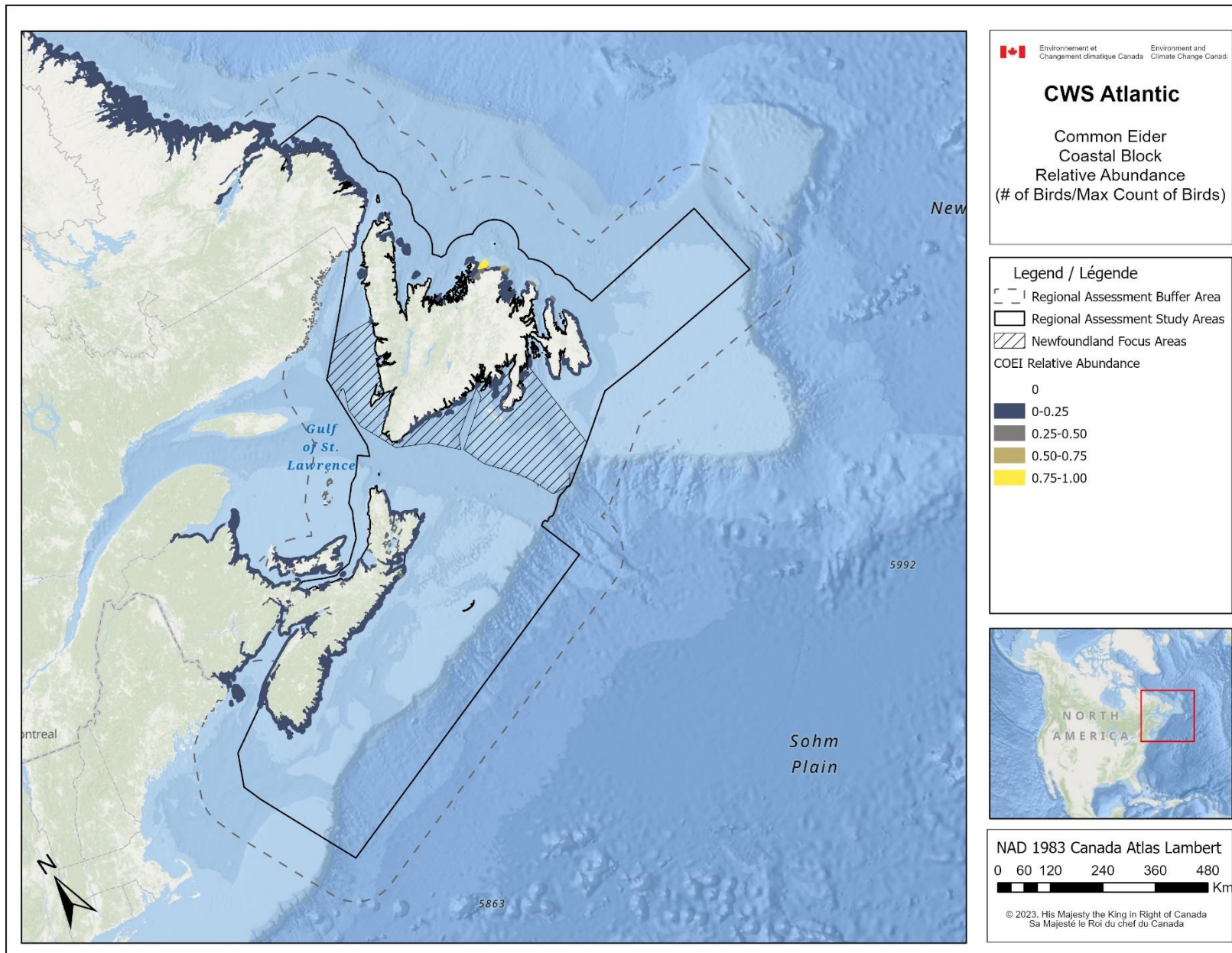
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 -  Newfoundland Focus Areas
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- 0
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 -  0.75-1.00

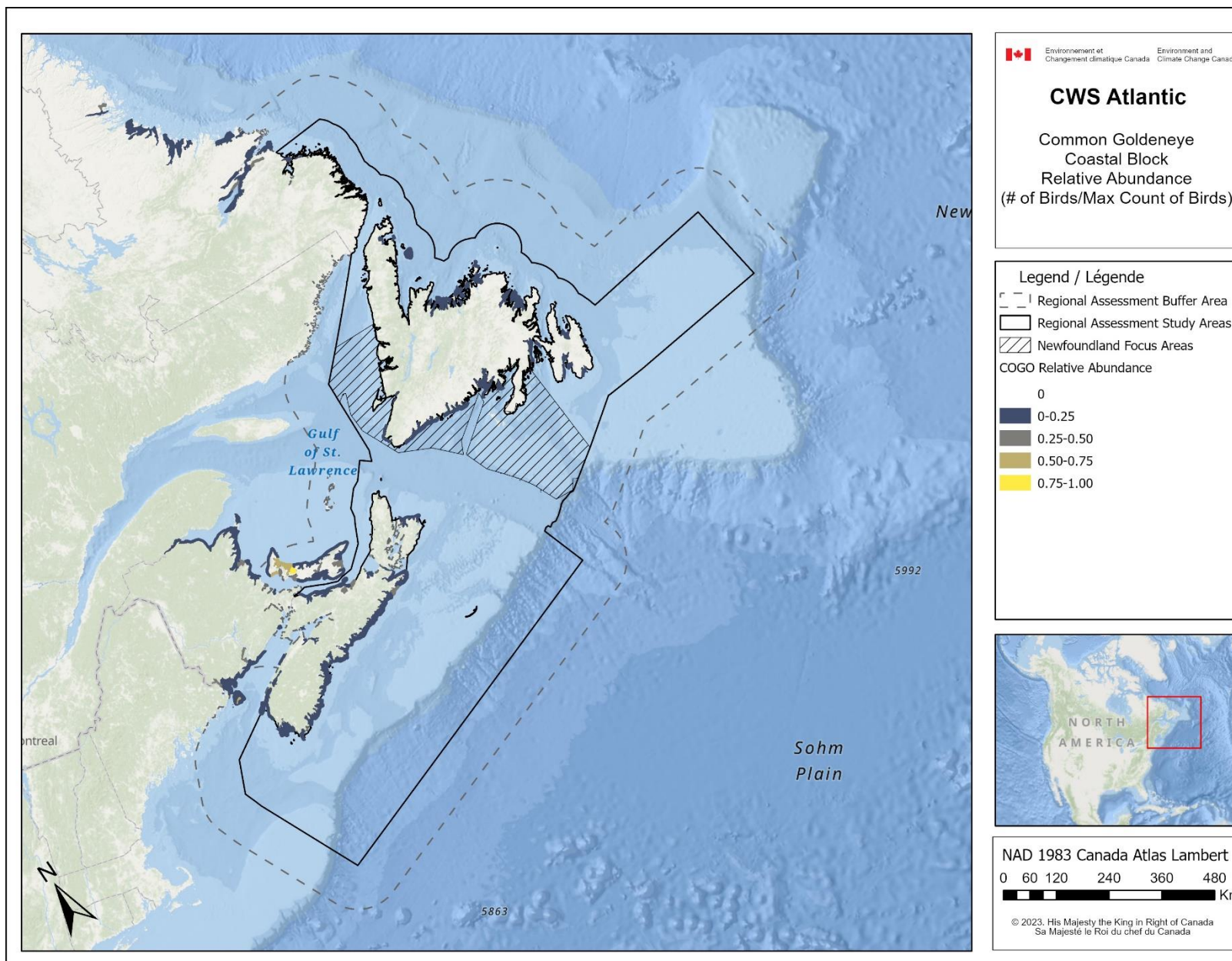


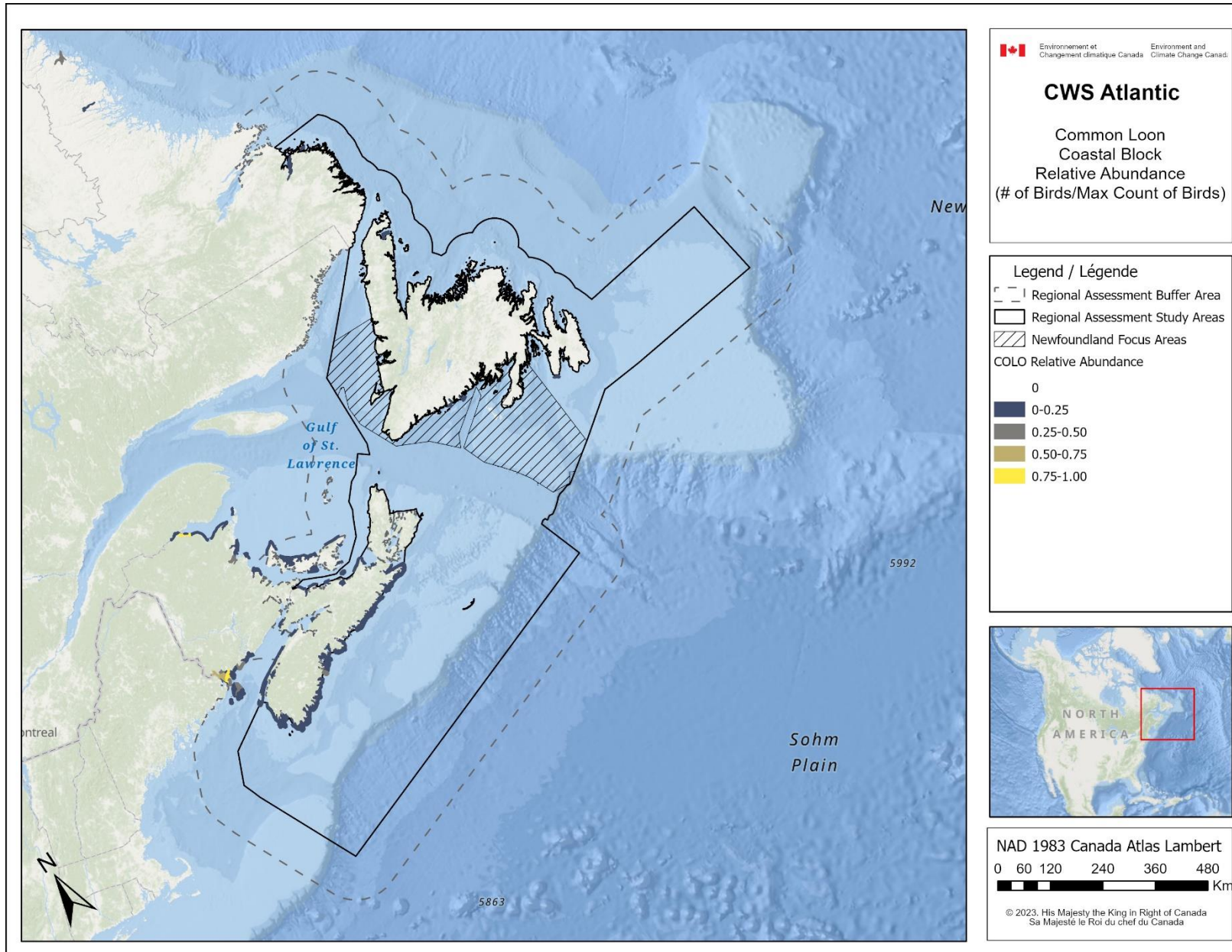
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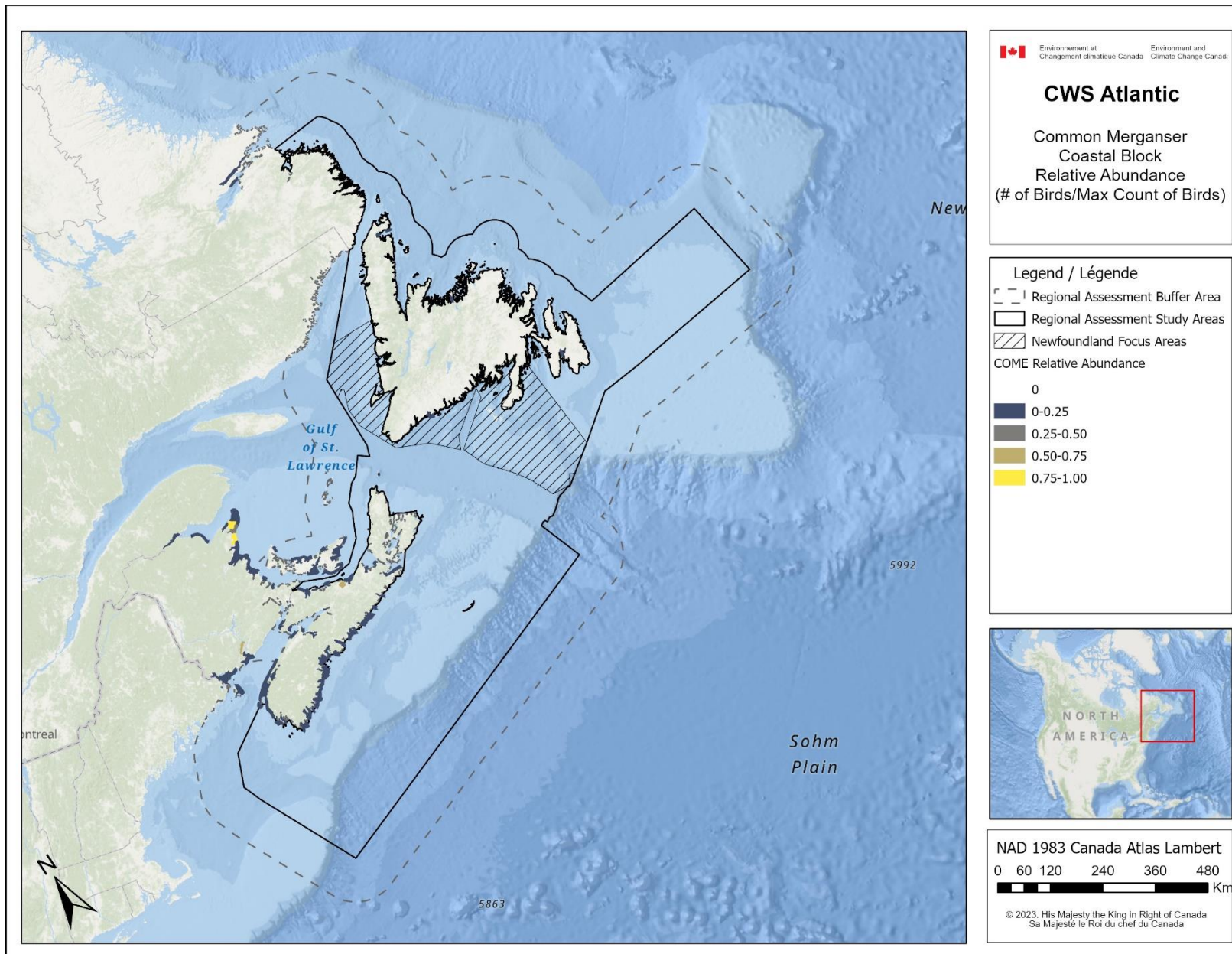


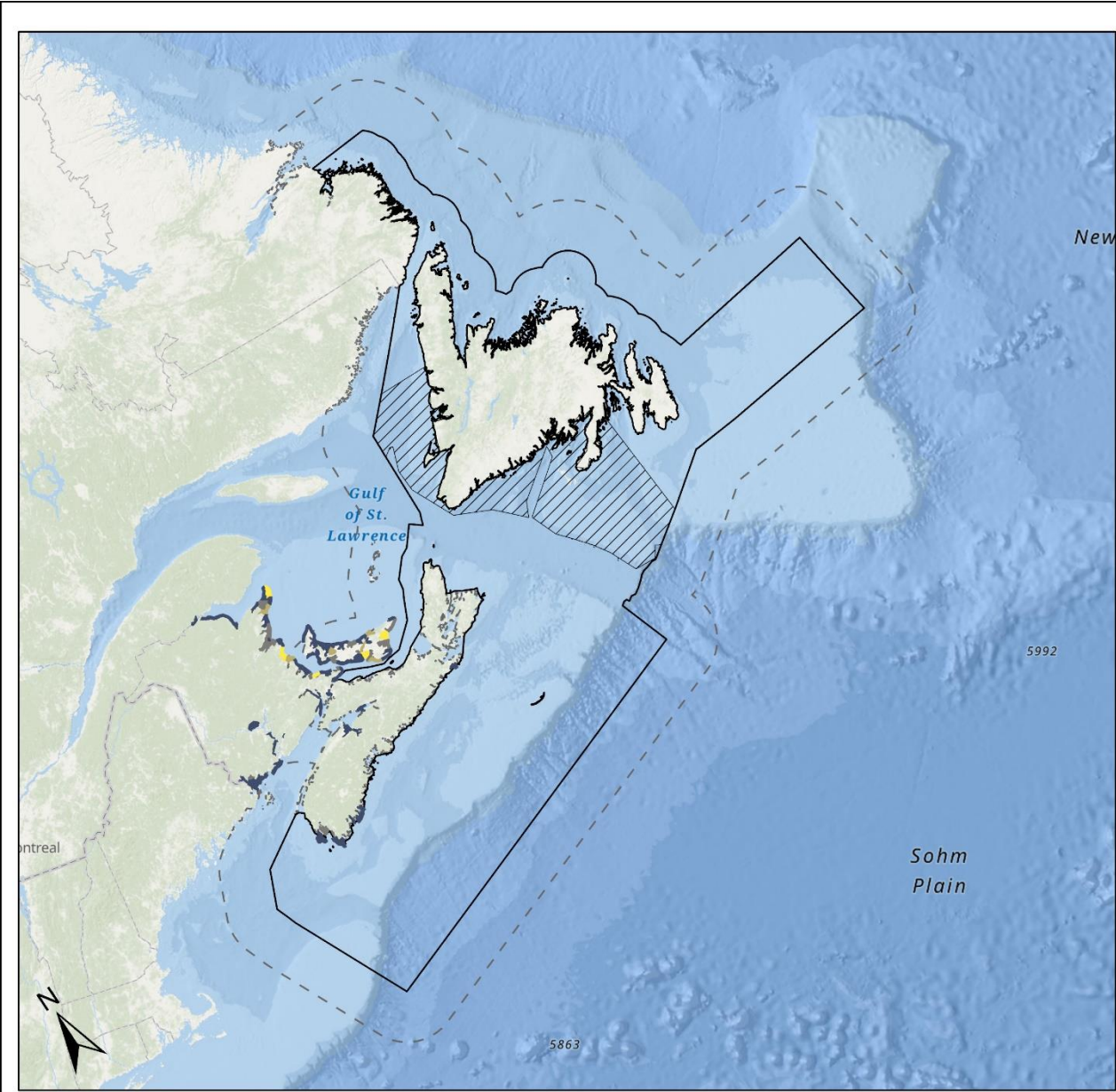
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CWS Atlantic
 Great Blue Heron
 Coastal Block
 Relative Abundance
 (# of Birds/Max Count of Birds)

Legend / Légende

-  Regional Assessment Buffer Area
-  Regional Assessment Study Areas
-  Newfoundland Focus Areas

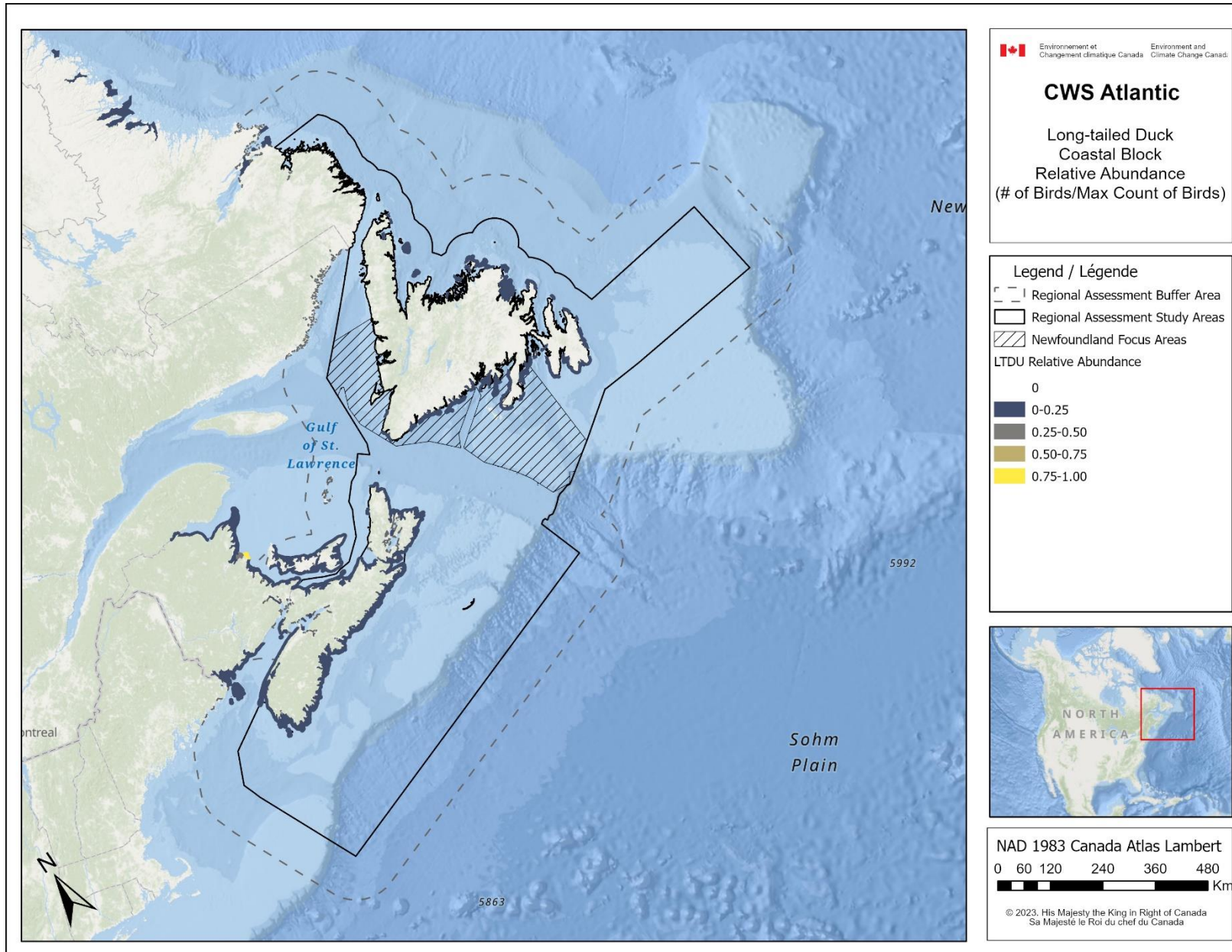
GBHE Relative Abundance

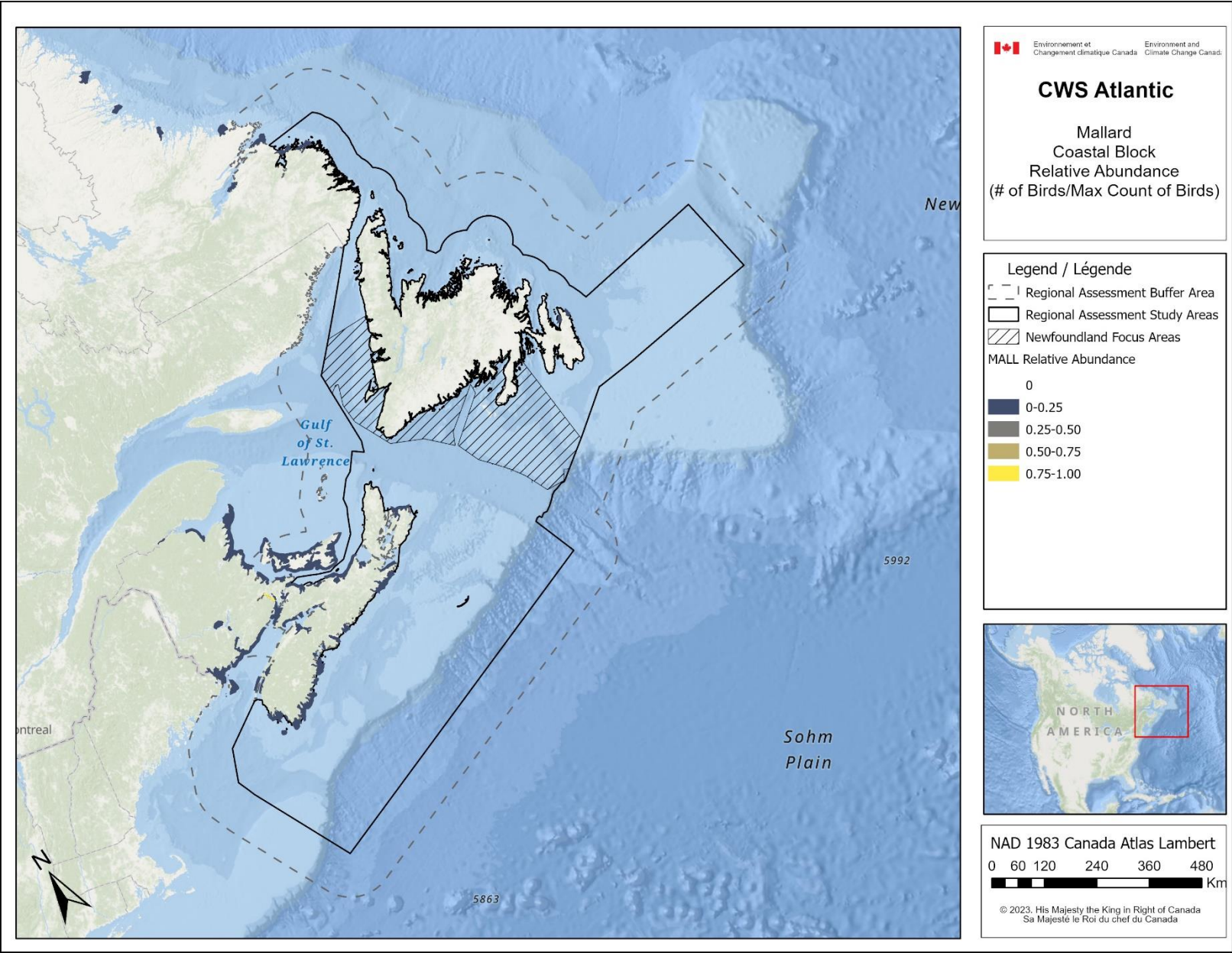
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-  0.25-0.50
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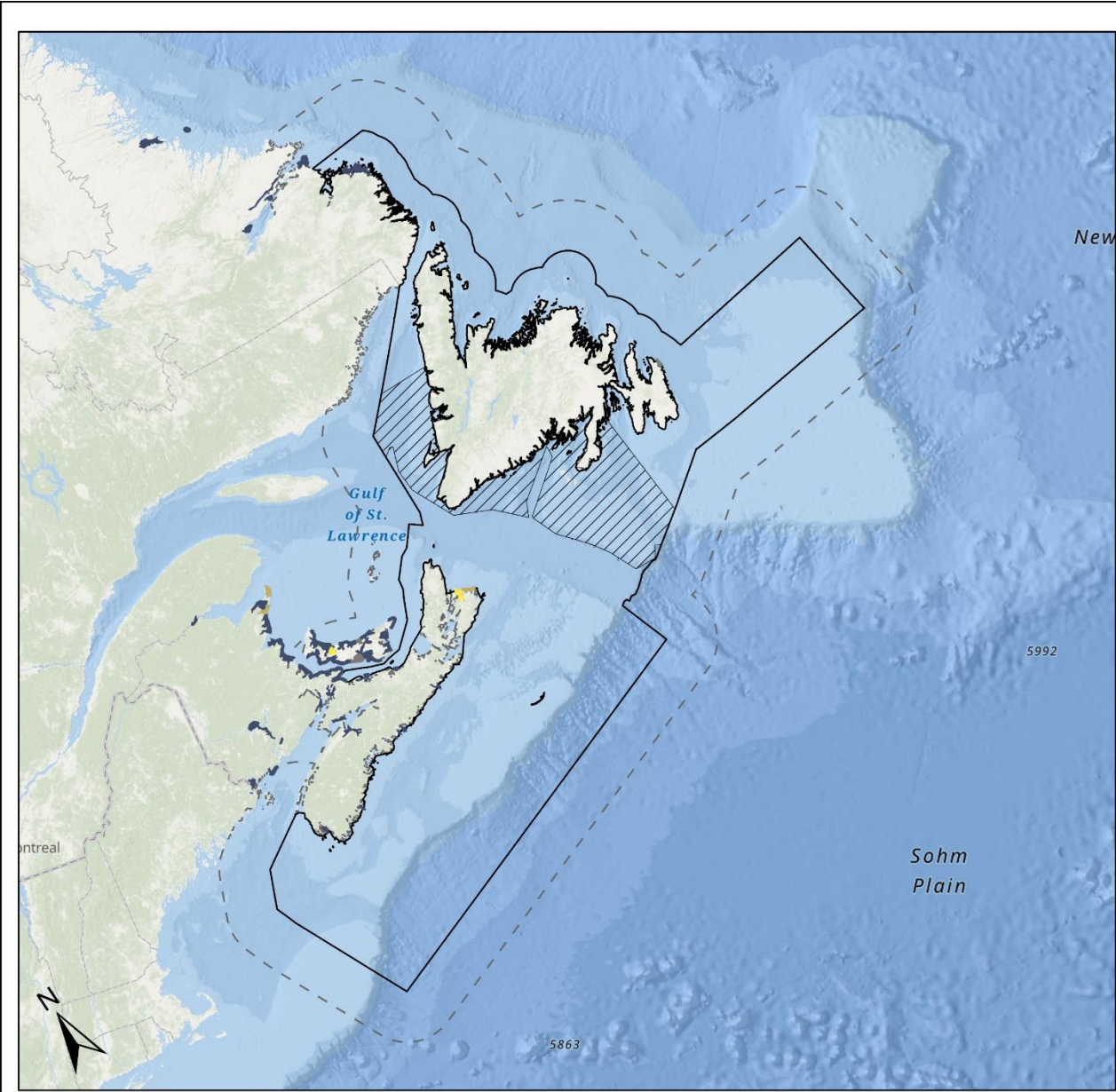


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 Km

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






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CWS Atlantic

Northern Pintail
Coastal Block
Relative Abundance
(# of Birds/Max Count of Birds)


Legend / Légende

-  Regional Assessment Buffer Area
 -  Regional Assessment Study Areas
 -  Newfoundland Focus Areas
- NOPI Relative Abundance
- 0
 -  0-0.25
 -  0.25-0.50
 -  0.50-0.75
 -  0.75-1.00

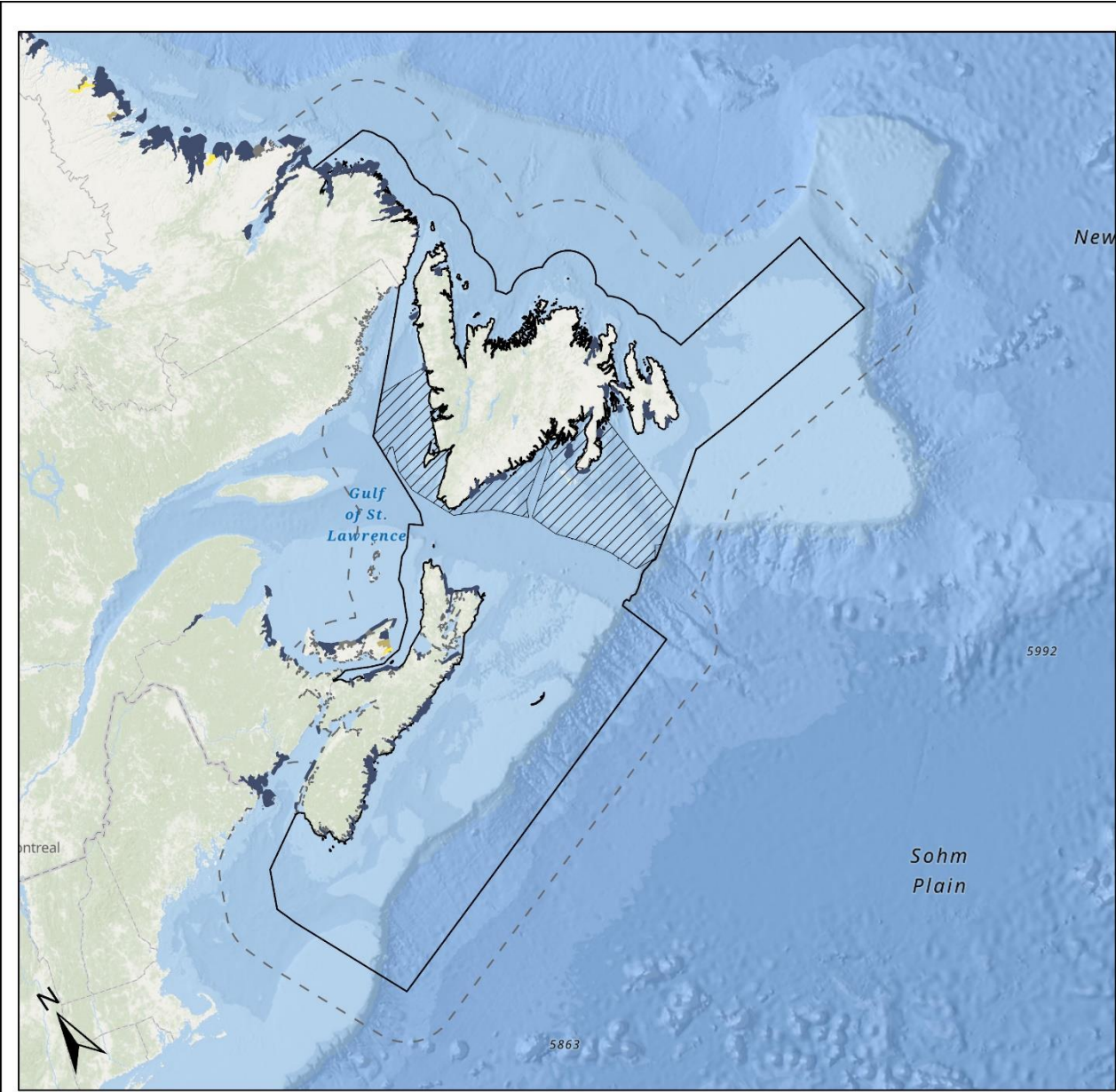


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




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CWS Atlantic
 Red-breasted Merganser
 Coastal Block
 Relative Abundance
 (# of Birds/Max Count of Birds)

Legend / Légende

-  Regional Assessment Buffer Area
-  Regional Assessment Study Areas
-  Newfoundland Focus Areas

RBME Relative Abundance

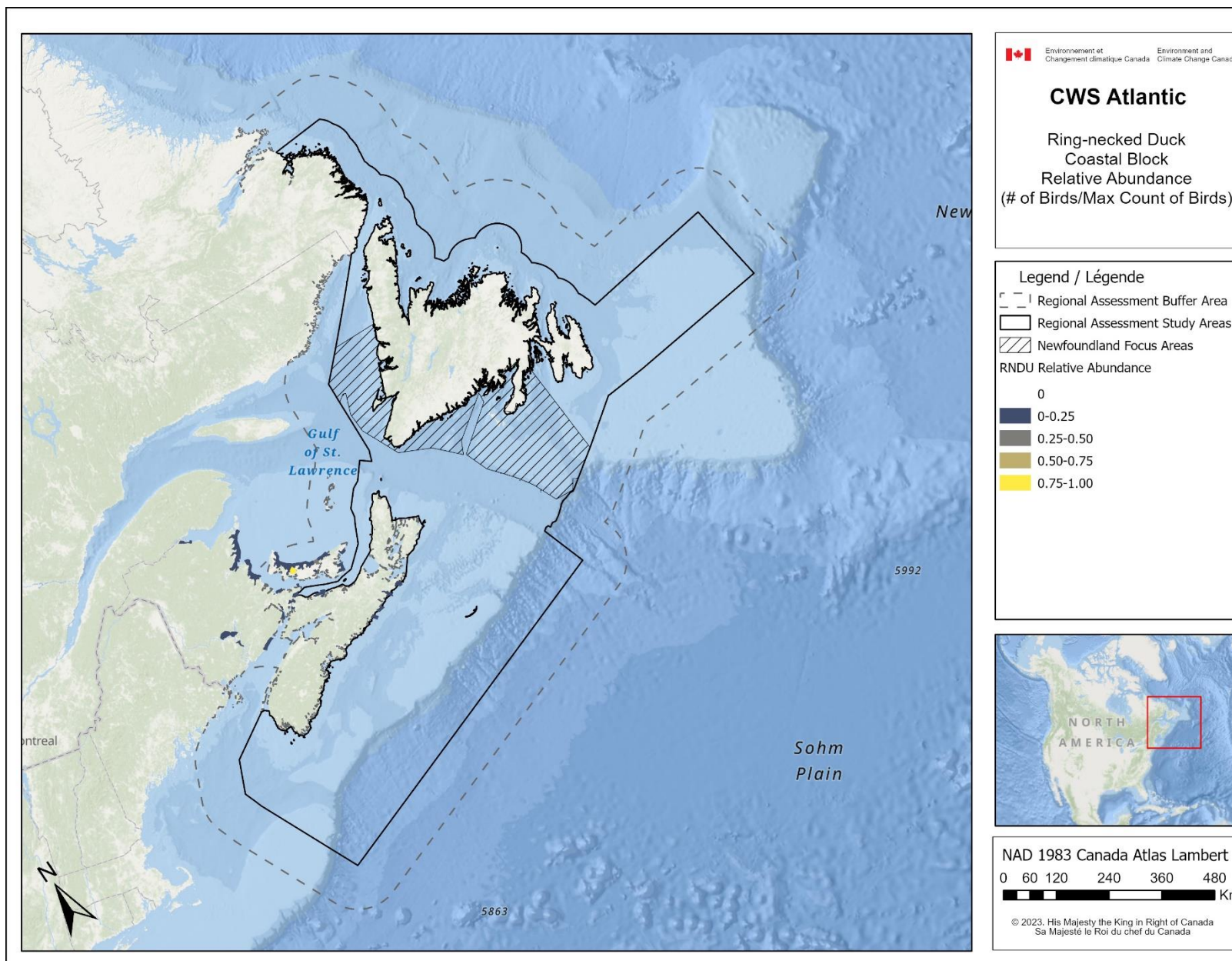
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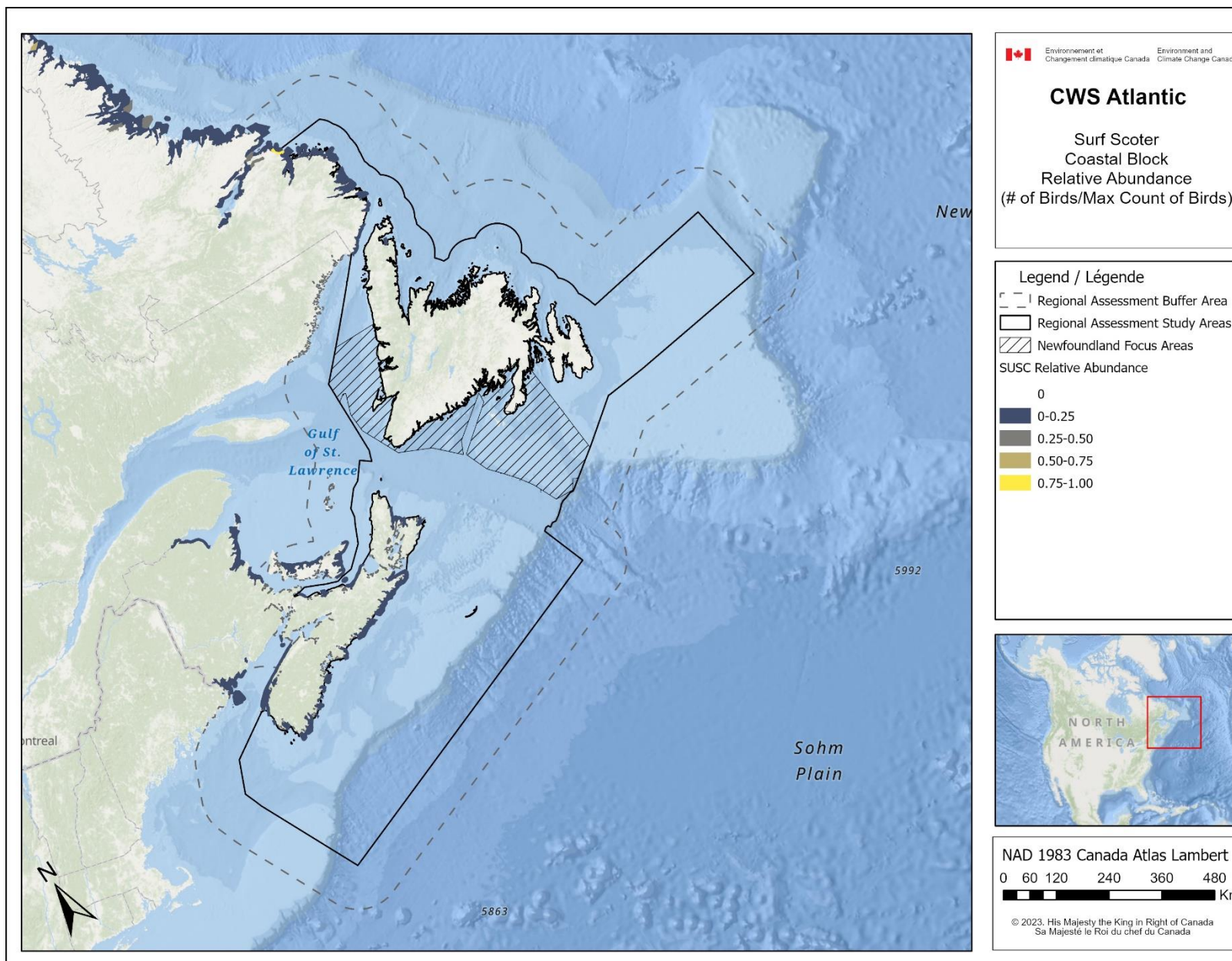


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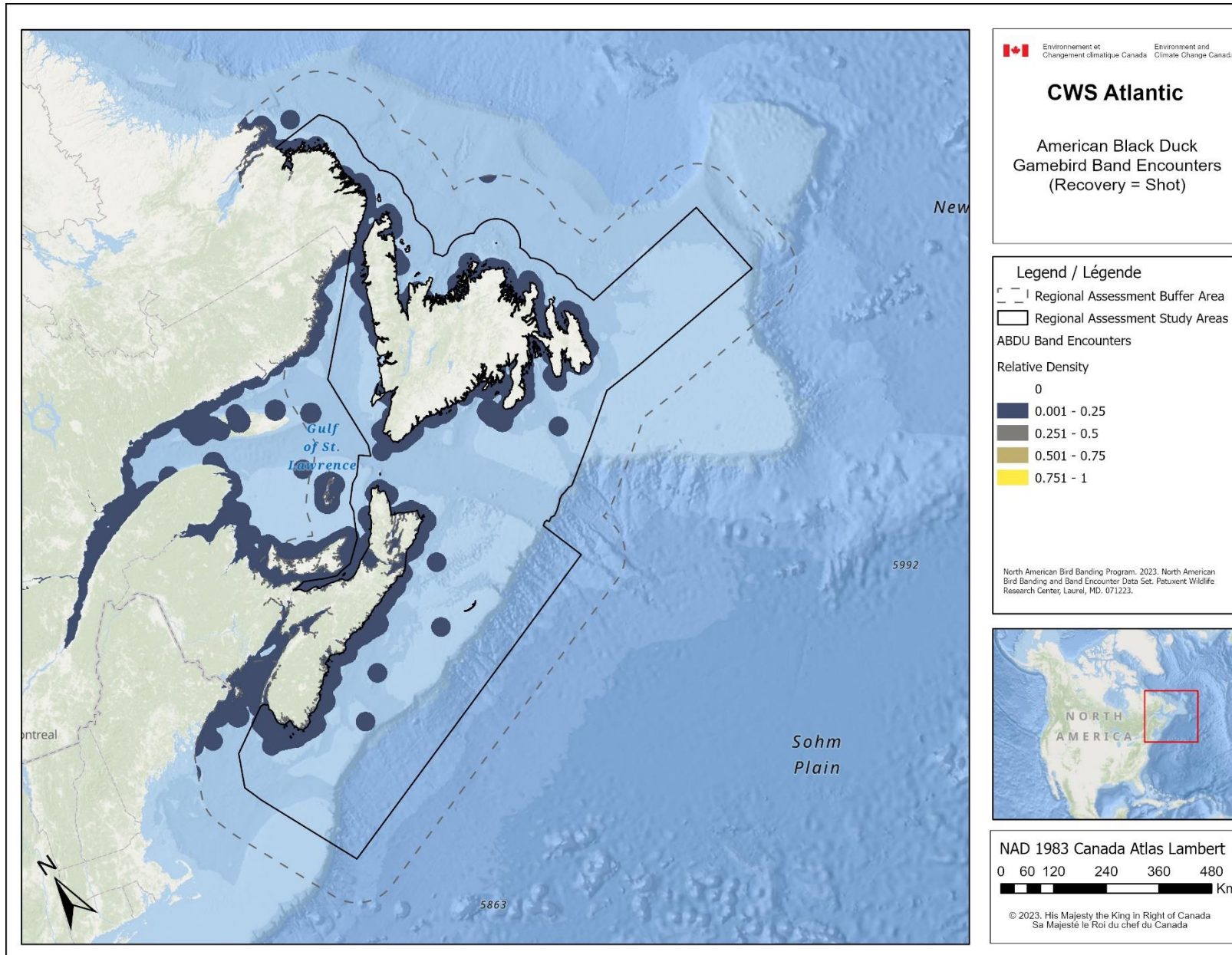


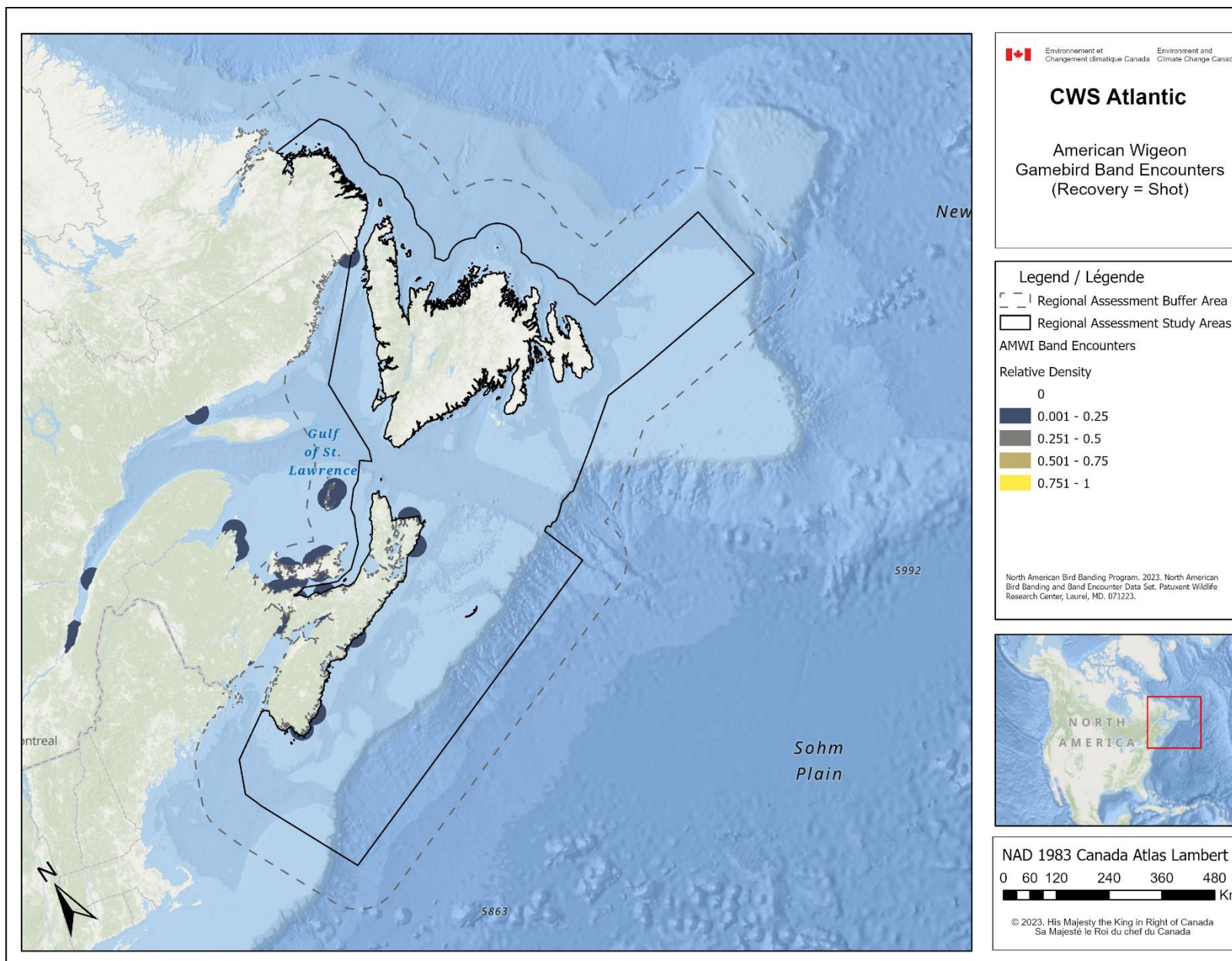
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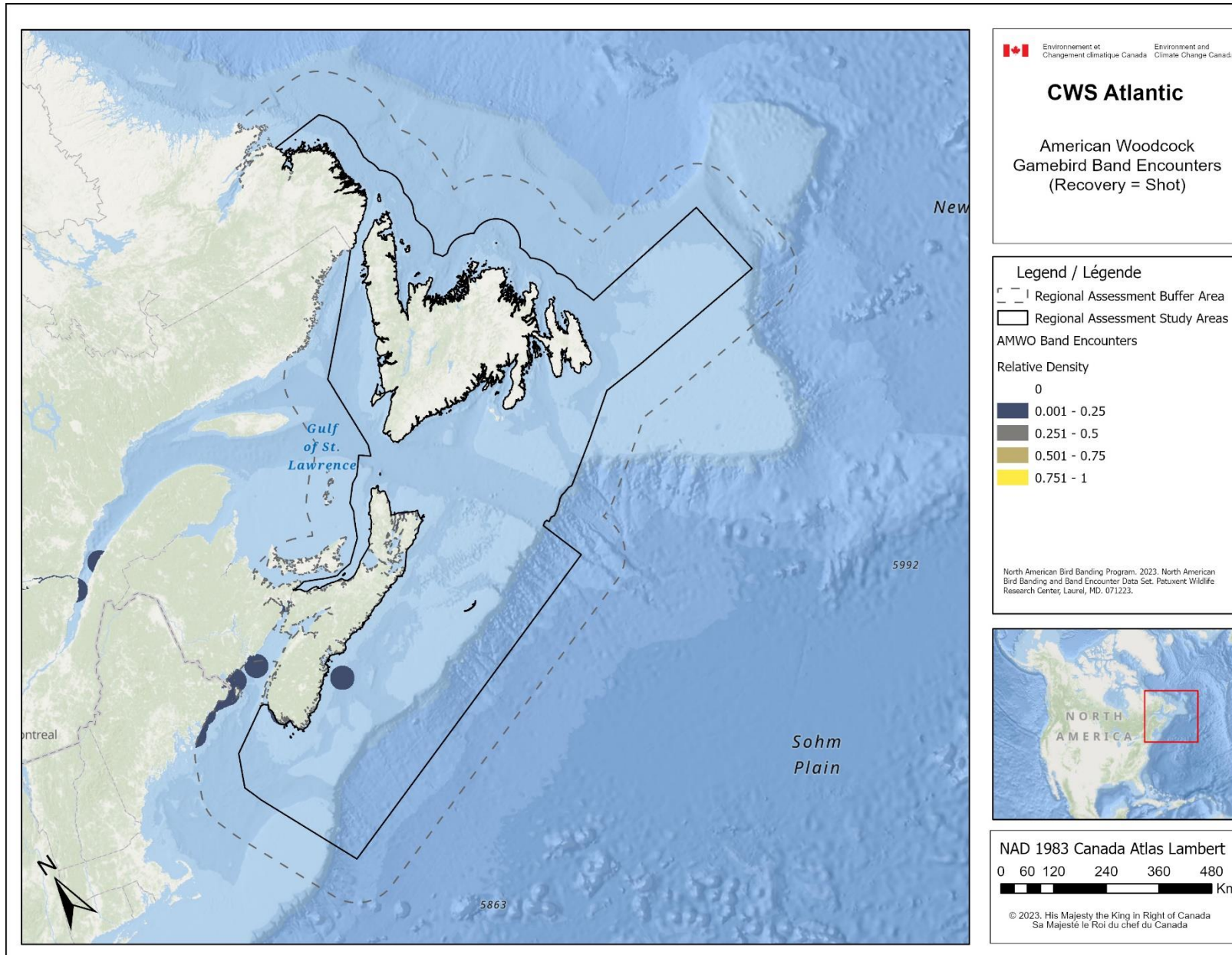




Waterfowl Band Encounters










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CWS Atlantic





American Woodcock
Gamebird Band Encounters
(Recovery = Shot)

Legend / Légende

-  Regional Assessment Buffer Area
-  Regional Assessment Study Areas

AMWO Band Encounters


Relative Density

- 0
-  0.001 - 0.25
-  0.251 - 0.5
-  0.501 - 0.75
-  0.751 - 1

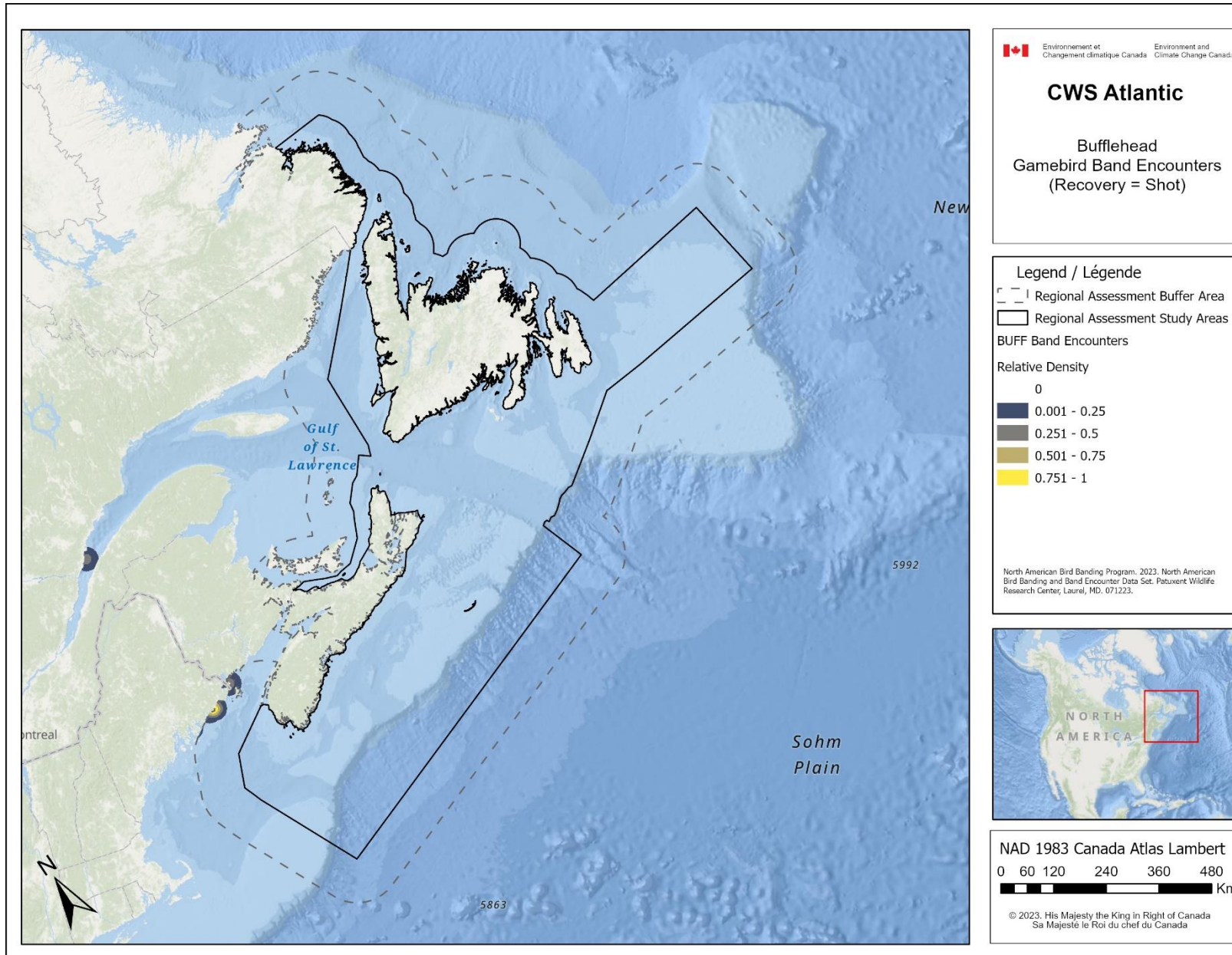
North American Bird Banding Program. 2023. North American
Bird Banding and Band Encounter Data Set. Patuxent Wildlife
Research Center, Laurel, MD. 071223.

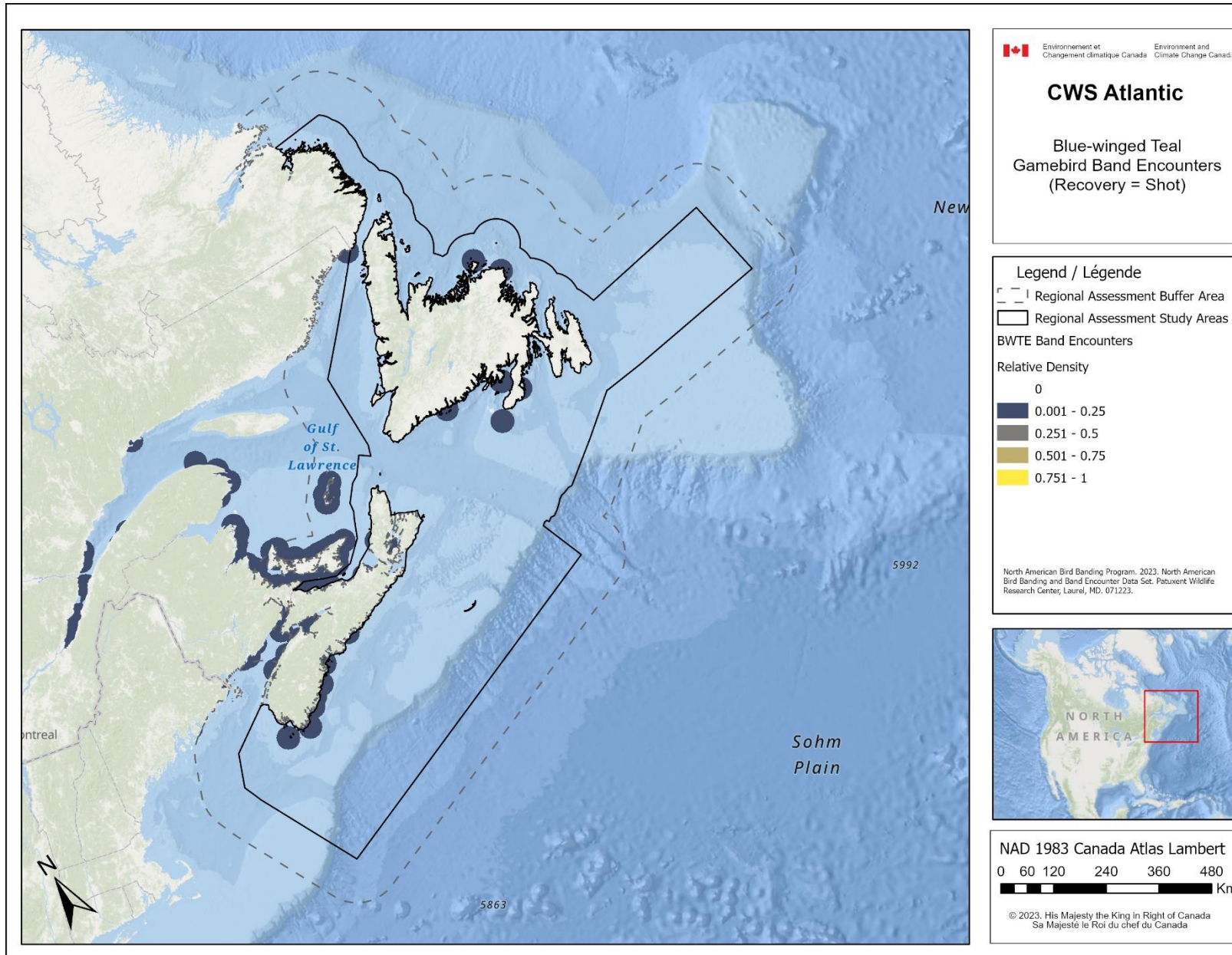


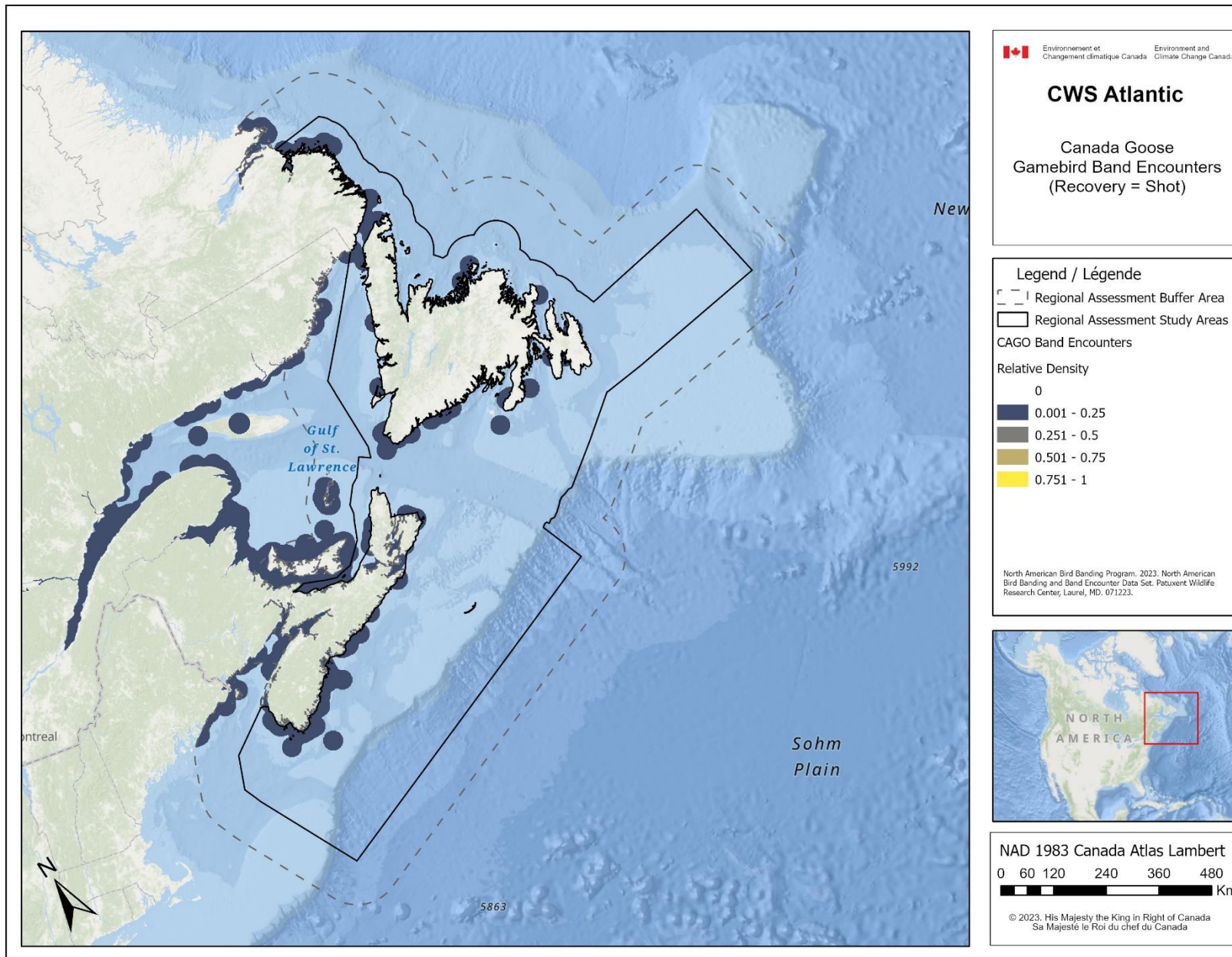
NAD 1983 Canada Atlas Lambert

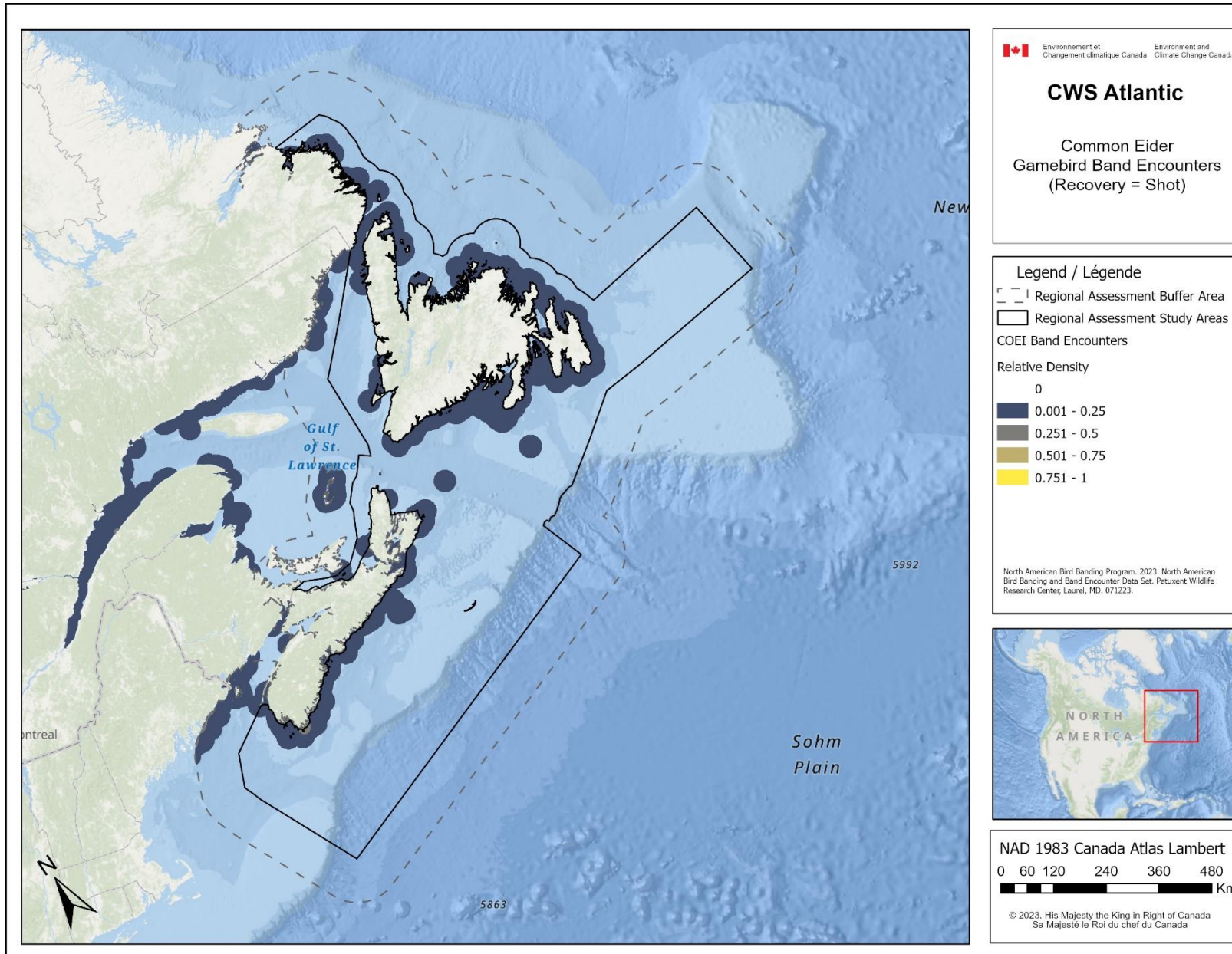
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 Km

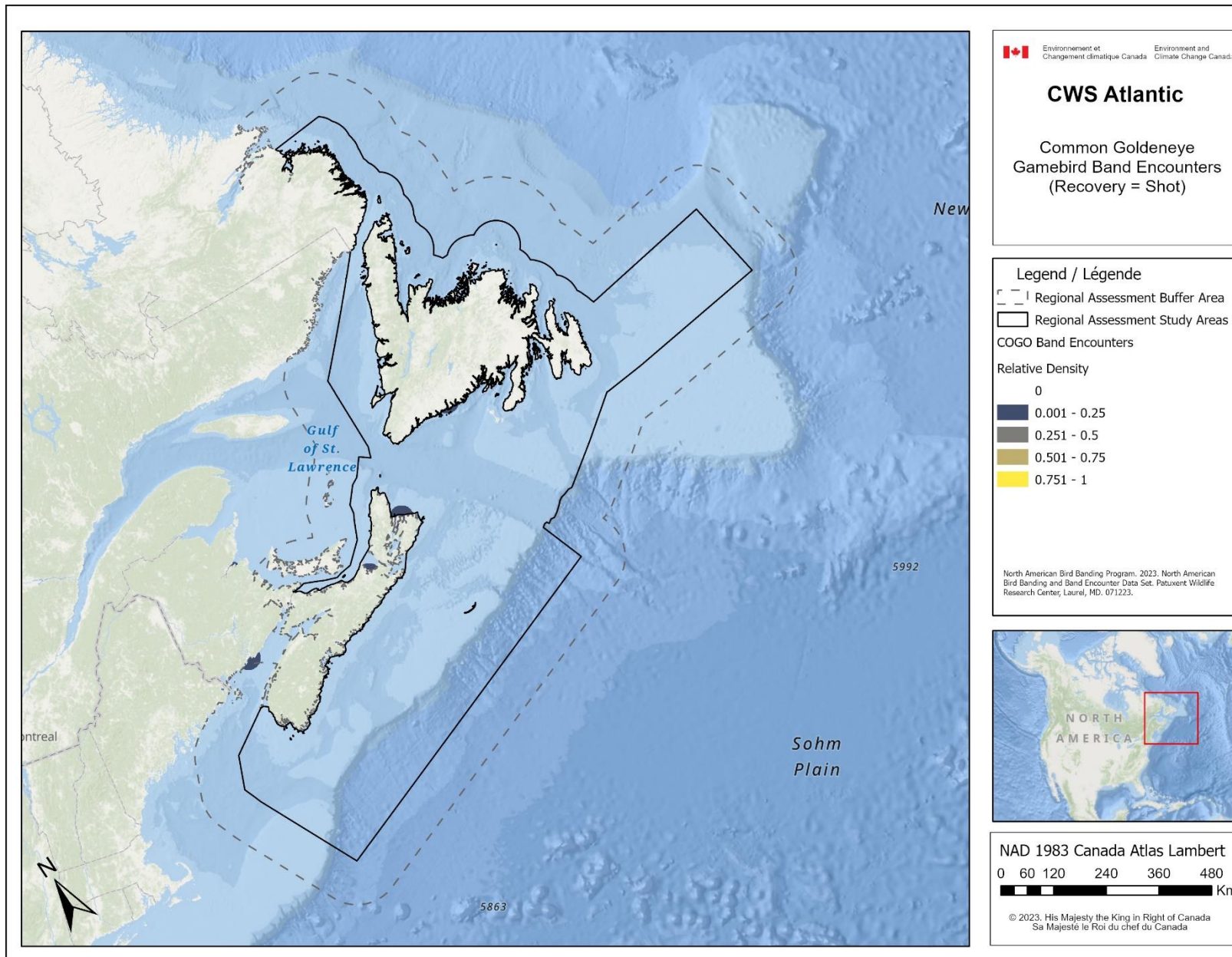
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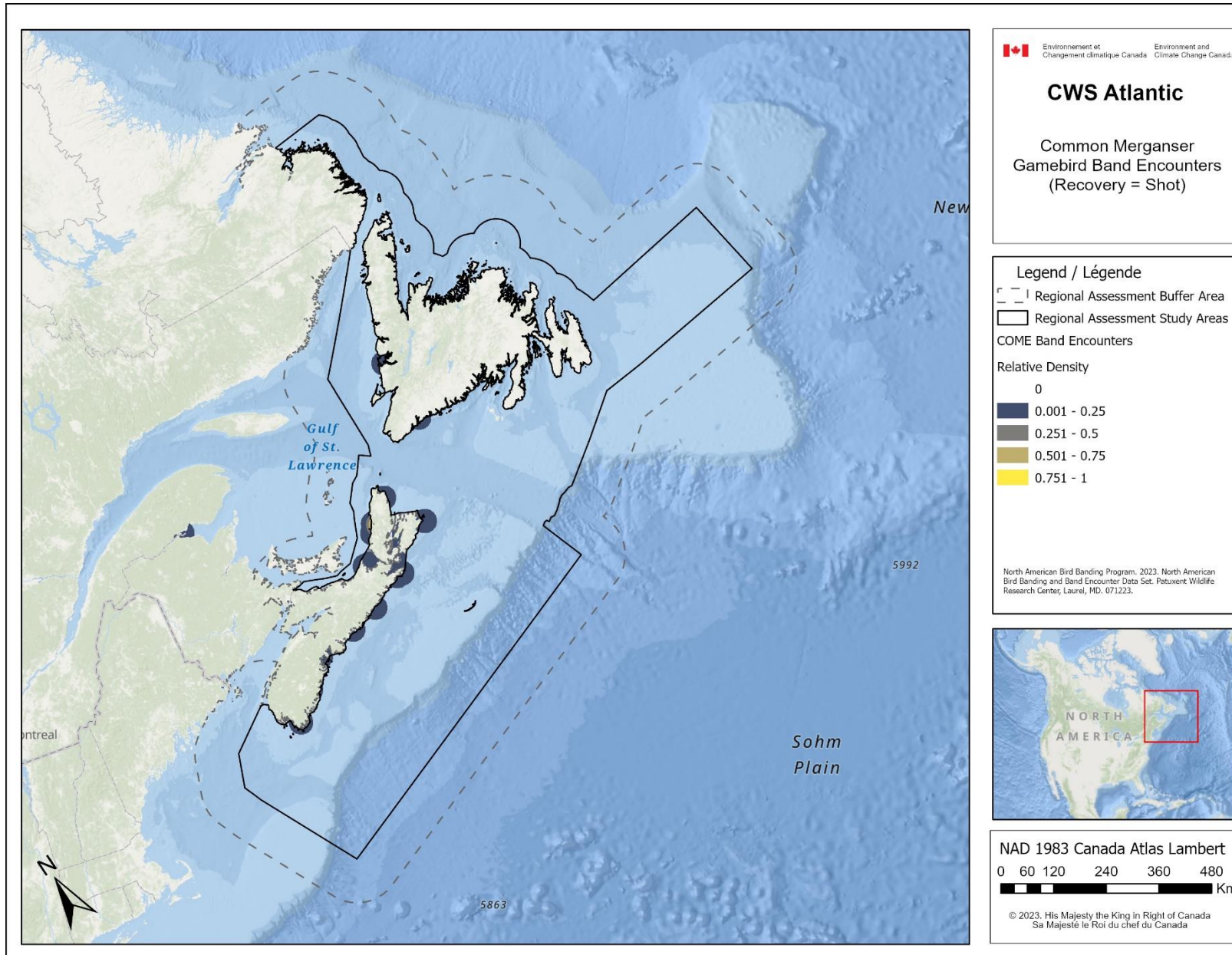


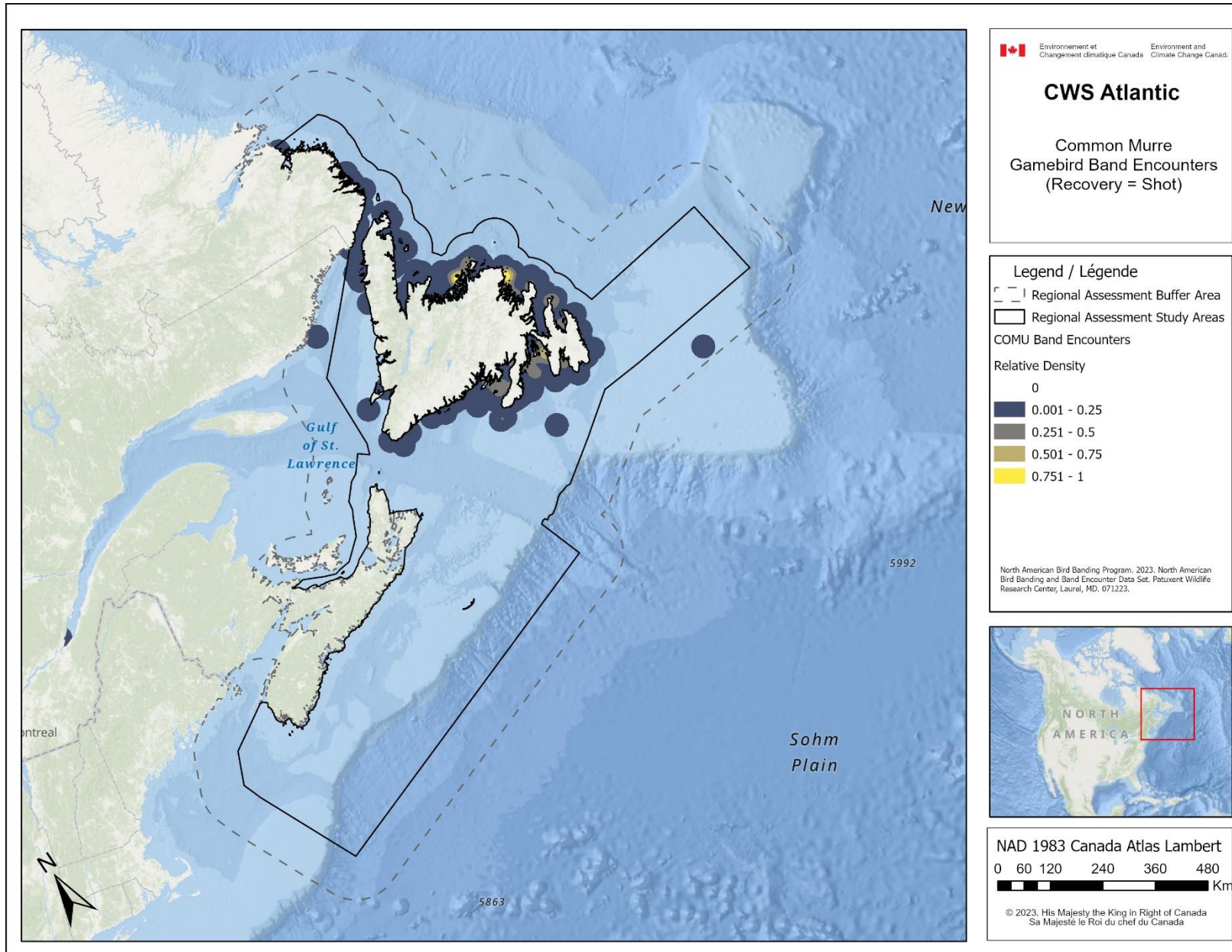


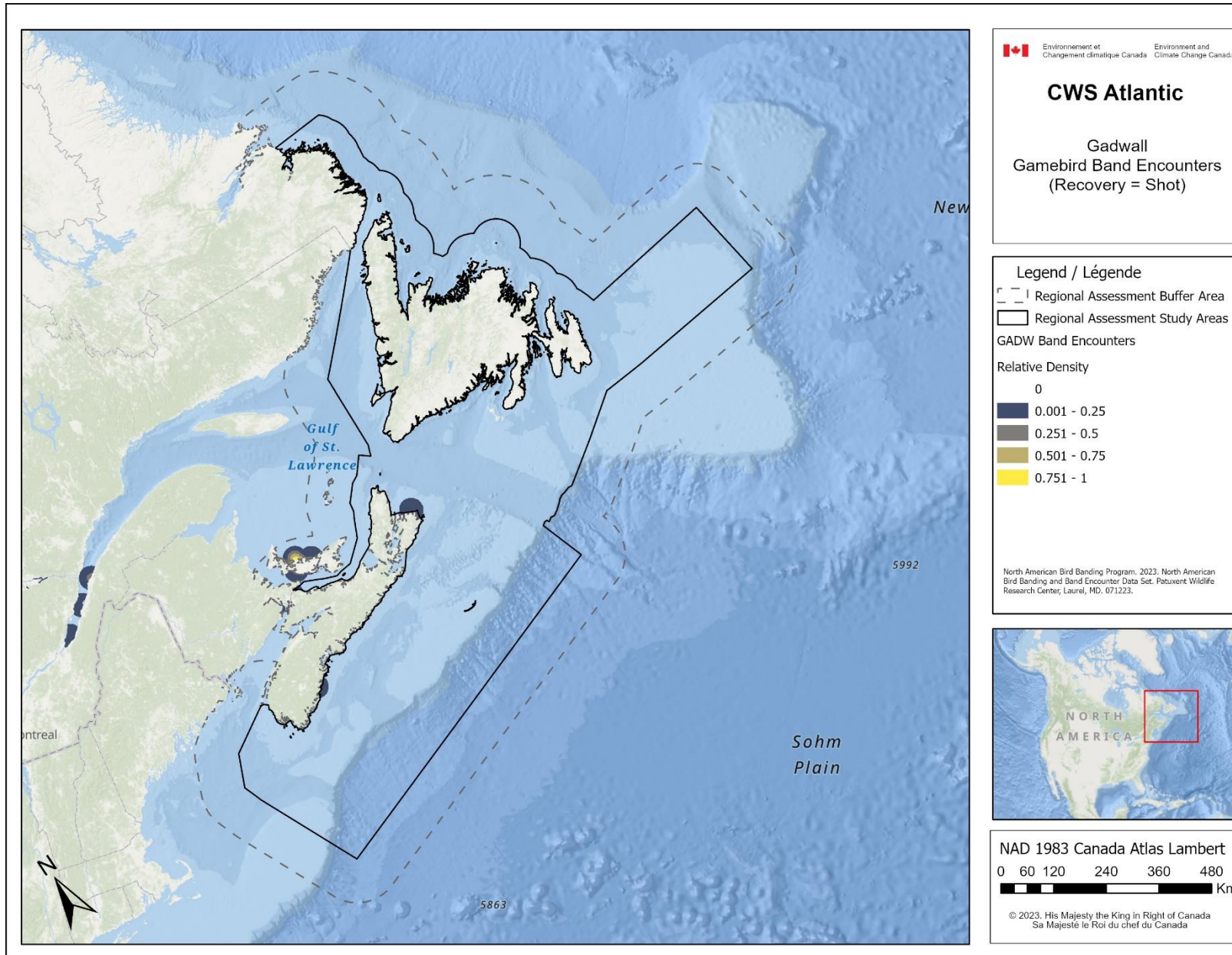


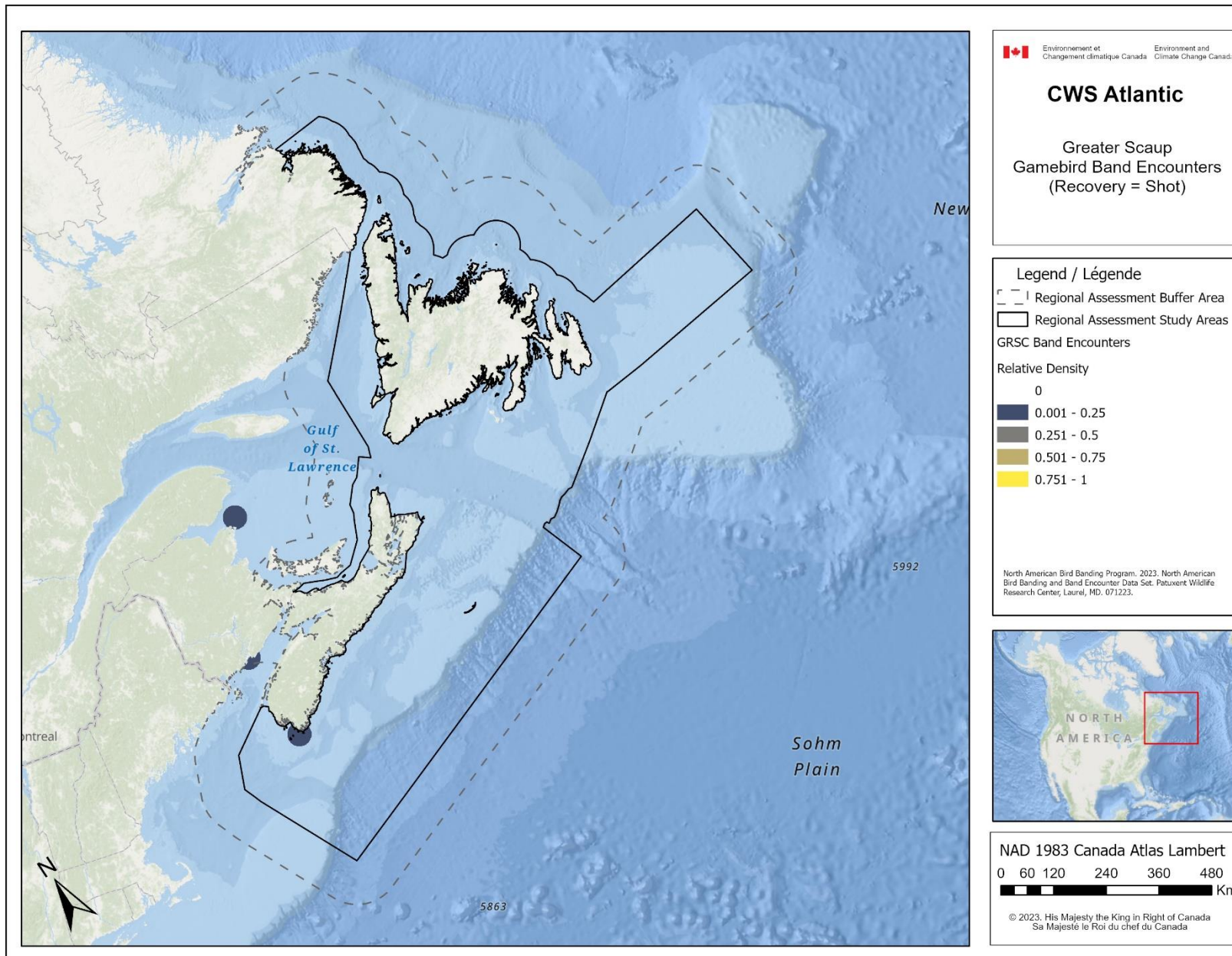


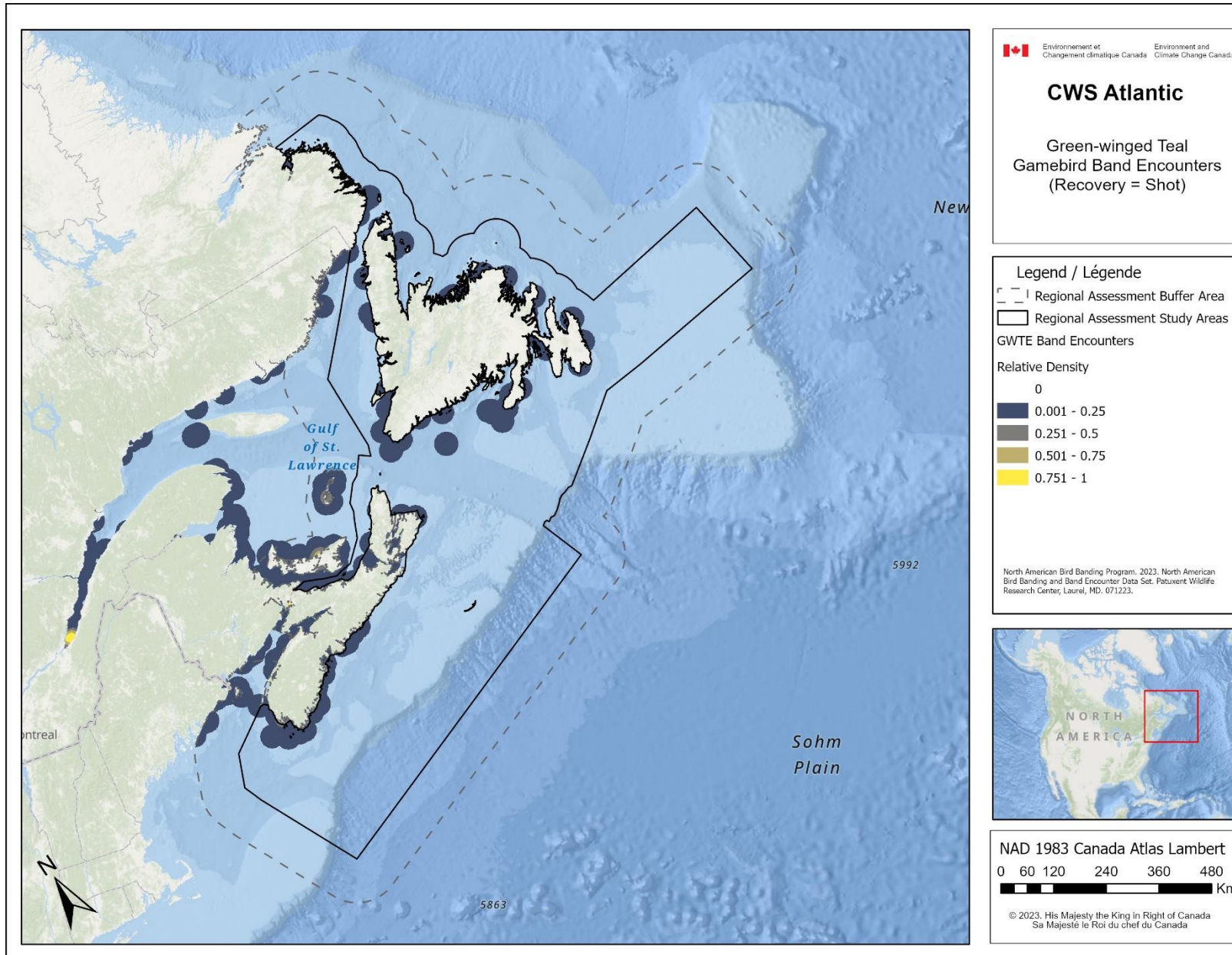


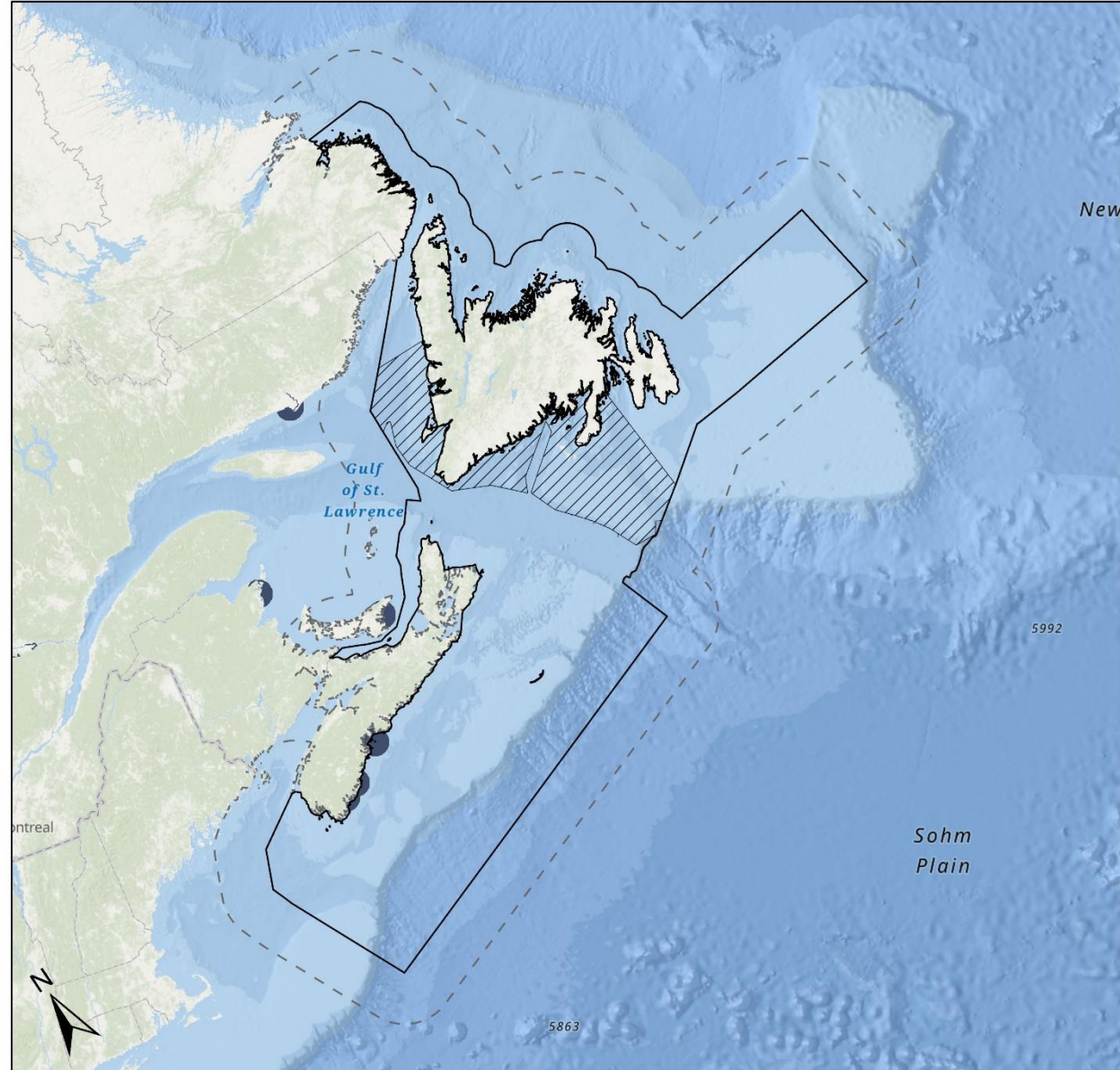
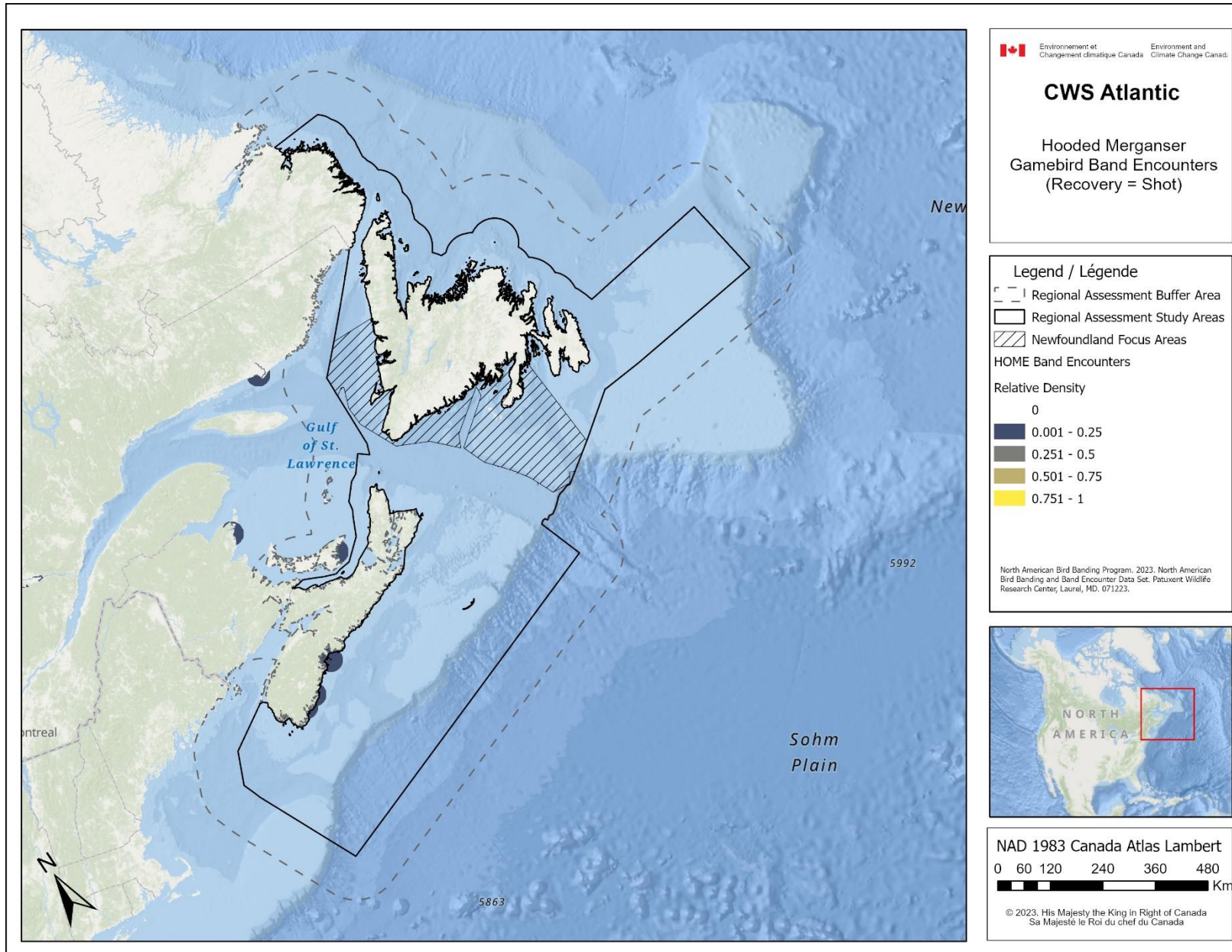












Environnement et Changement climatique Canada / Environment and Climate Change Canada

CWS Atlantic

Hooded Merganser Gamebird Band Encounters (Recovery = Shot)

Legend / Légende

- Regional Assessment Buffer Area
- Regional Assessment Study Areas
- Newfoundland Focus Areas

HOME Band Encounters

Relative Density

- 0
- 0.001 - 0.25
- 0.251 - 0.5
- 0.501 - 0.75
- 0.751 - 1

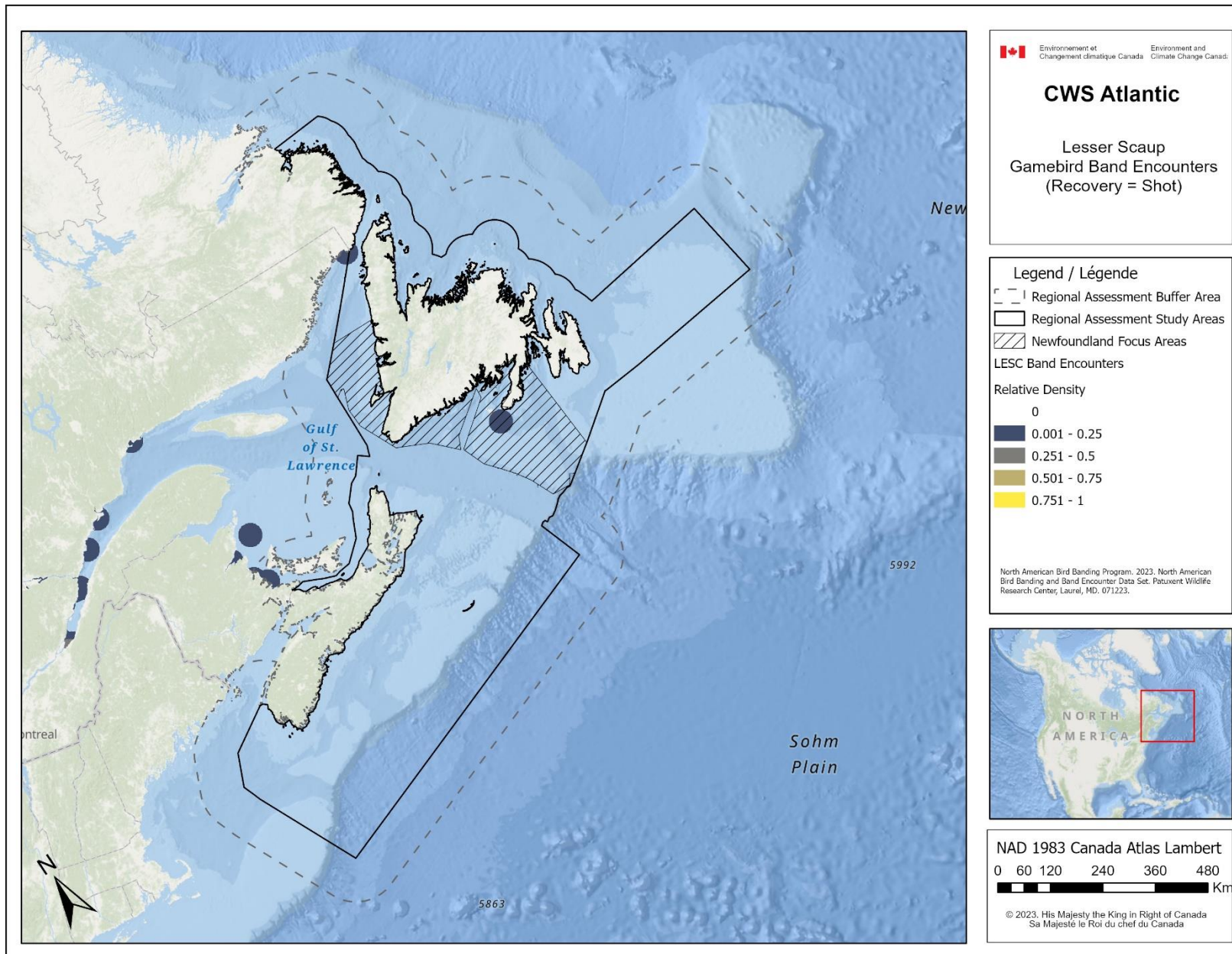
North American Bird Banding Program. 2023. North American Bird Banding and Band Encounter Data Set. Patuxent Wildlife Research Center, Laurel, MD. 071223.

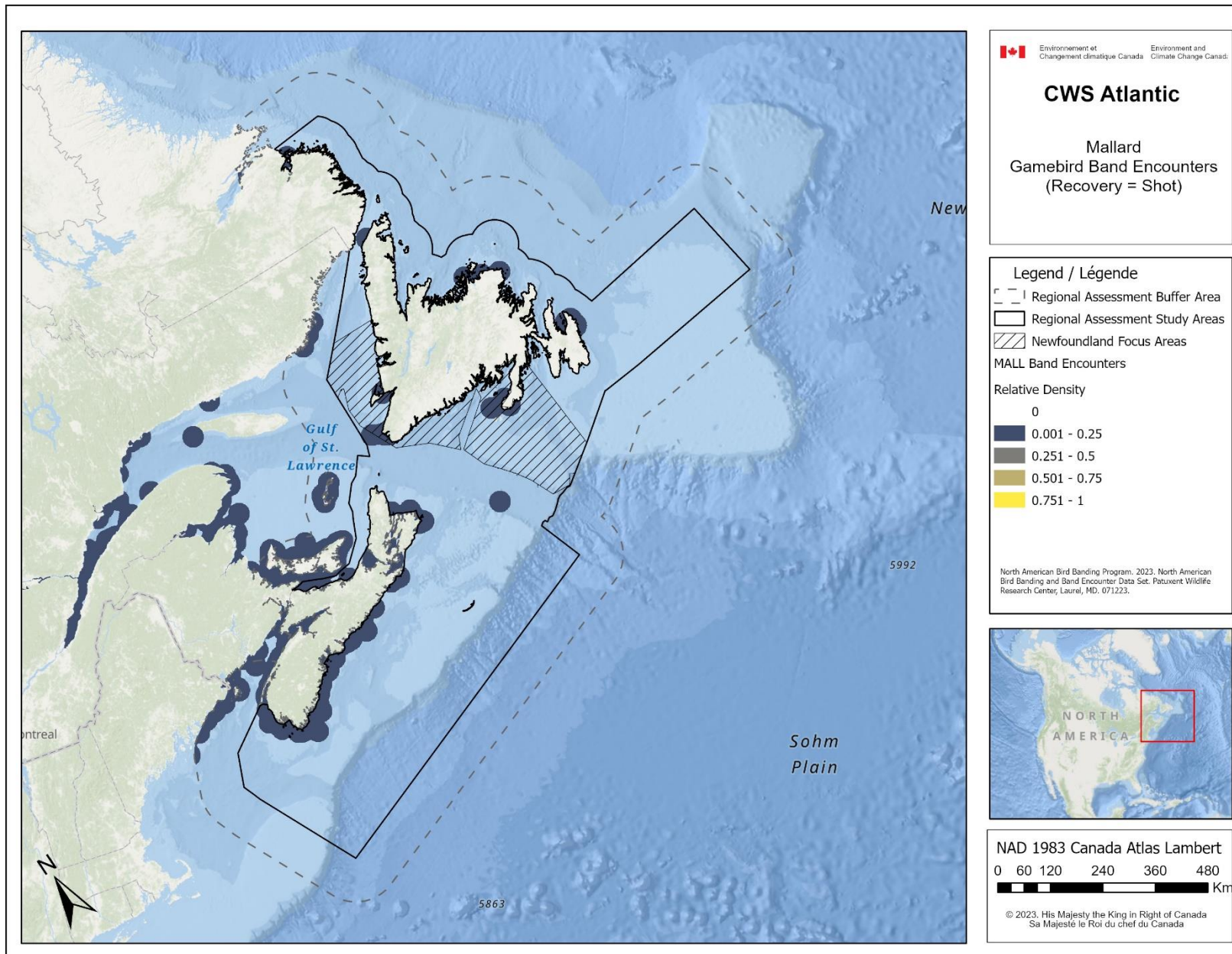


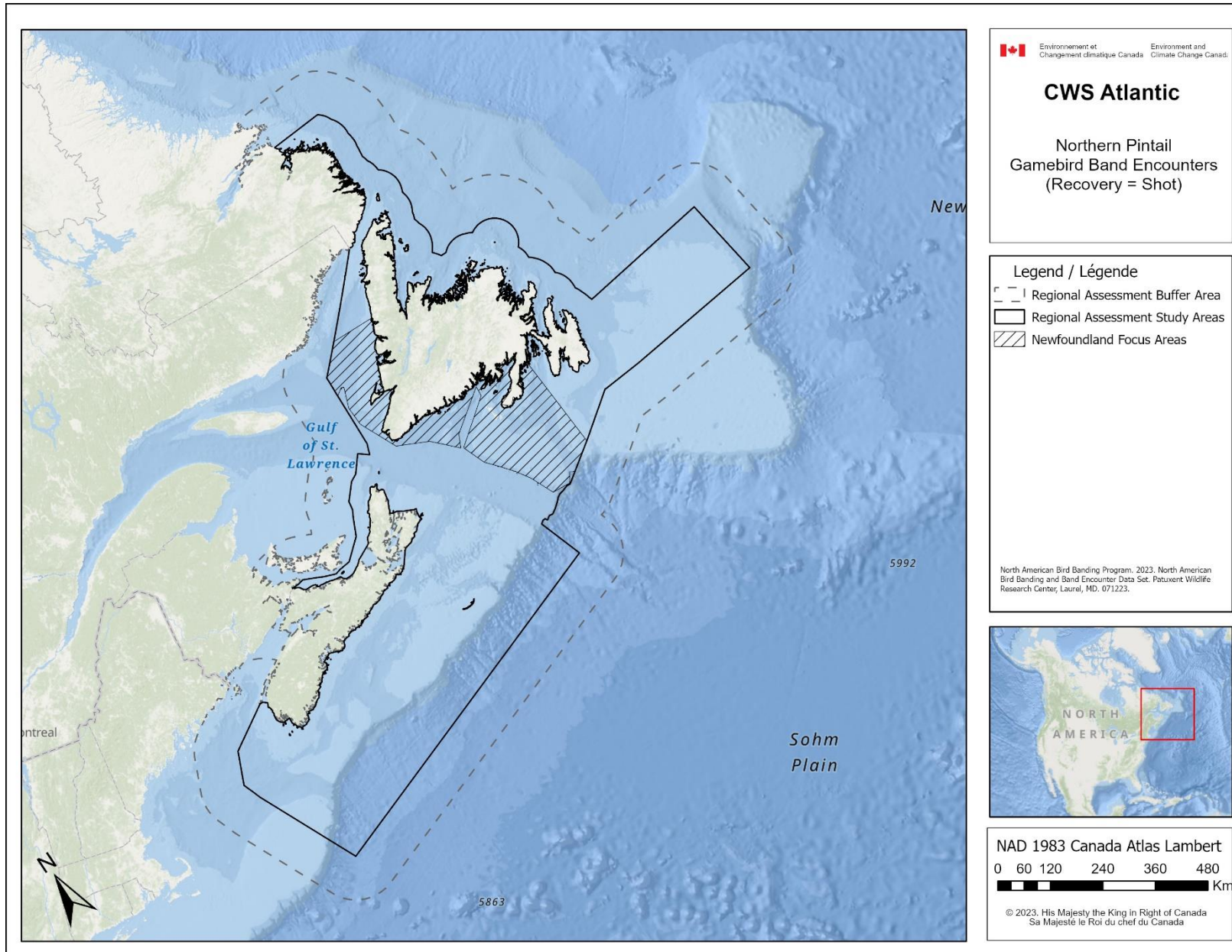
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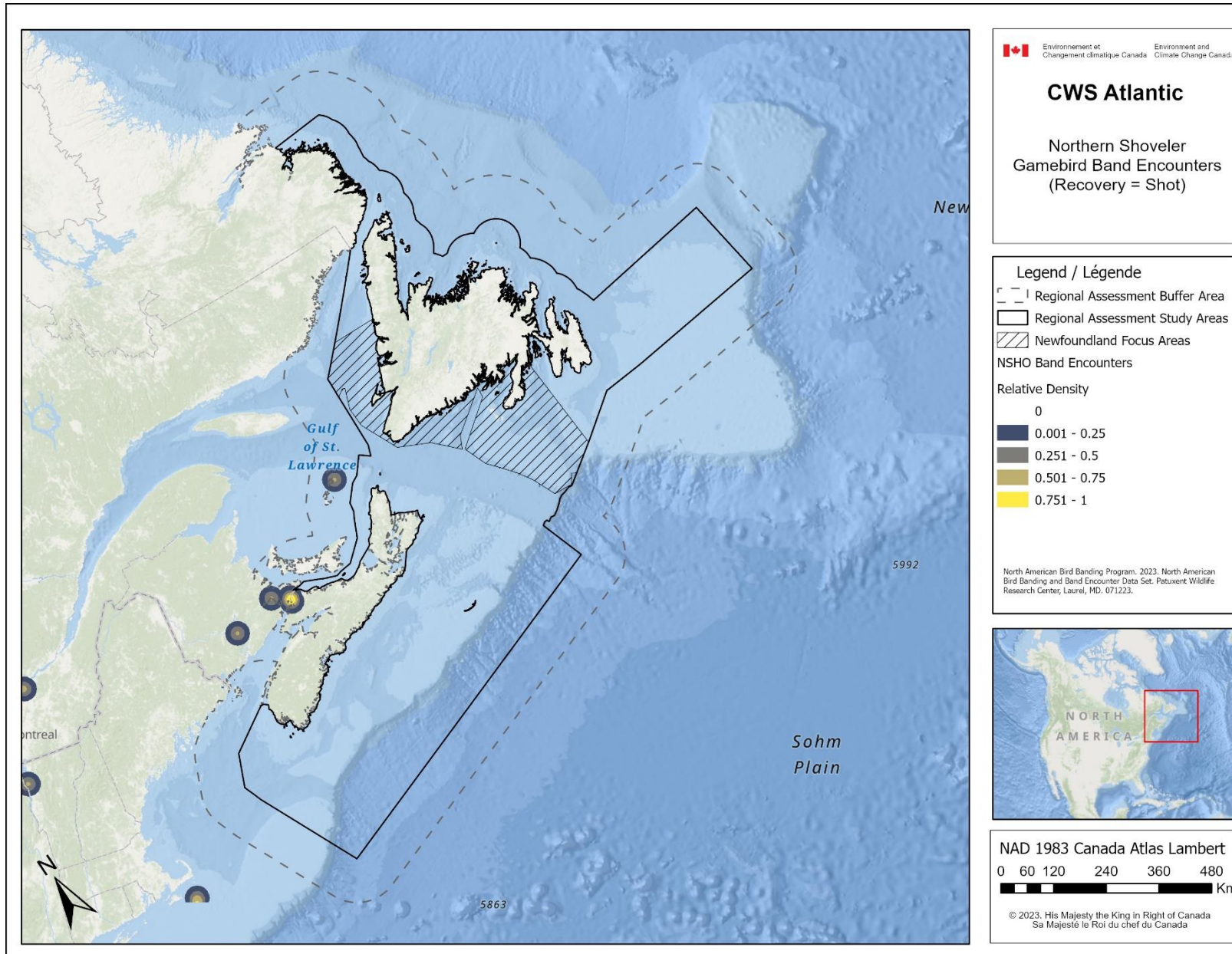
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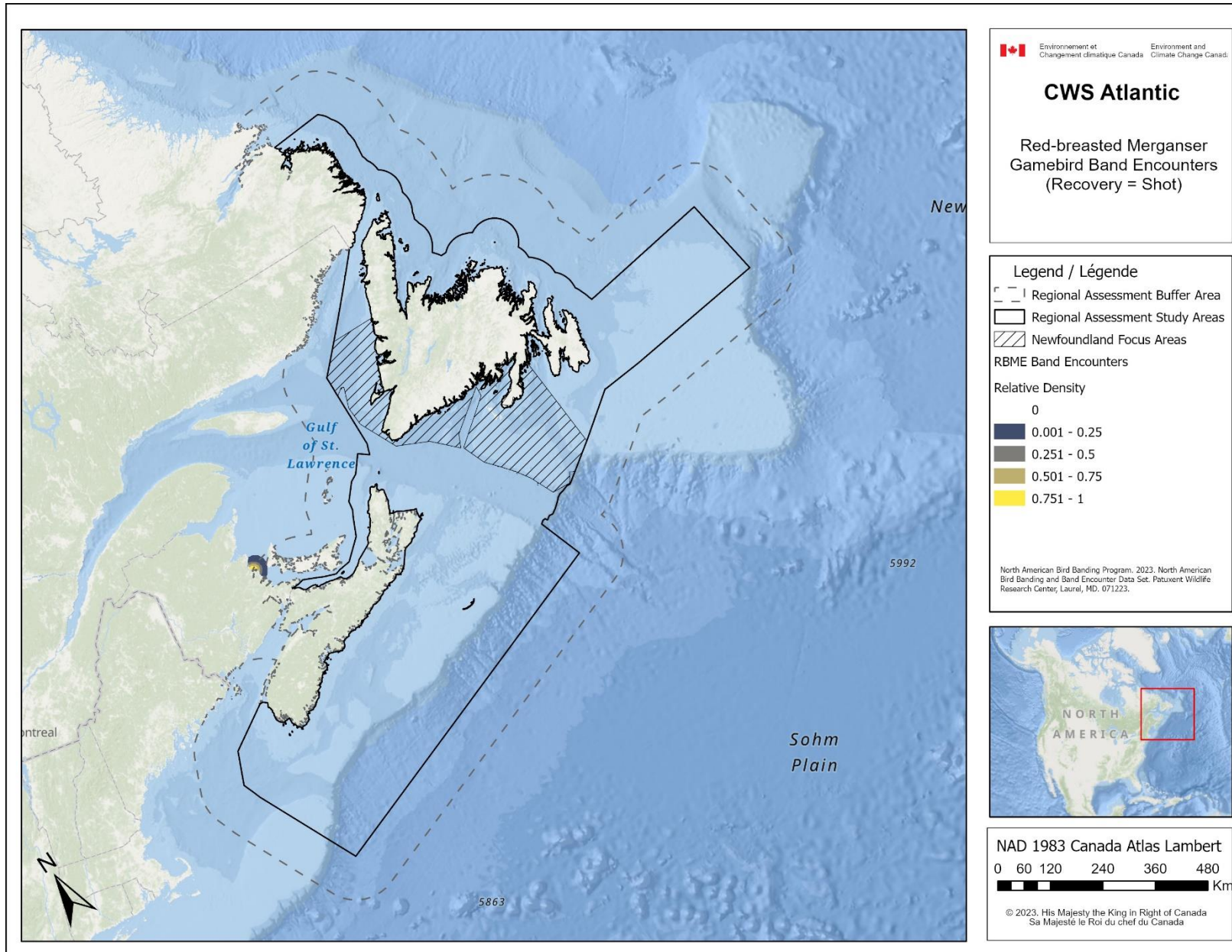
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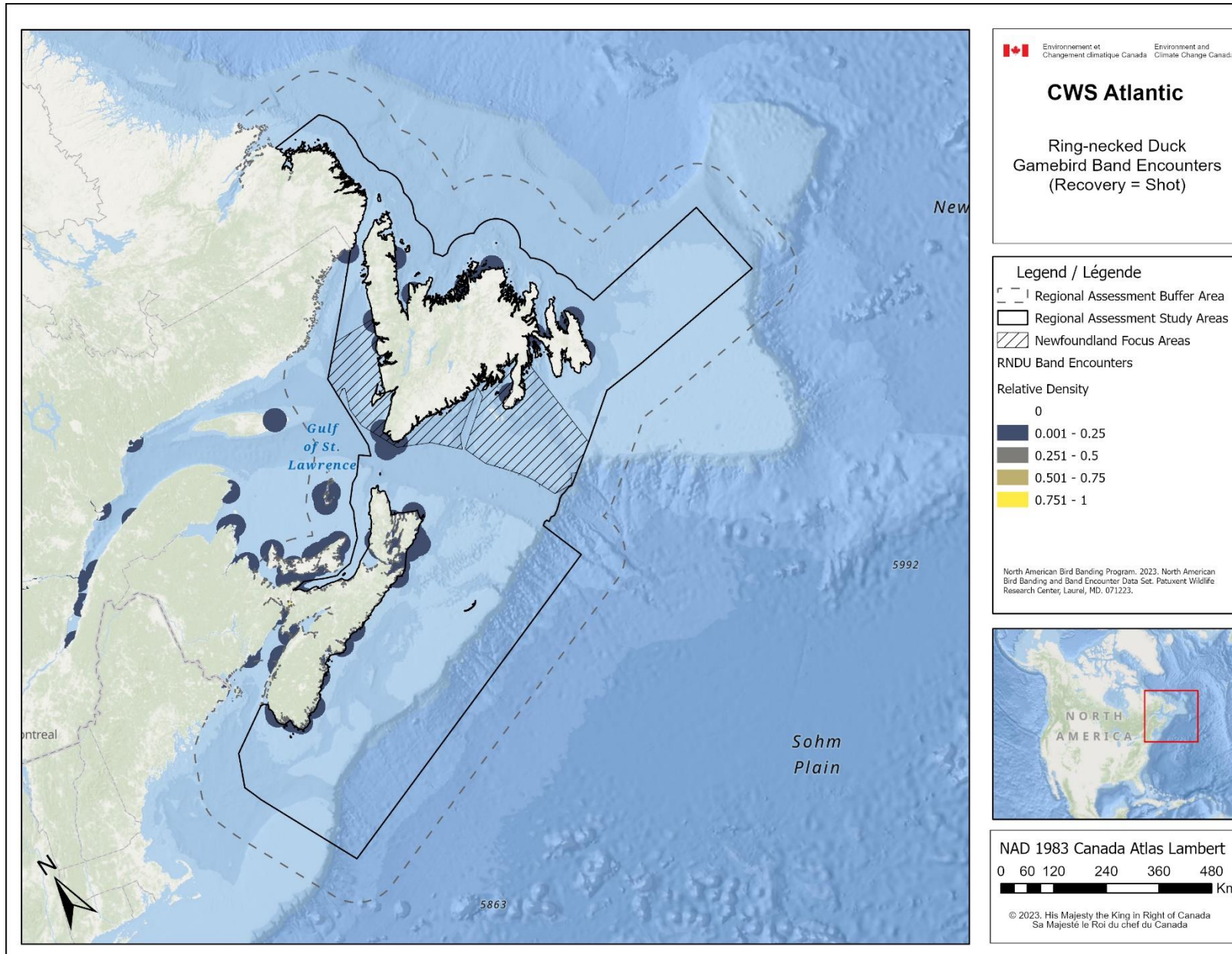


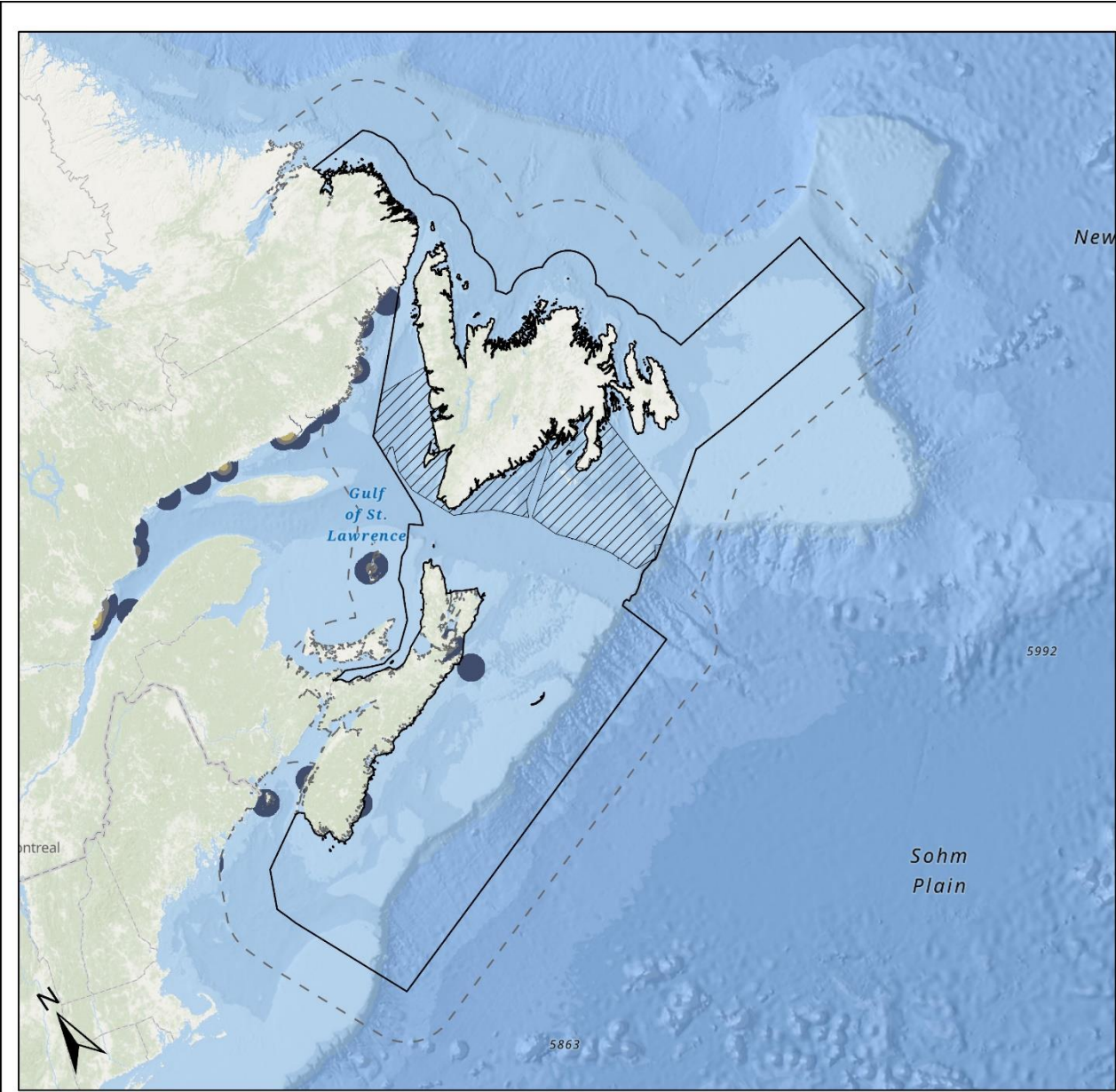
















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 Changement climatique Canada

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CWS Atlantic





Surf Scoter
 Gamebird Band Encounters
 (Recovery = Shot)

Legend / Légende

-  Regional Assessment Buffer Area
-  Regional Assessment Study Areas
-  Newfoundland Focus Areas

SUSC Band Encounters

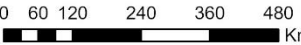
Relative Density

- 0
-  0.001 - 0.25
-  0.251 - 0.5
-  0.501 - 0.75
-  0.751 - 1

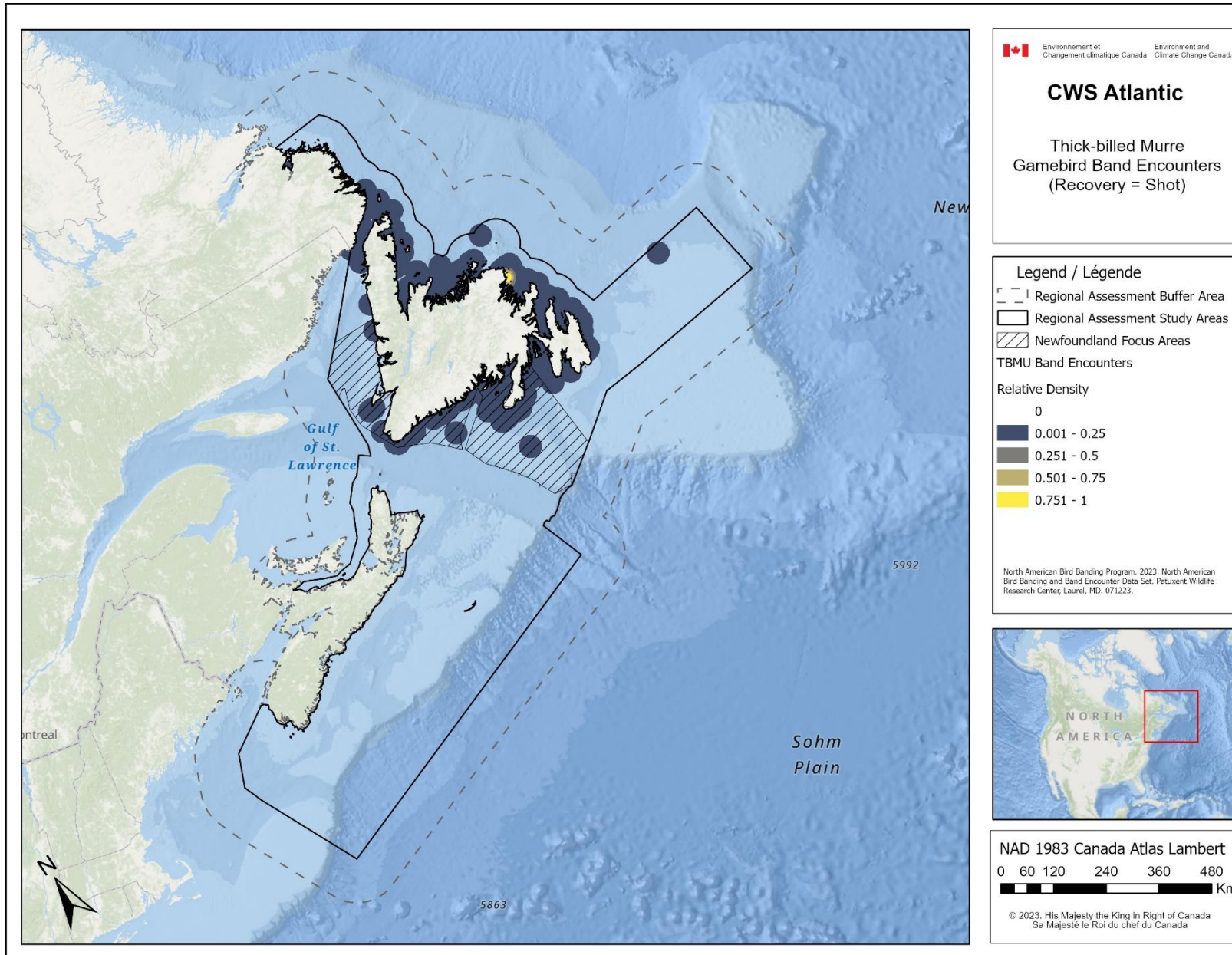
North American Bird Banding Program. 2023. North American Bird Banding and Band Encounter Data Set. Patuxent Wildlife Research Center, Laurel, MD. 071223.

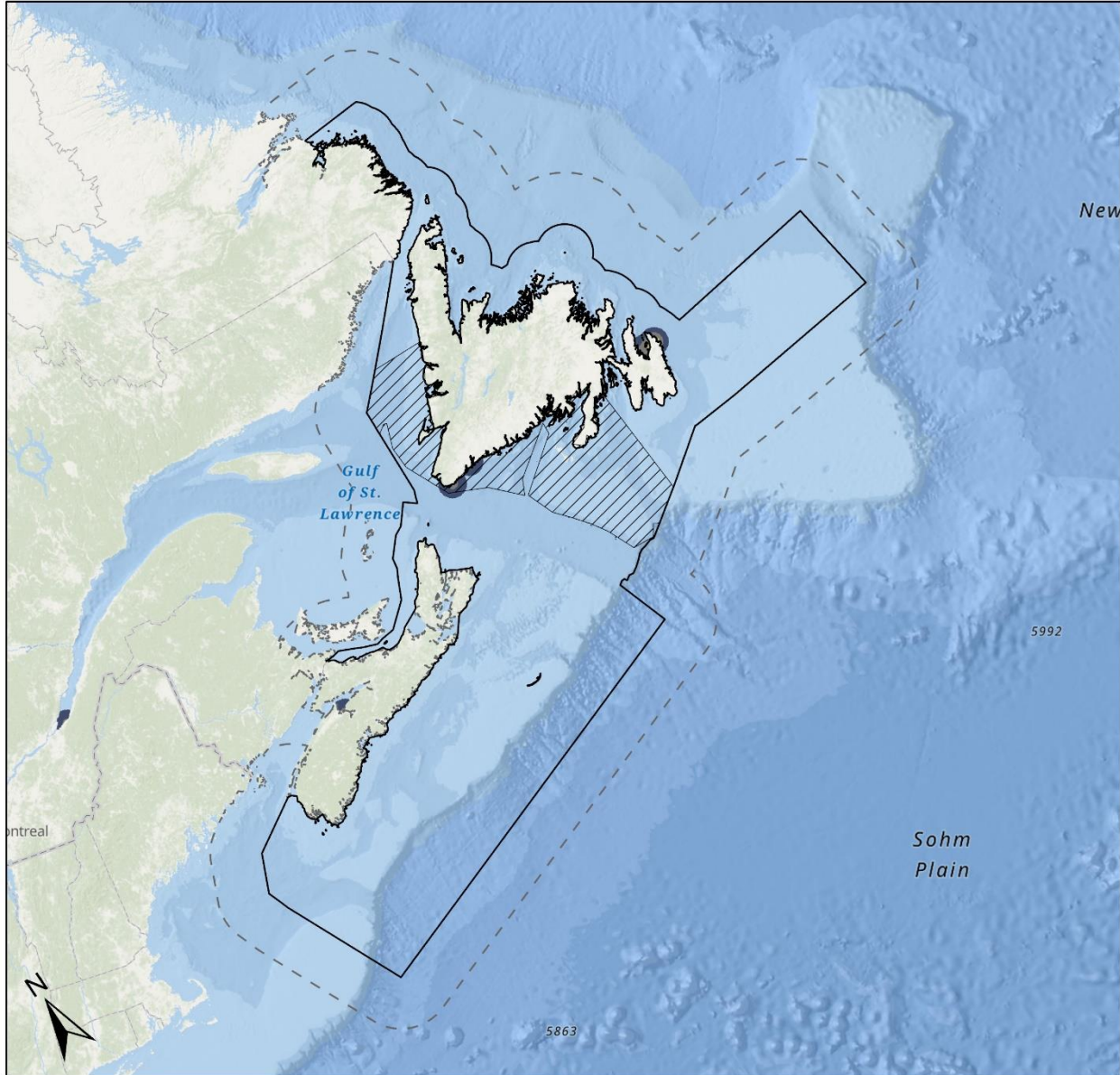
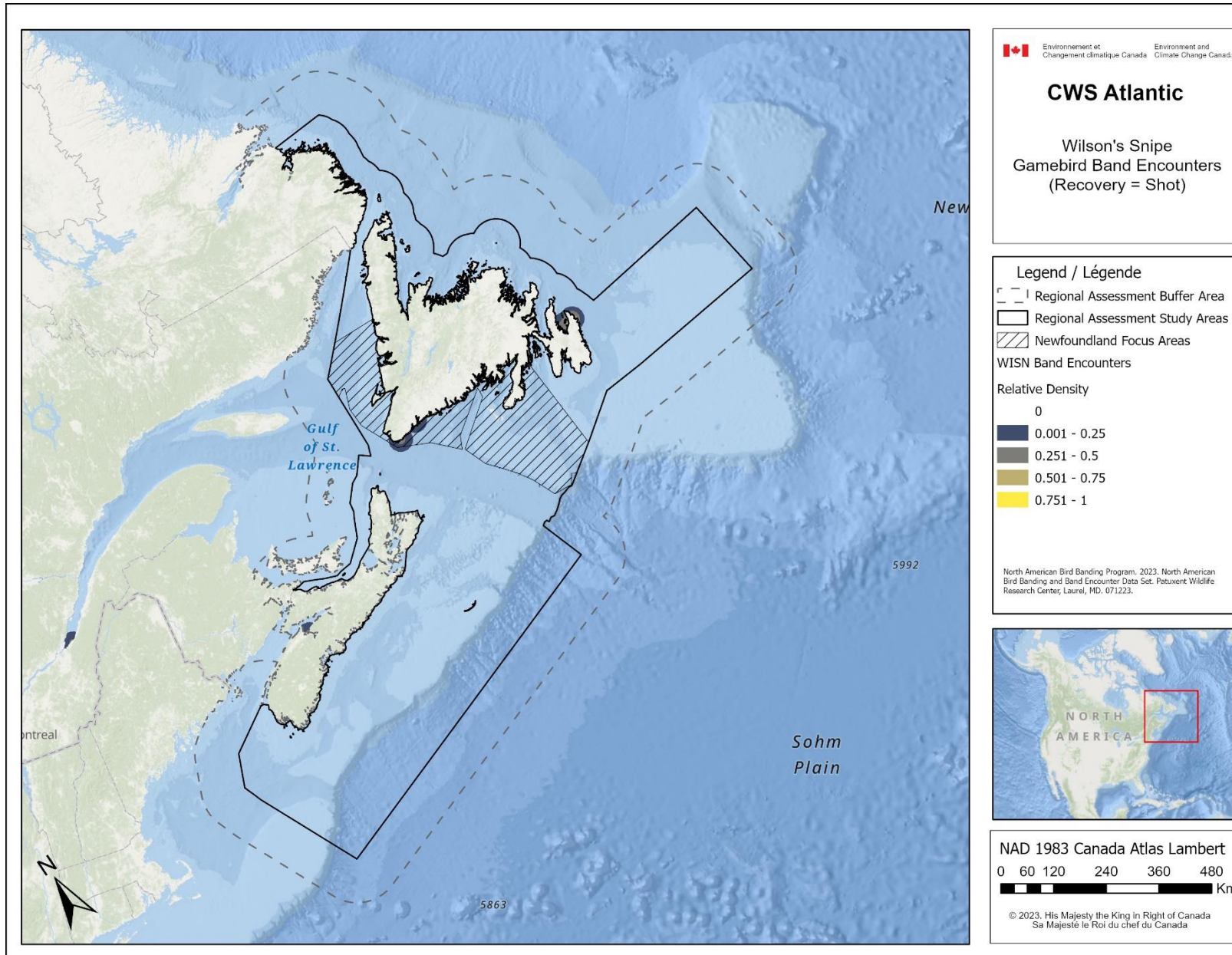


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CWS Atlantic

Wilson's Snipe Gamebird Band Encounters (Recovery = Shot)

Legend / Légende

- Regional Assessment Buffer Area
- Regional Assessment Study Areas
- Newfoundland Focus Areas

WISN Band Encounters

Relative Density

- 0
- 0.001 - 0.25
- 0.251 - 0.5
- 0.501 - 0.75
- 0.751 - 1

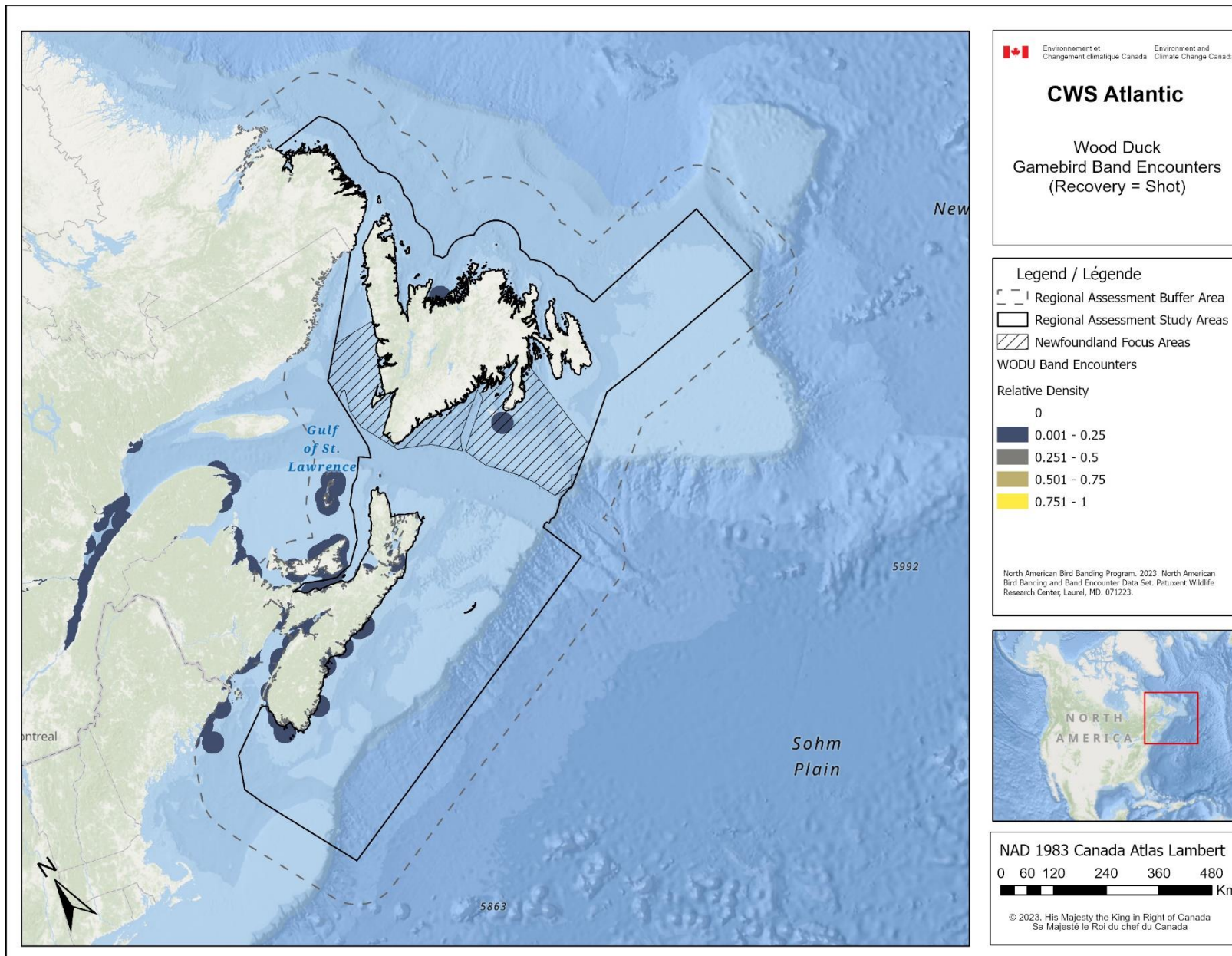
North American Bird Banding Program. 2023. North American Bird Banding and Band Encounter Data Set. Patuxent Wildlife Research Center, Laurel, MD. 071223.

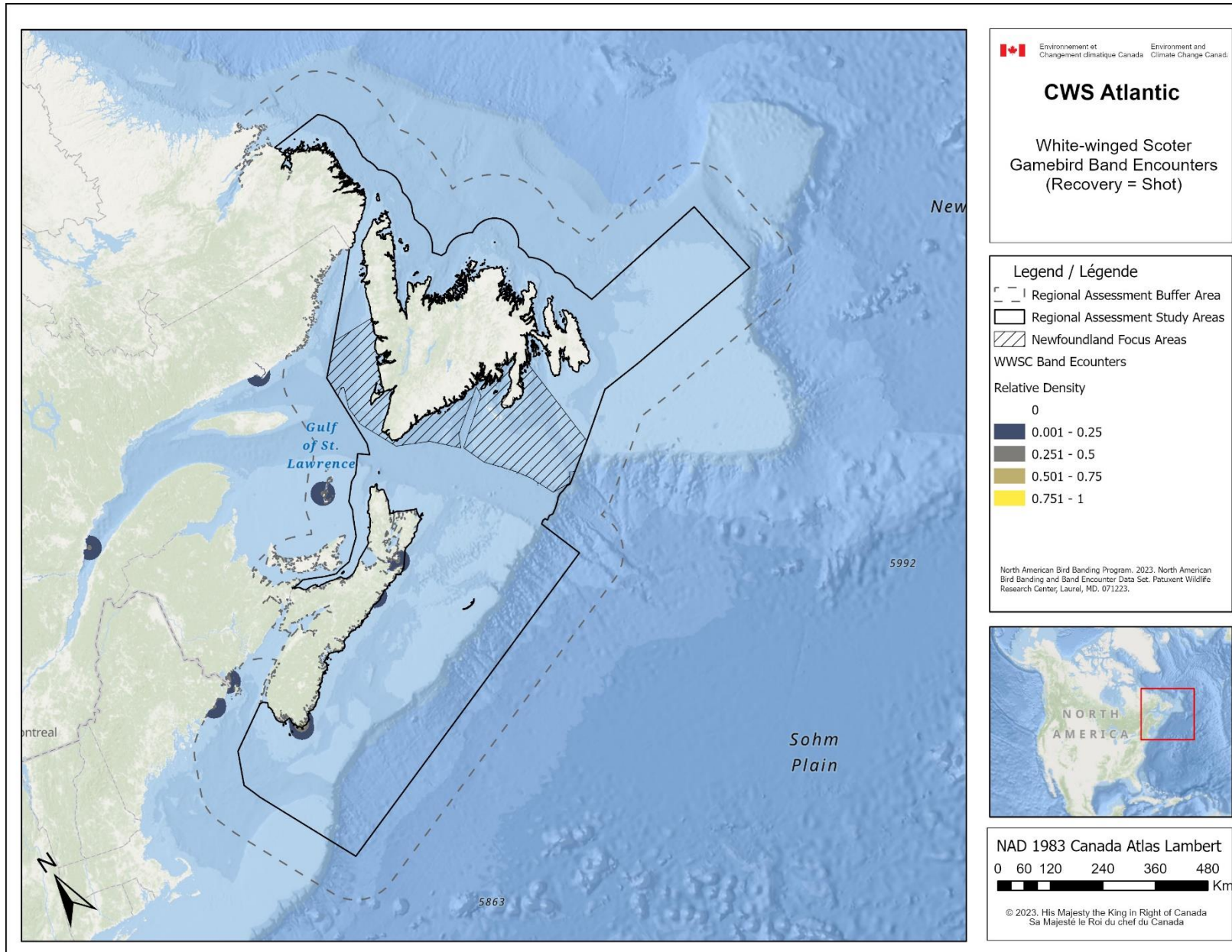


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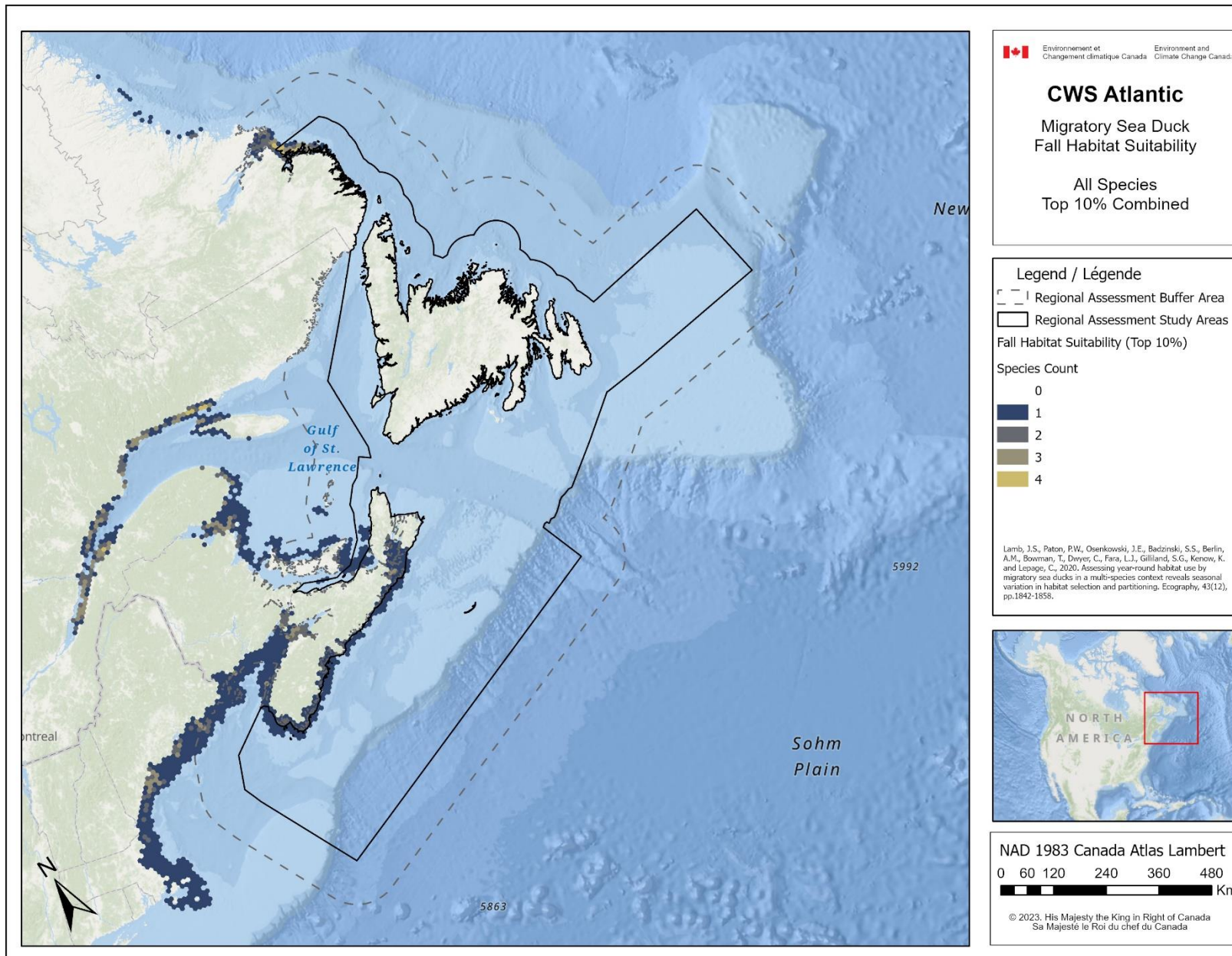
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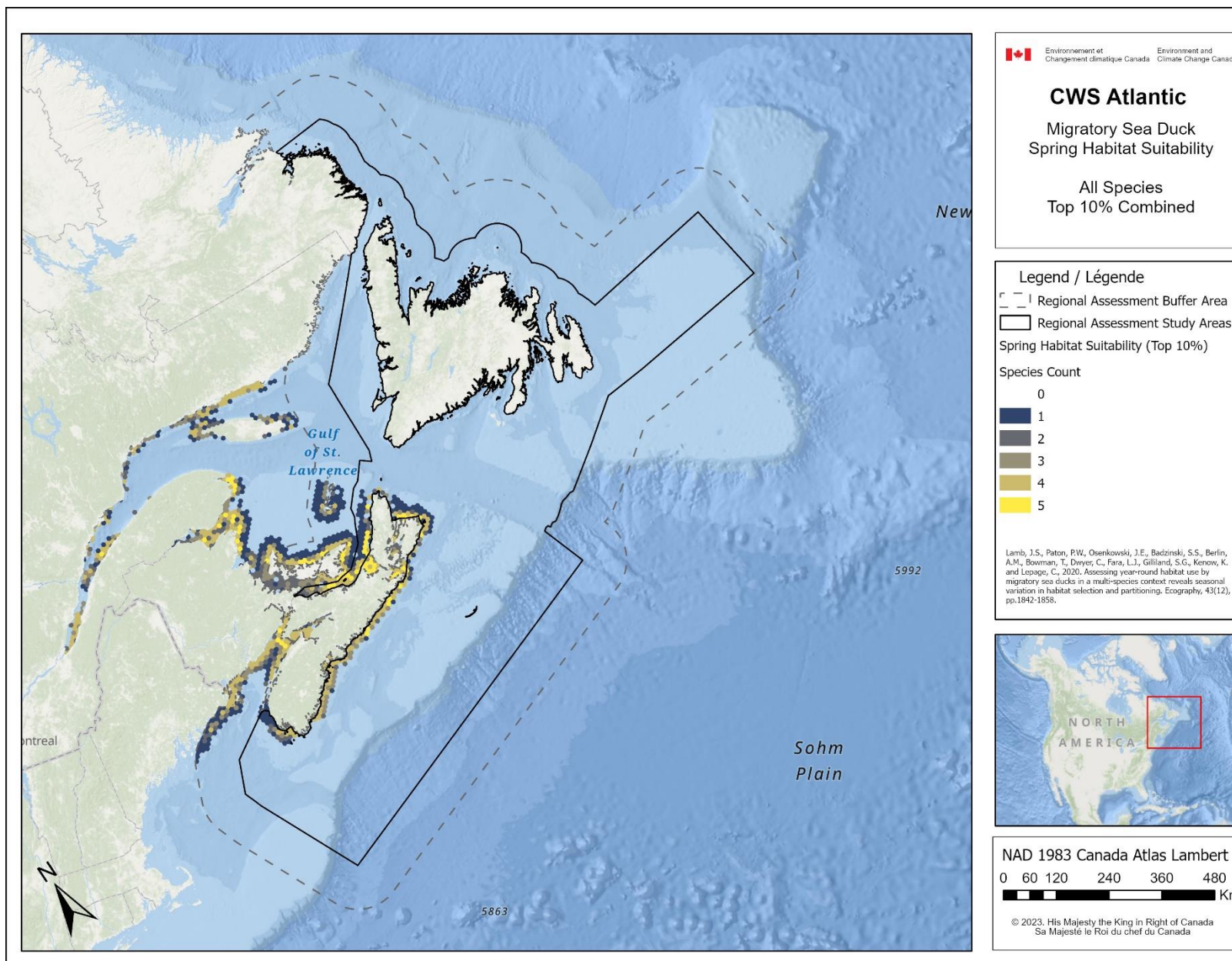
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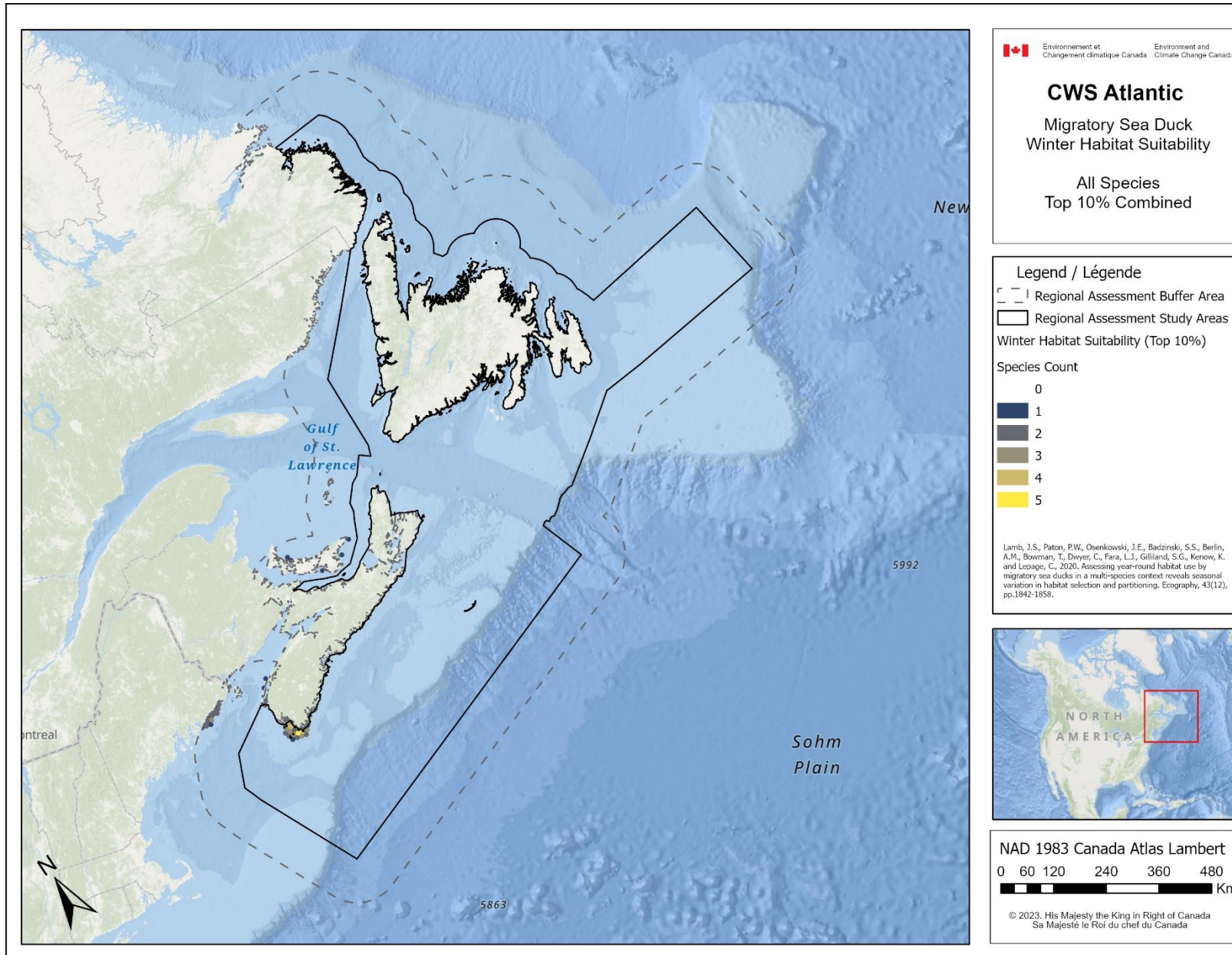


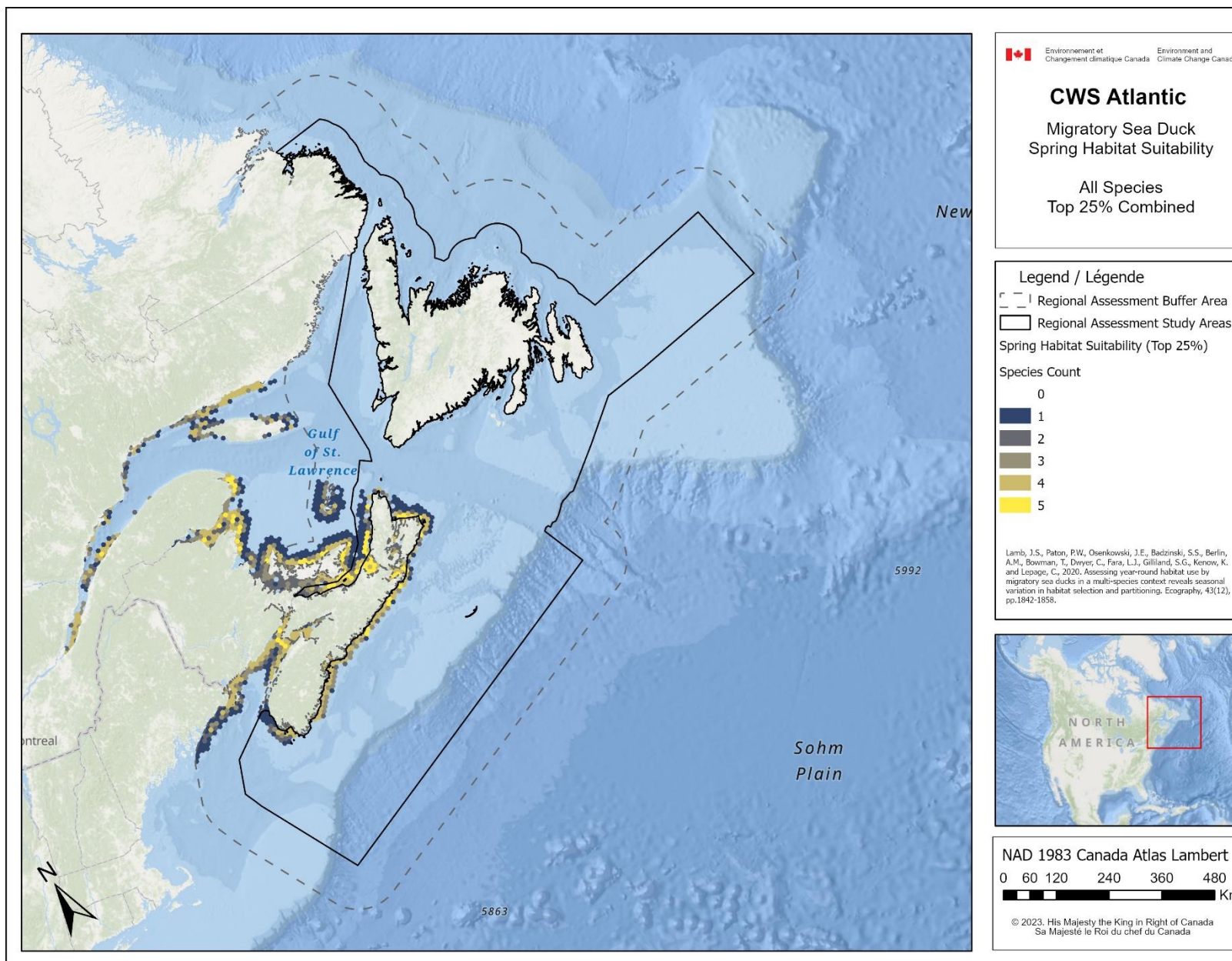


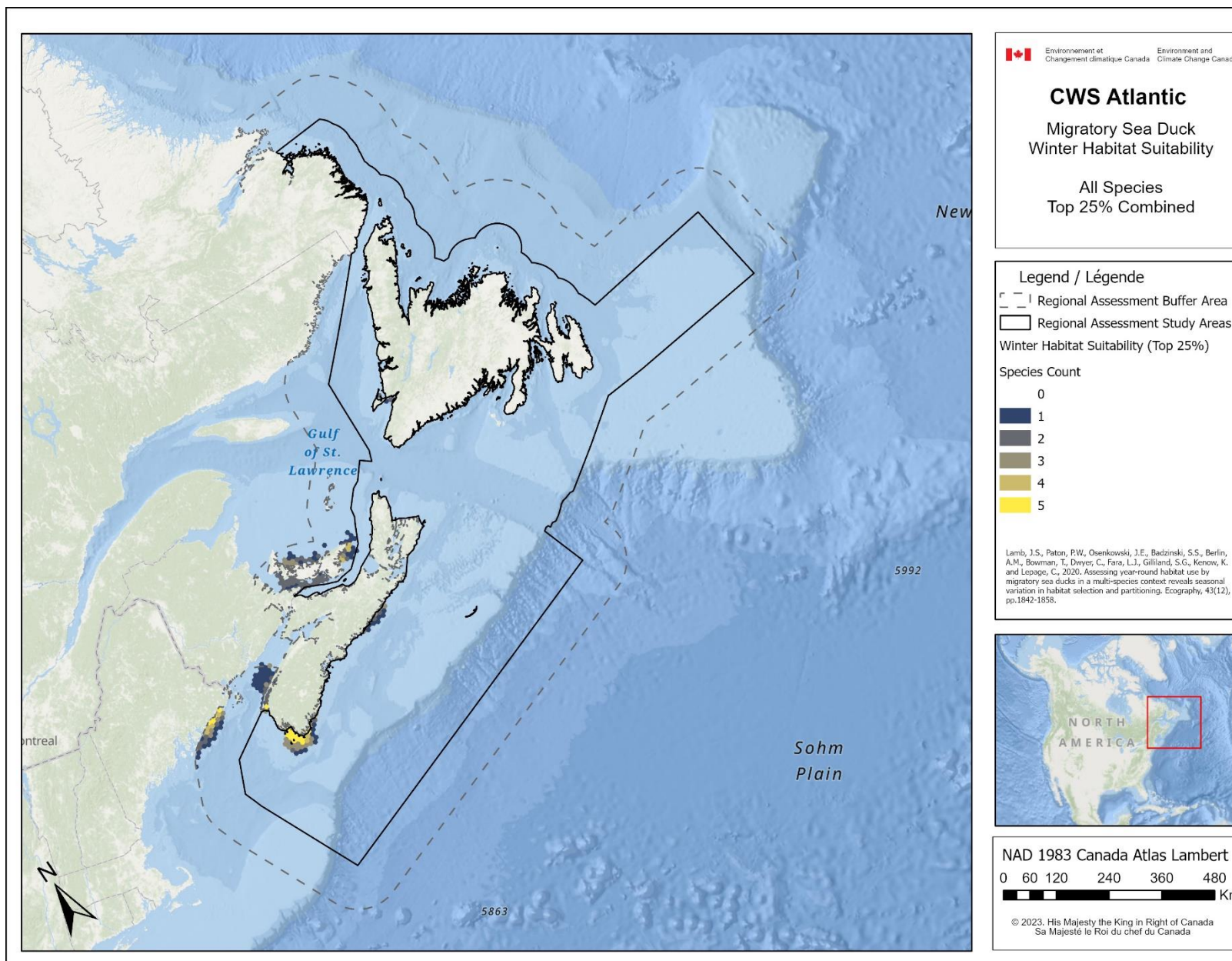
Waterfowl Habitat Suitability

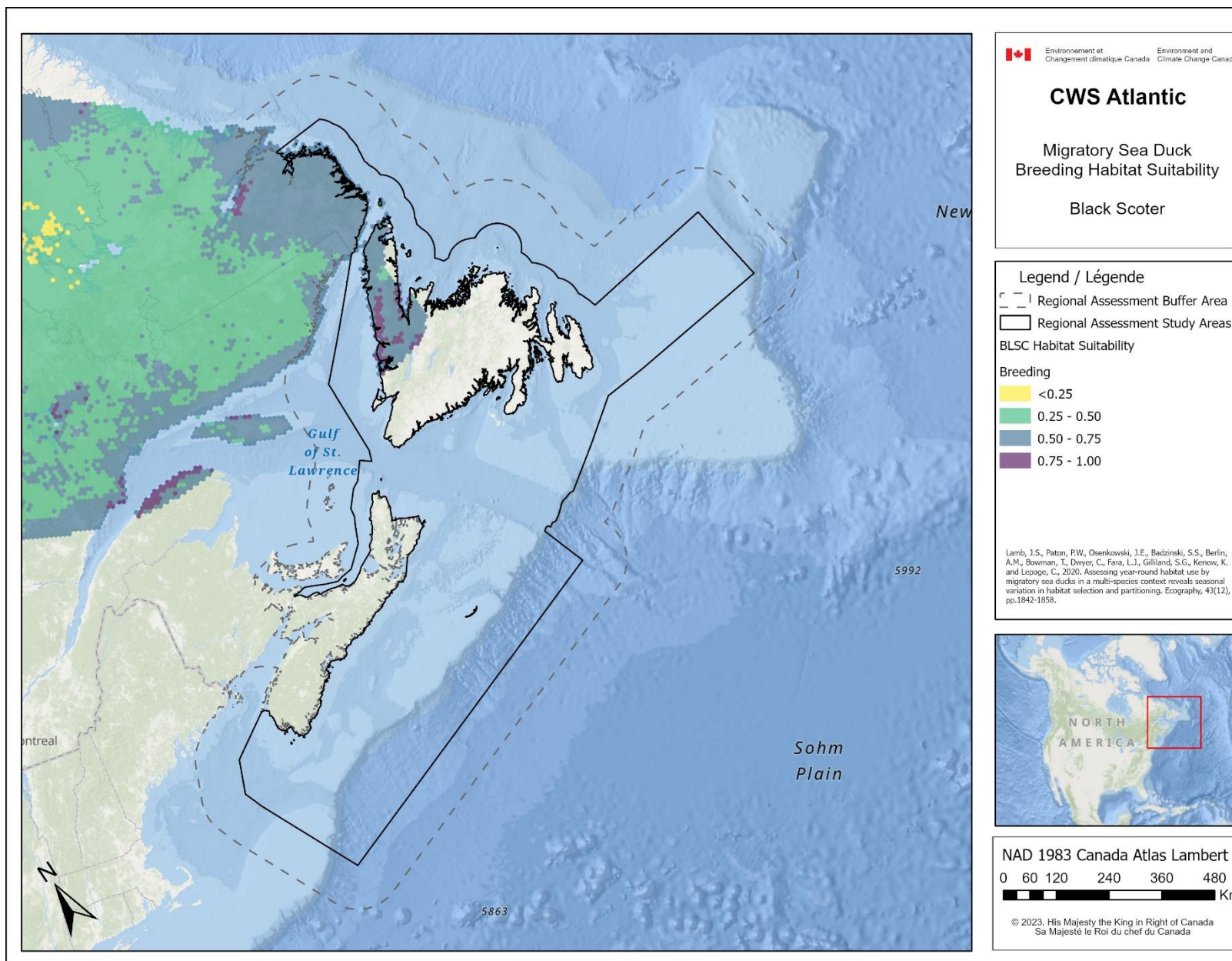


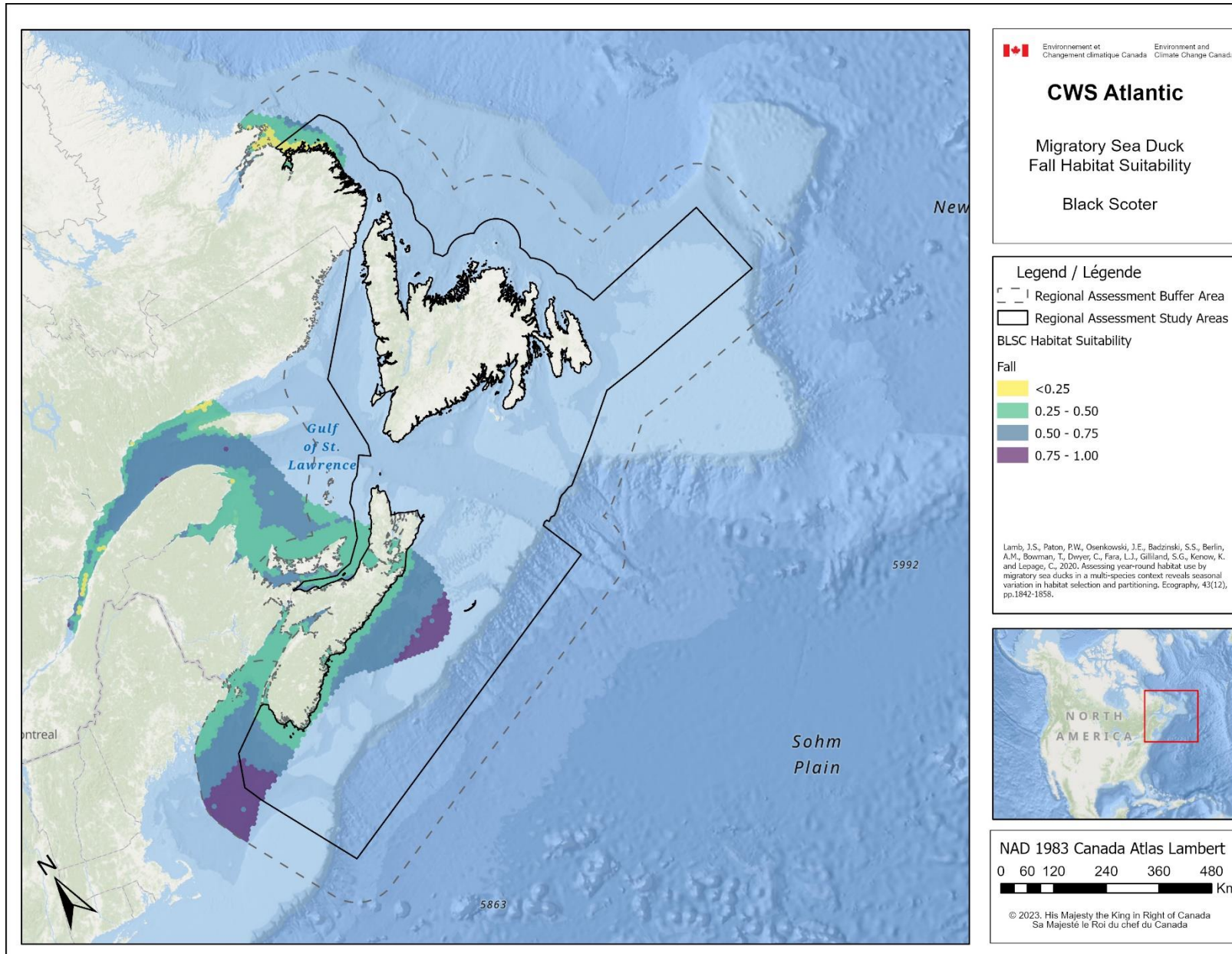


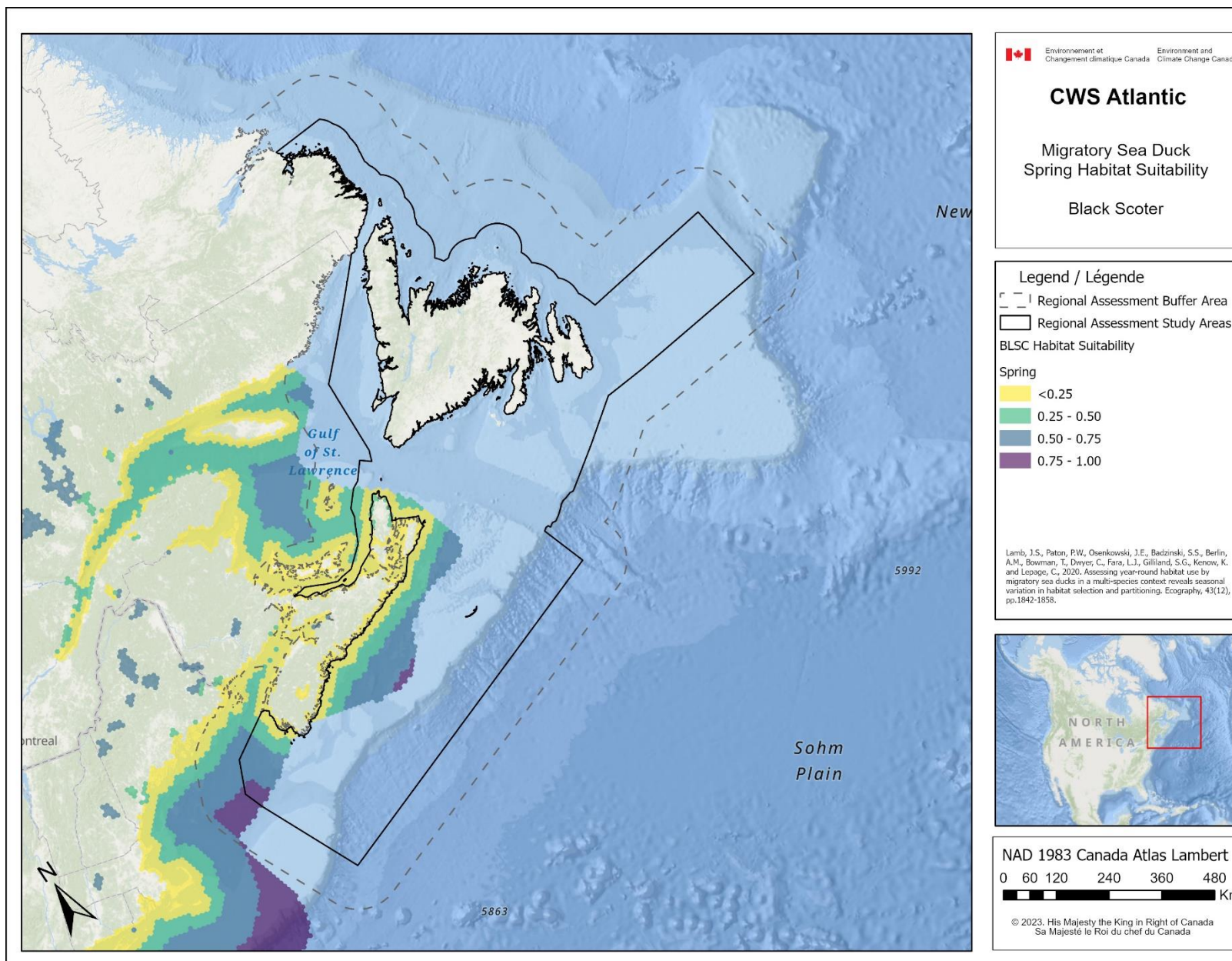


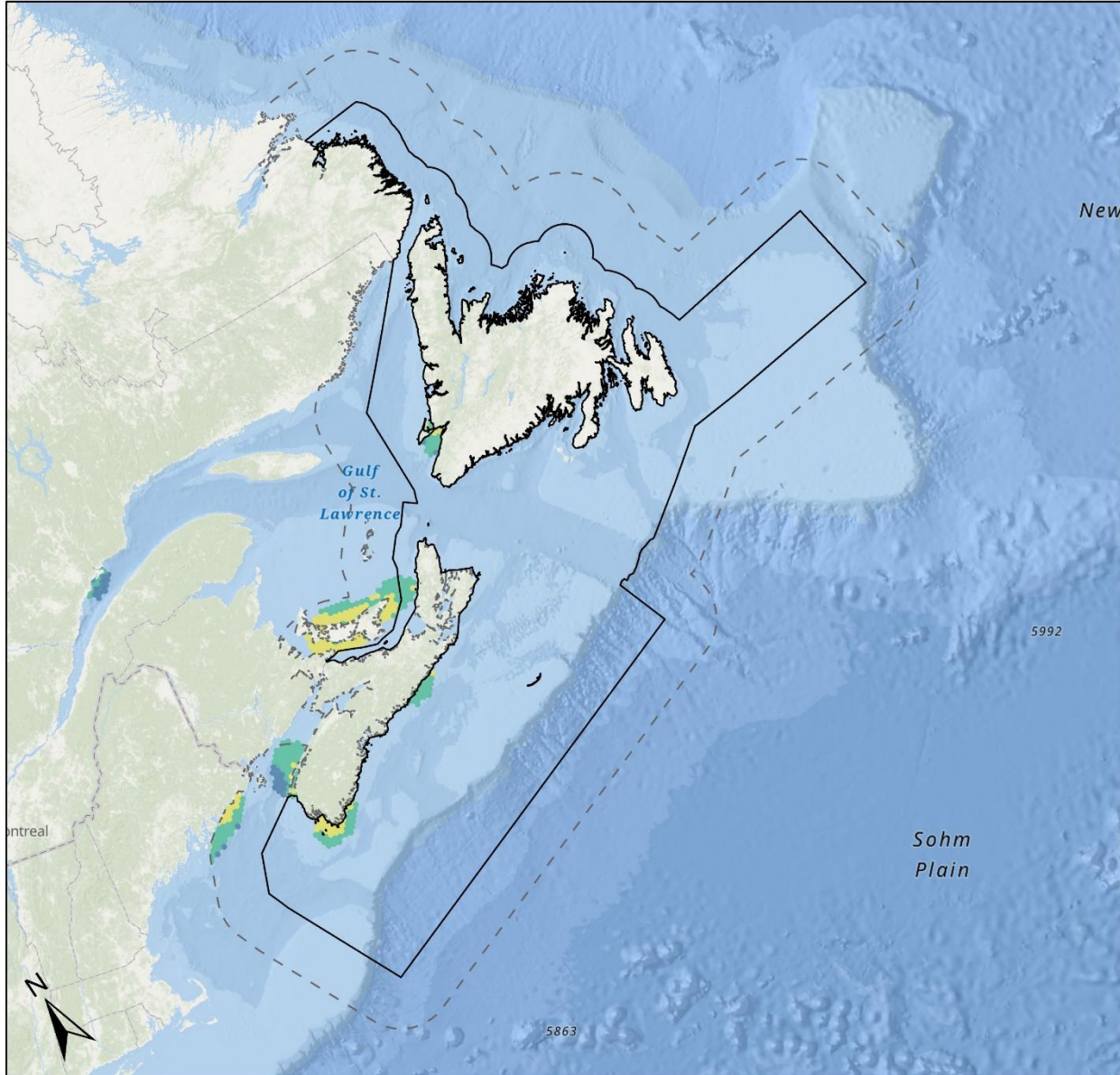
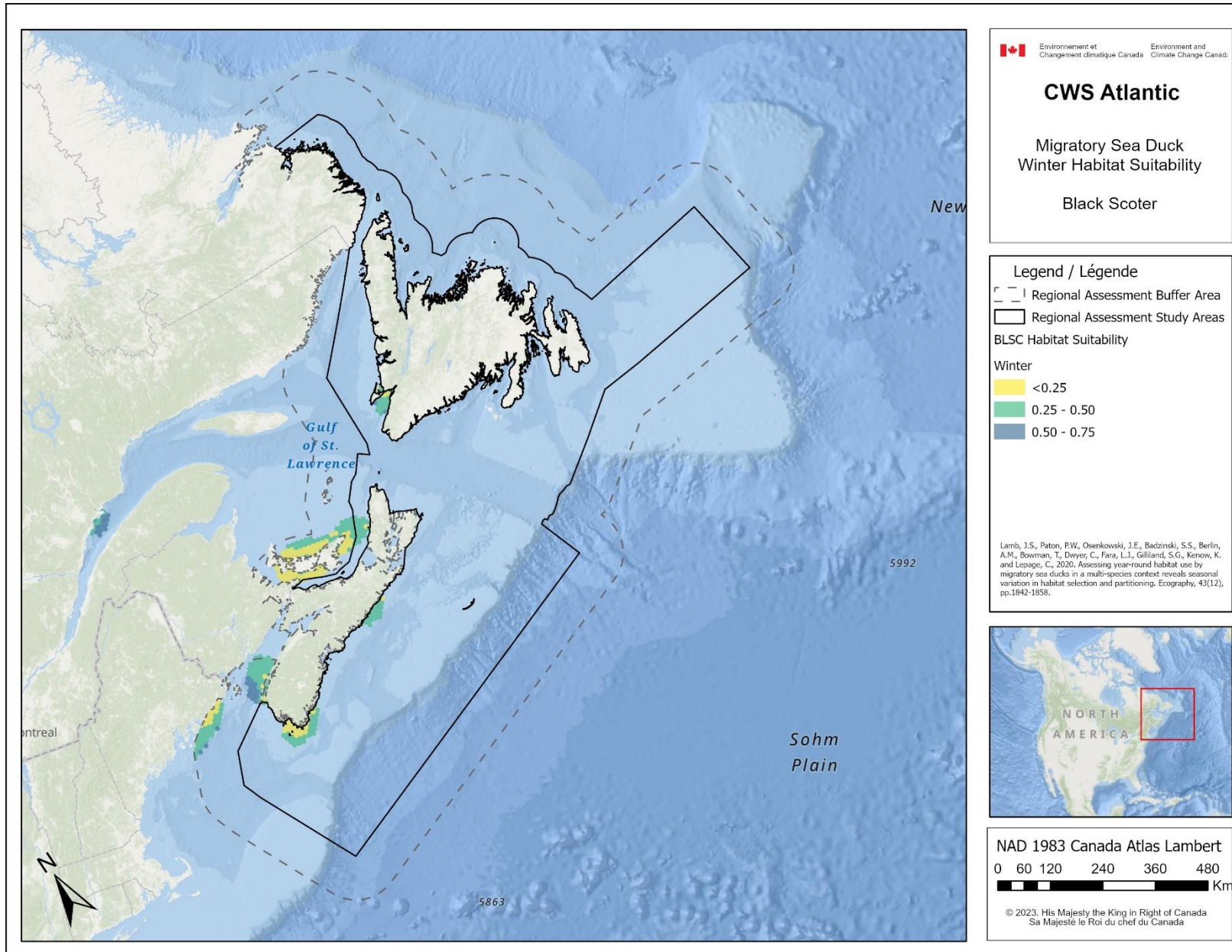


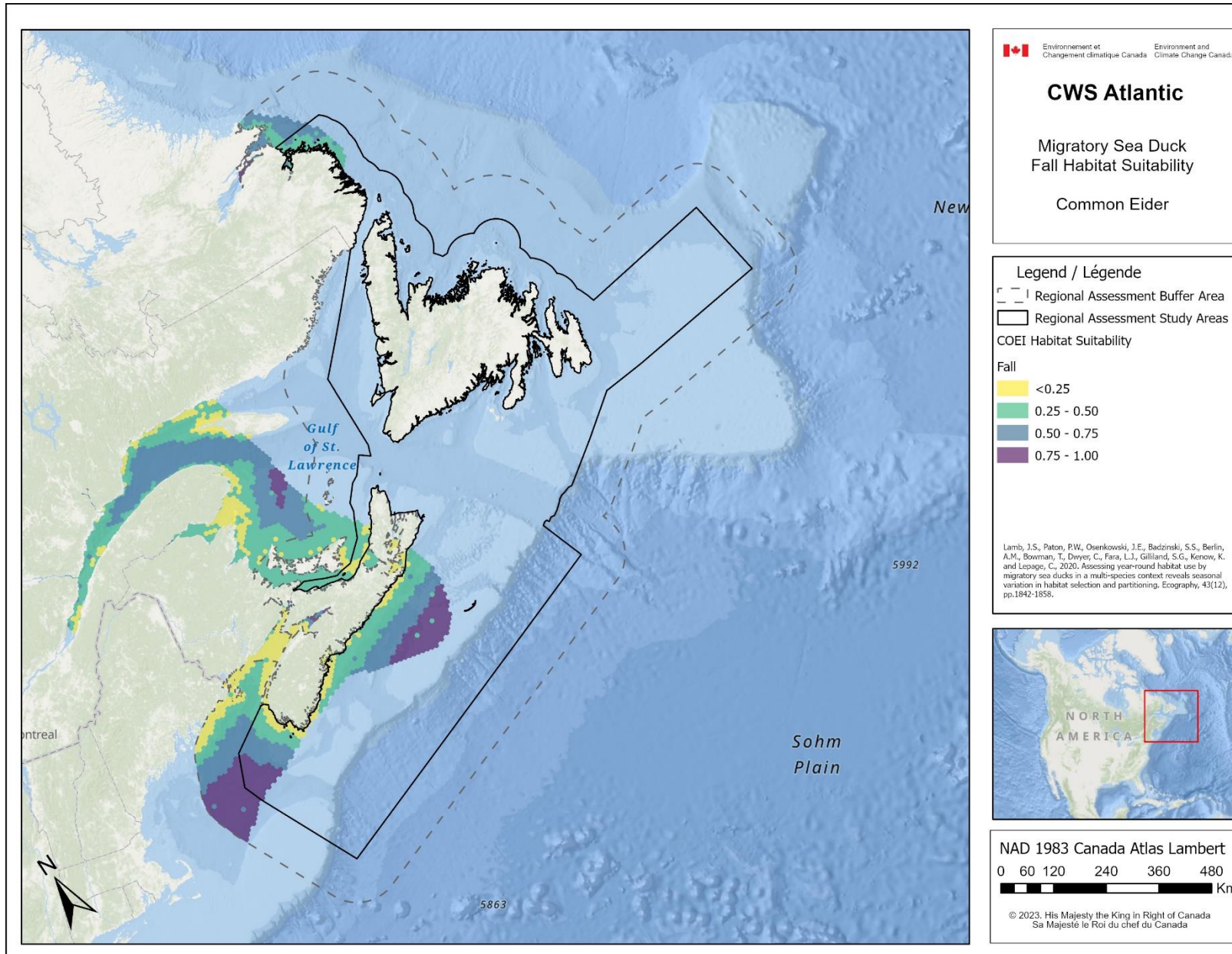


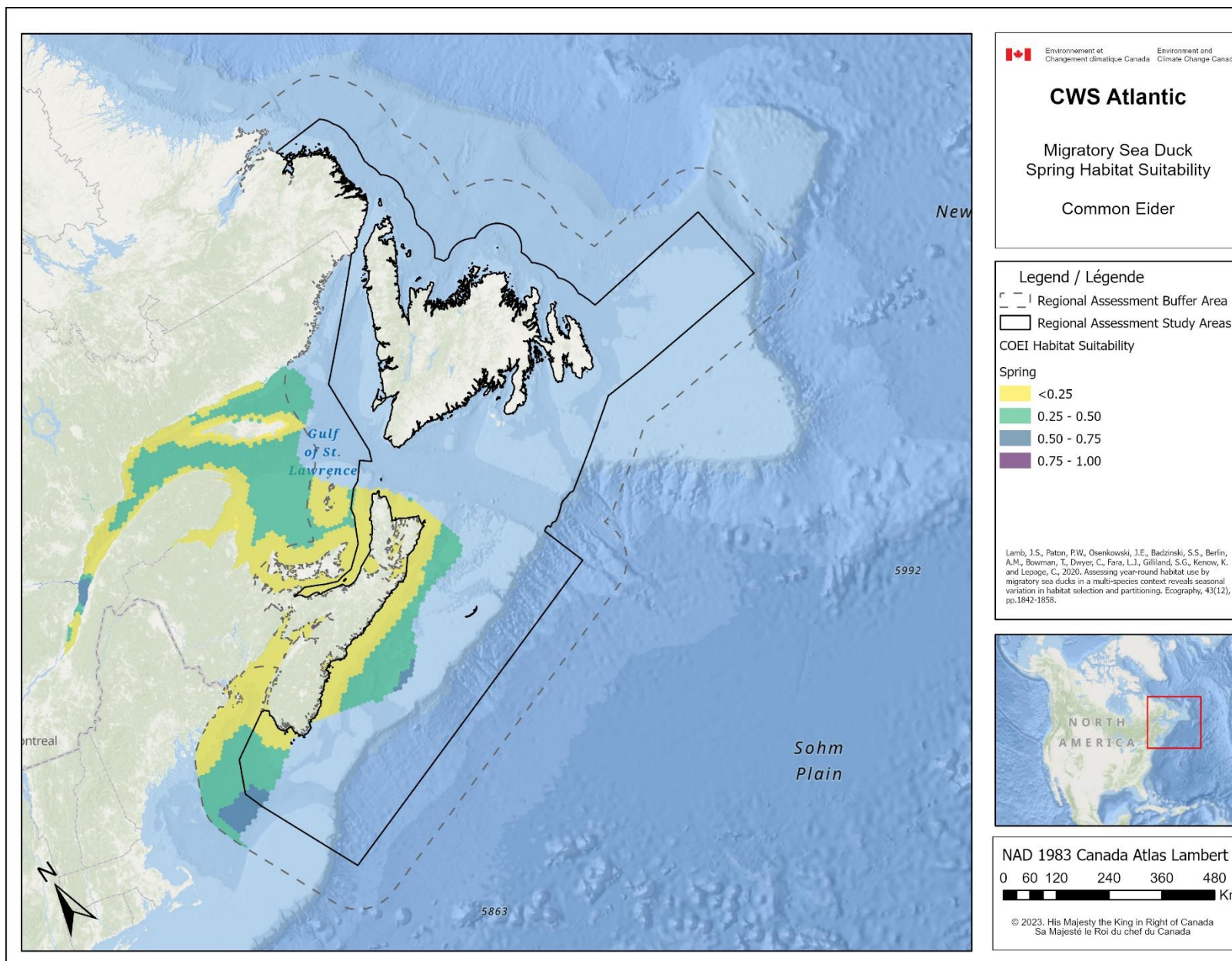


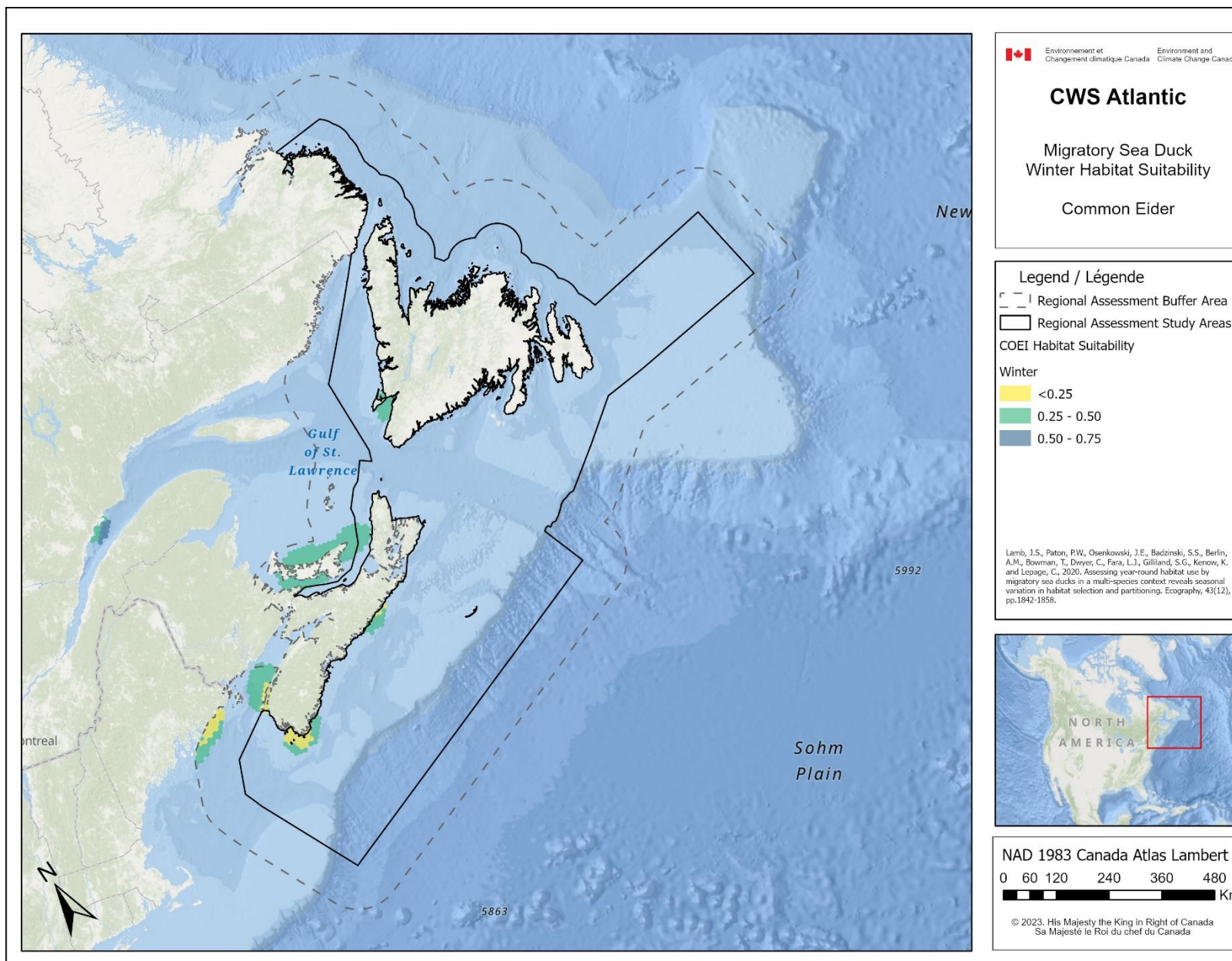


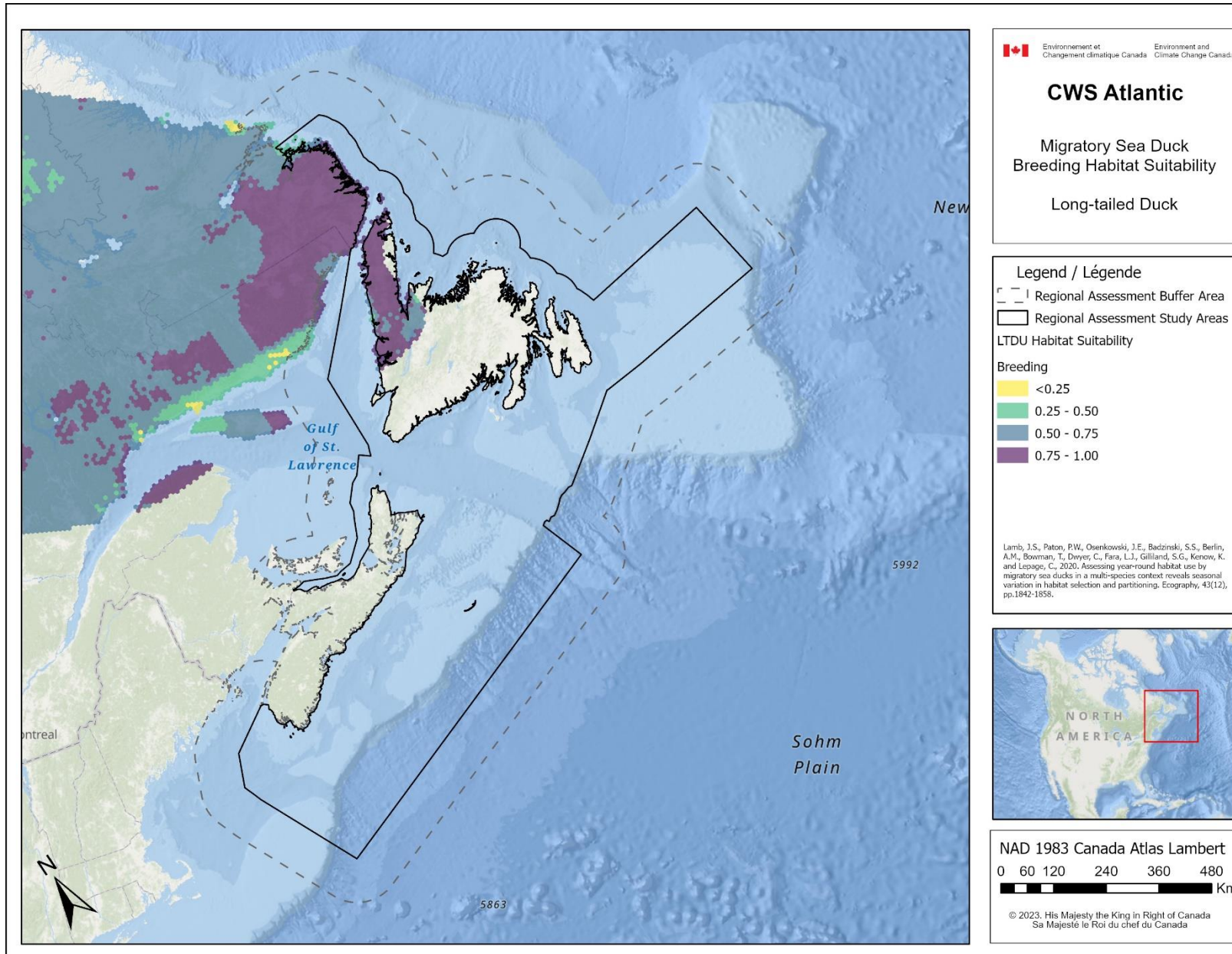


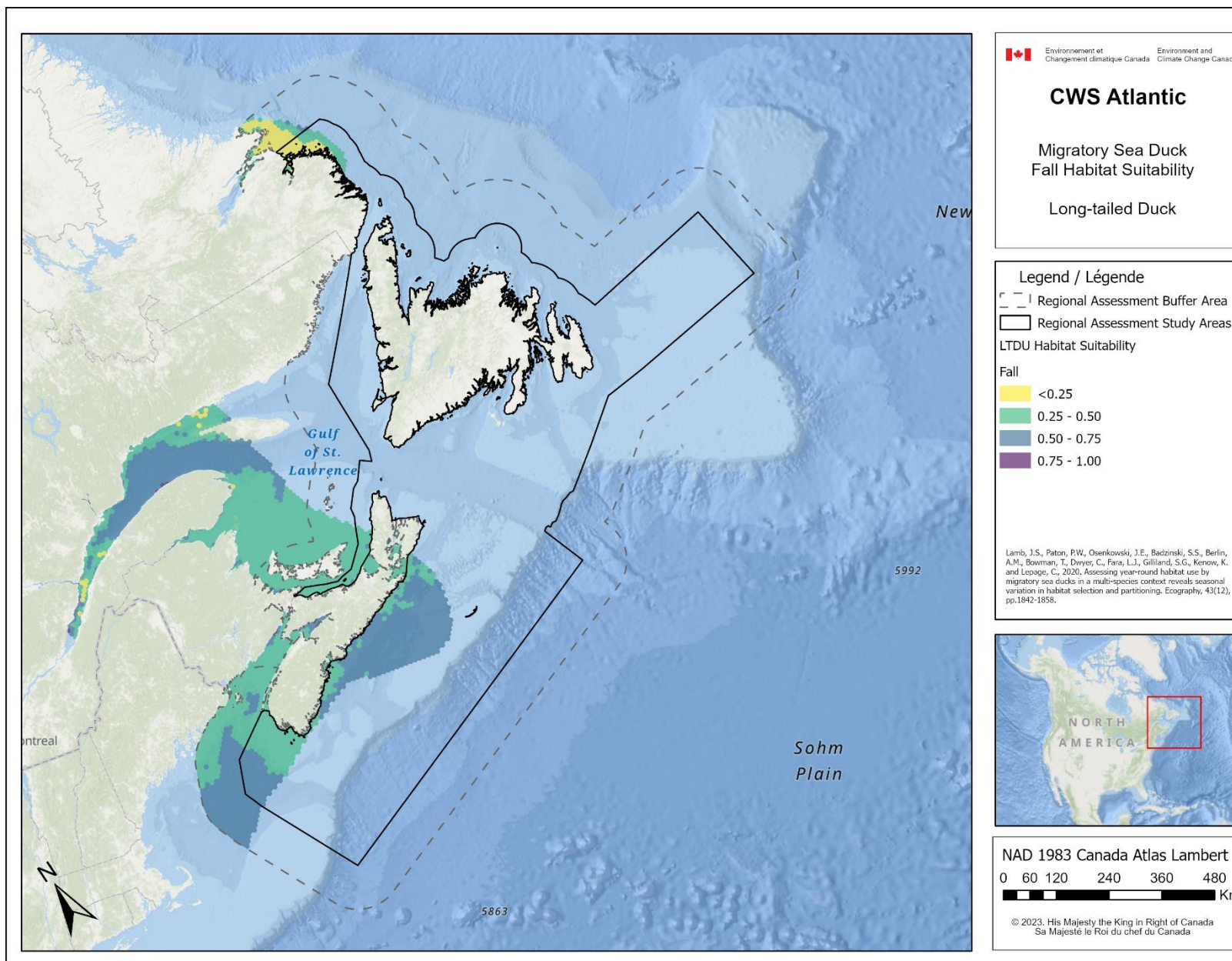


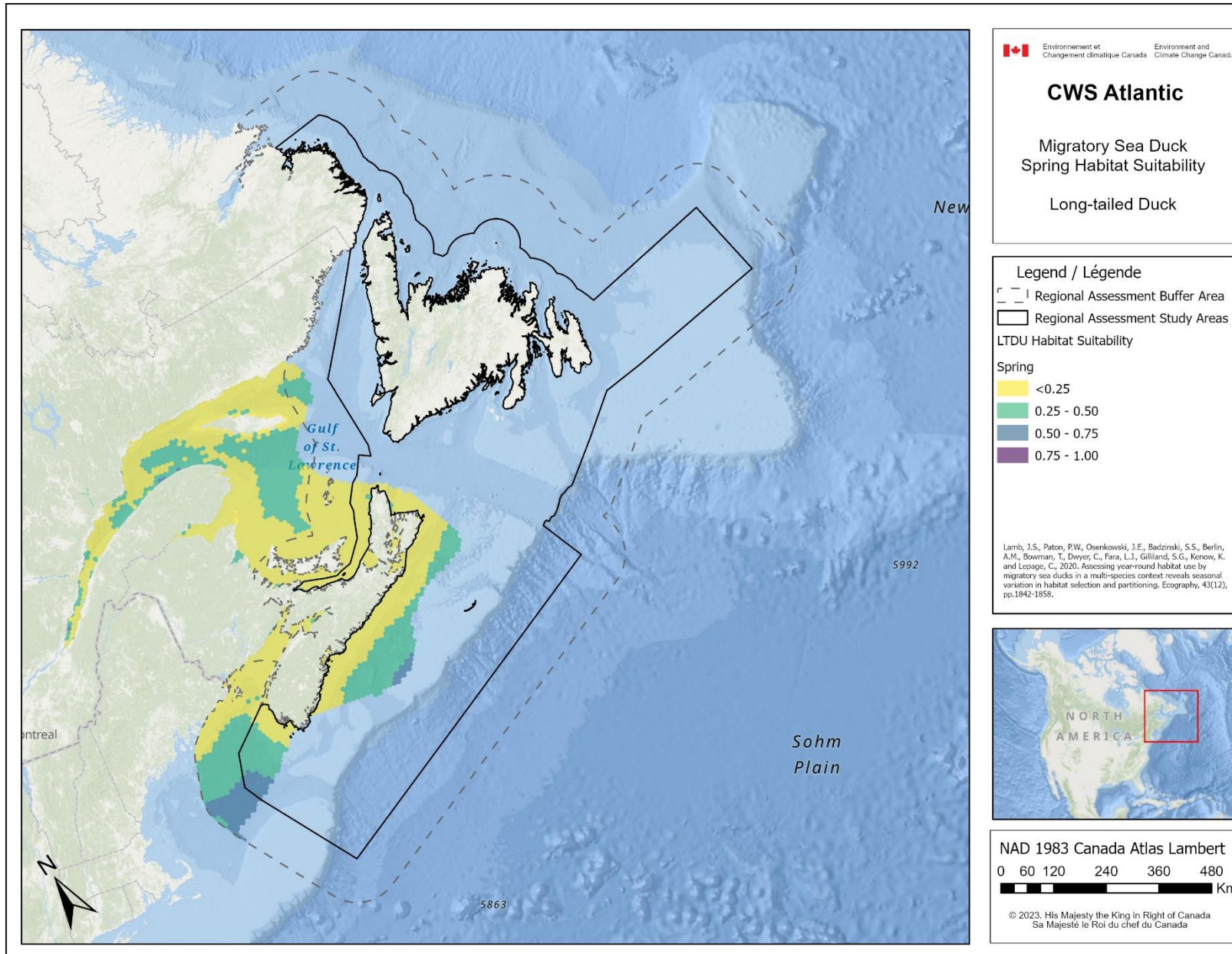


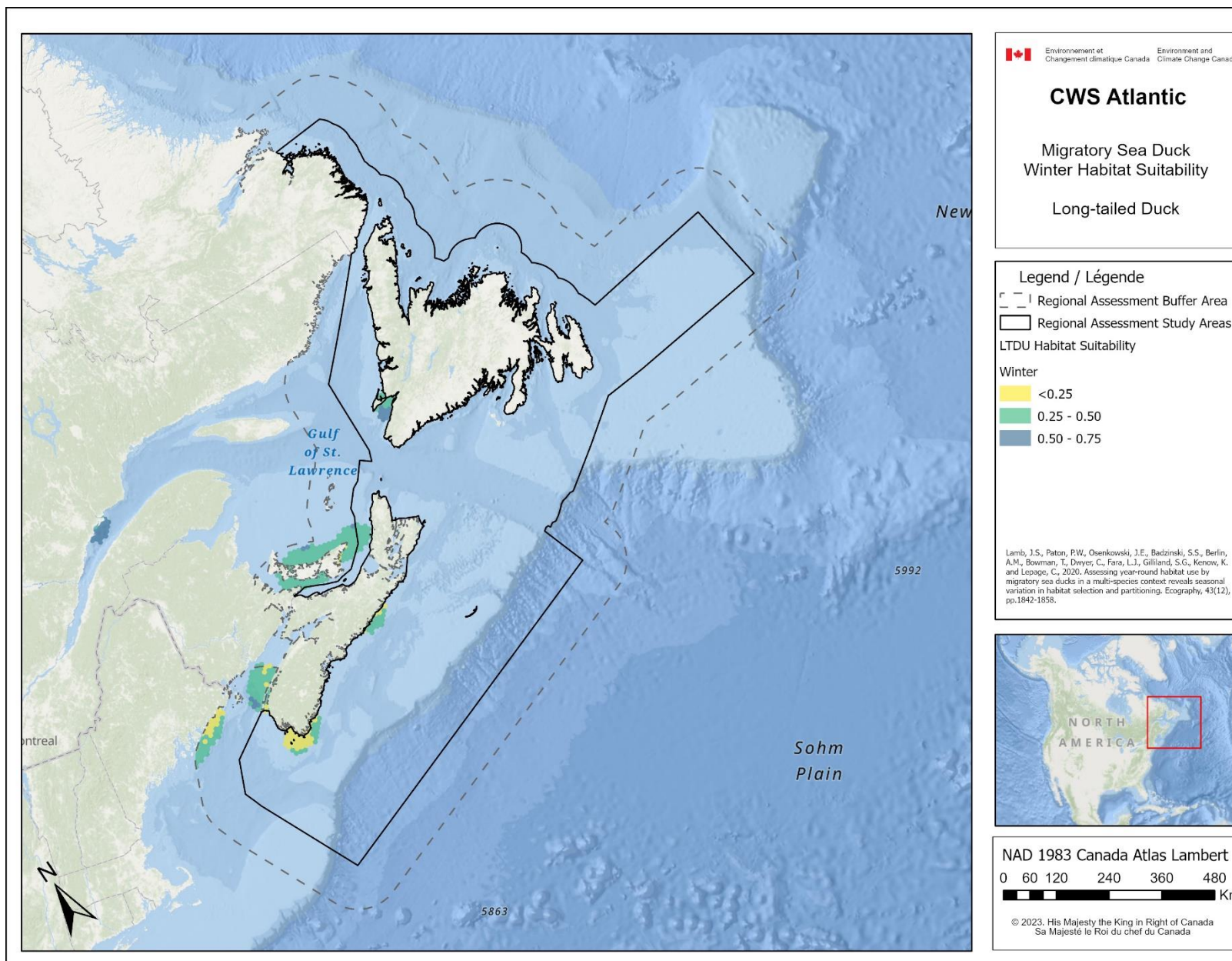


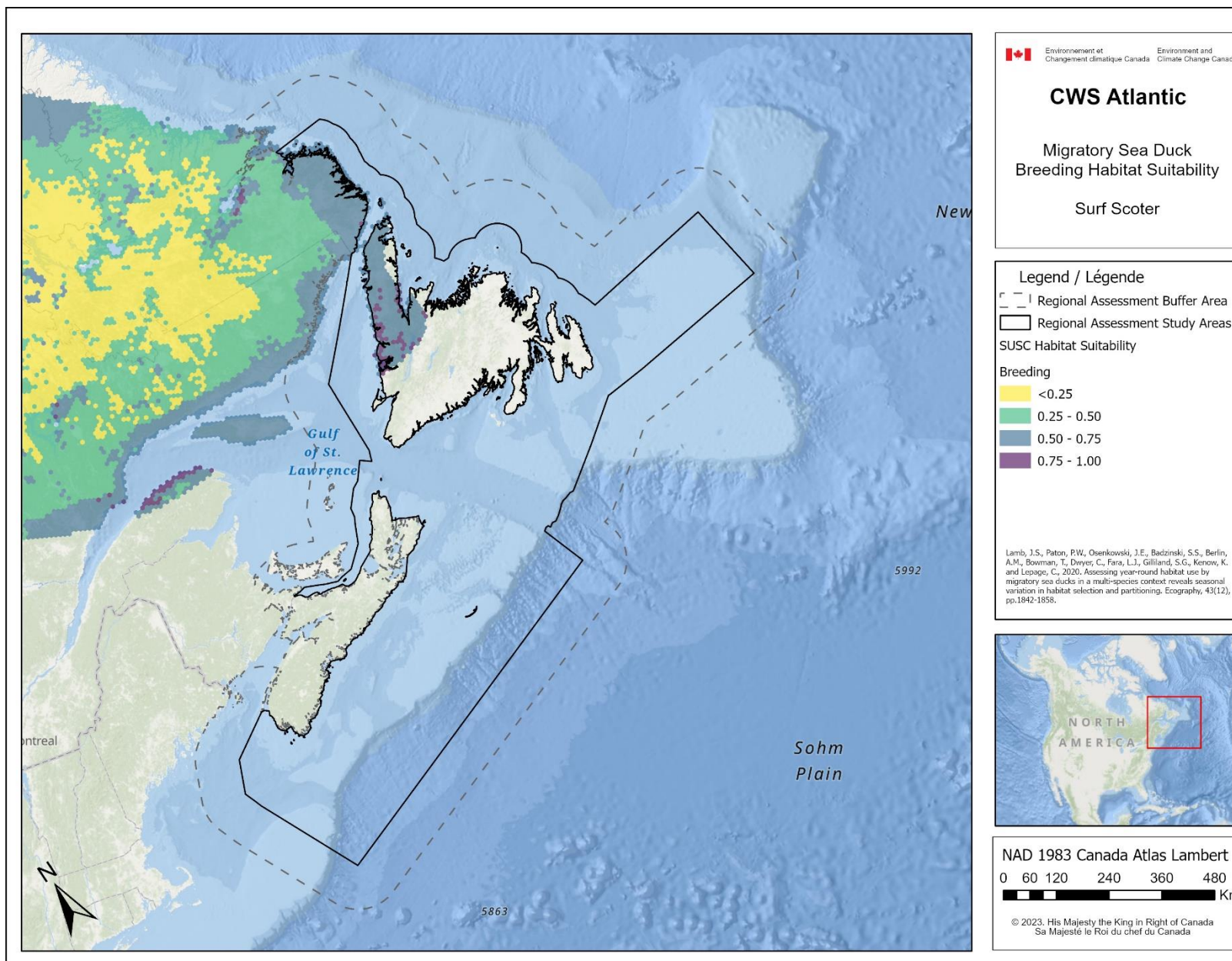


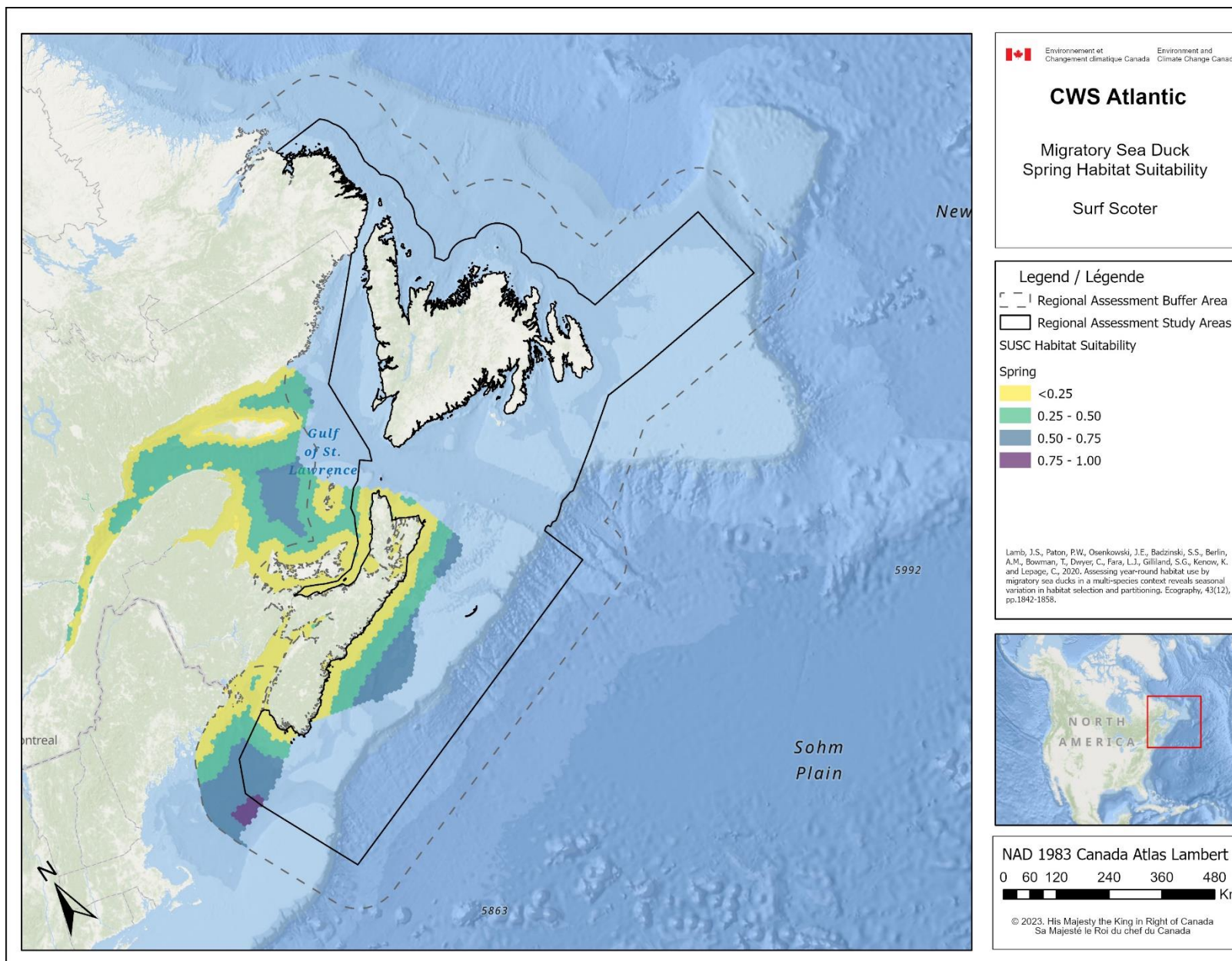


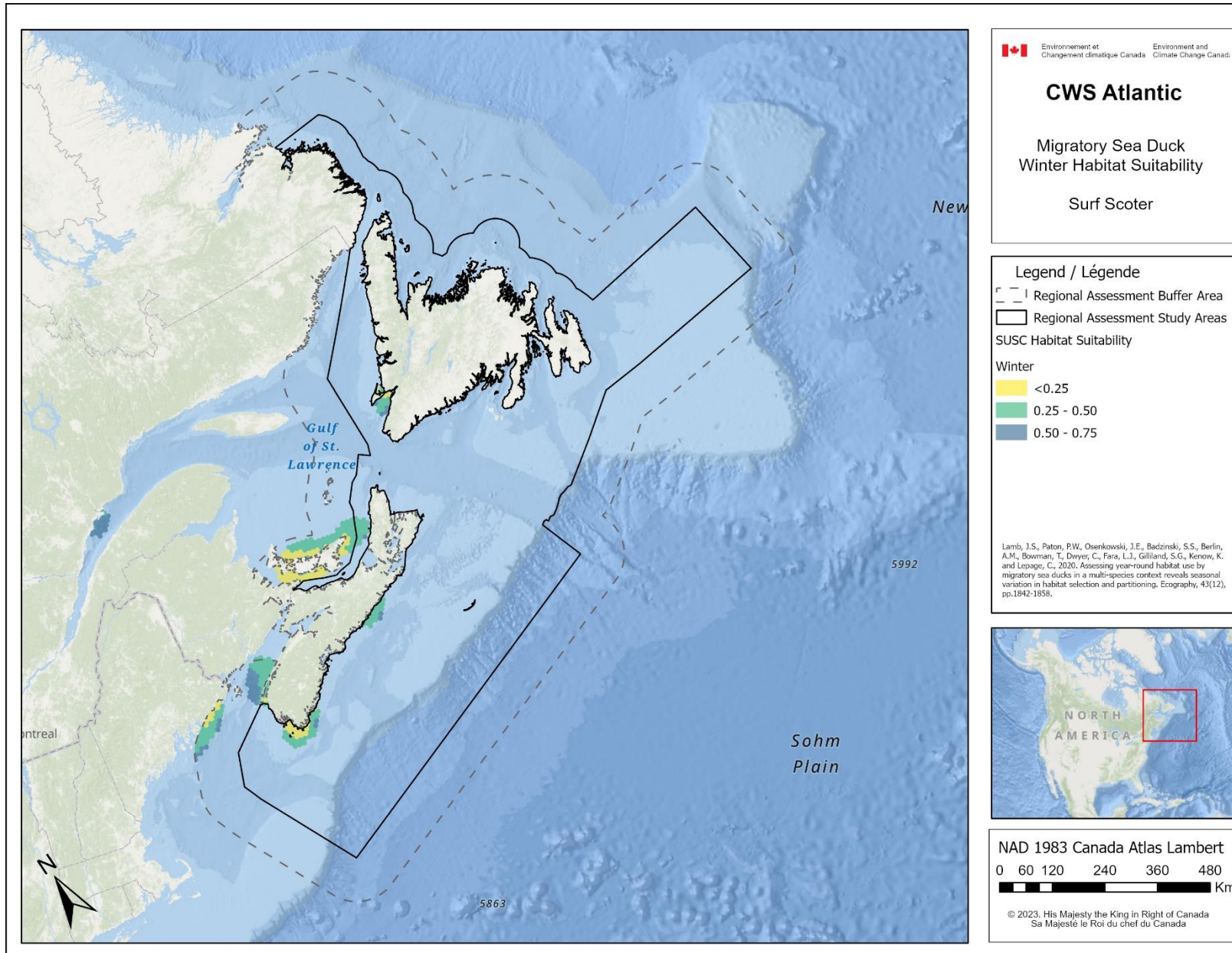


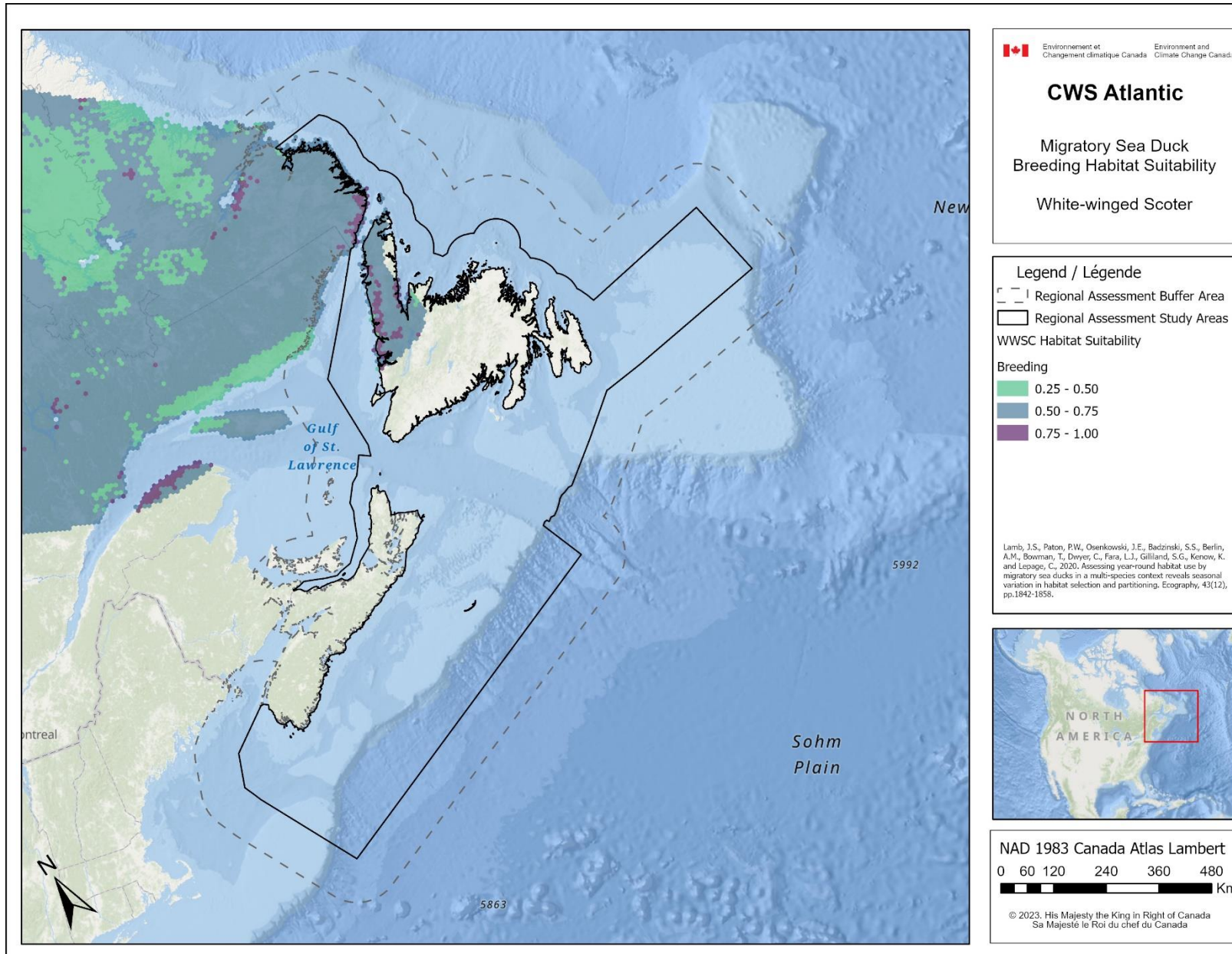


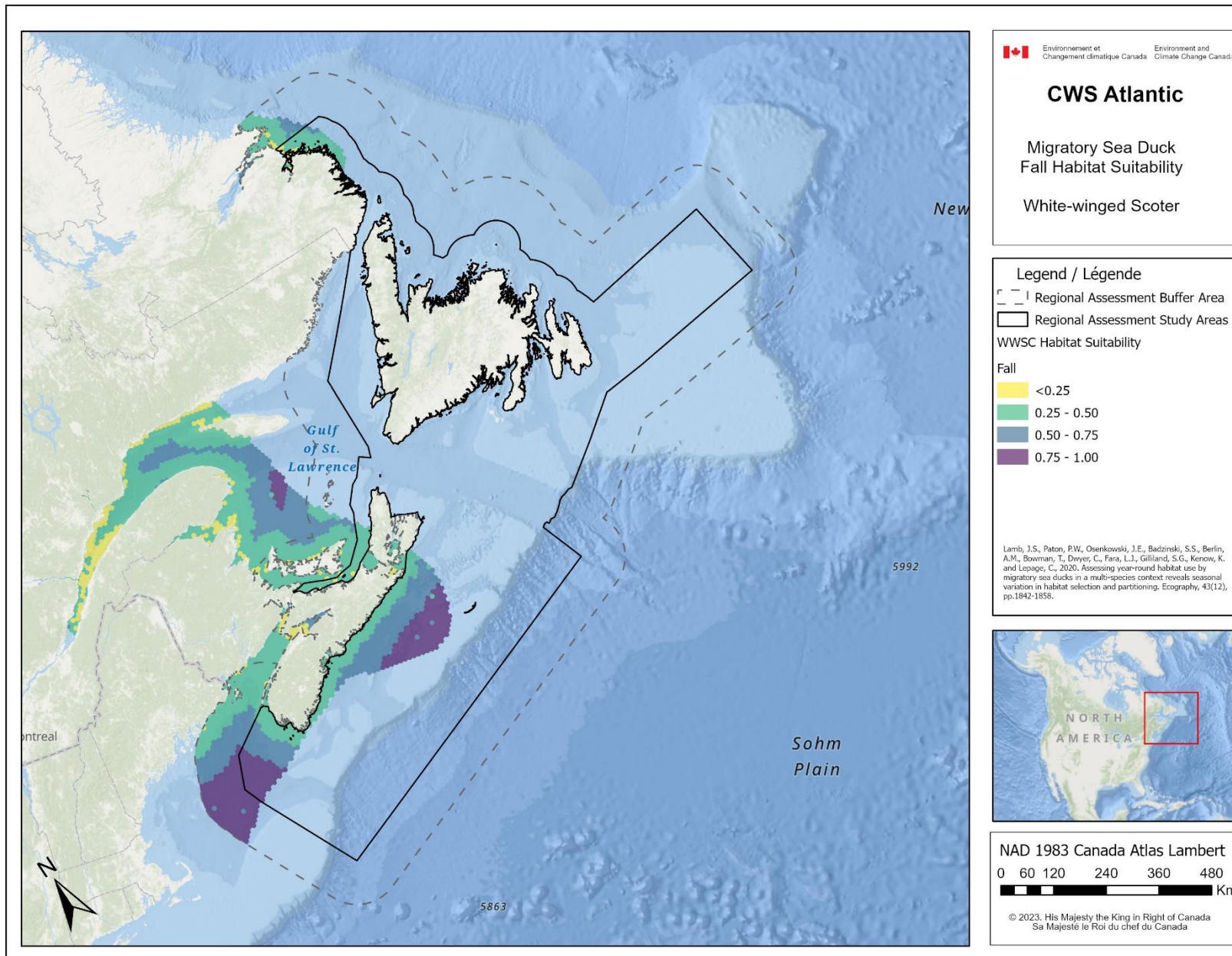


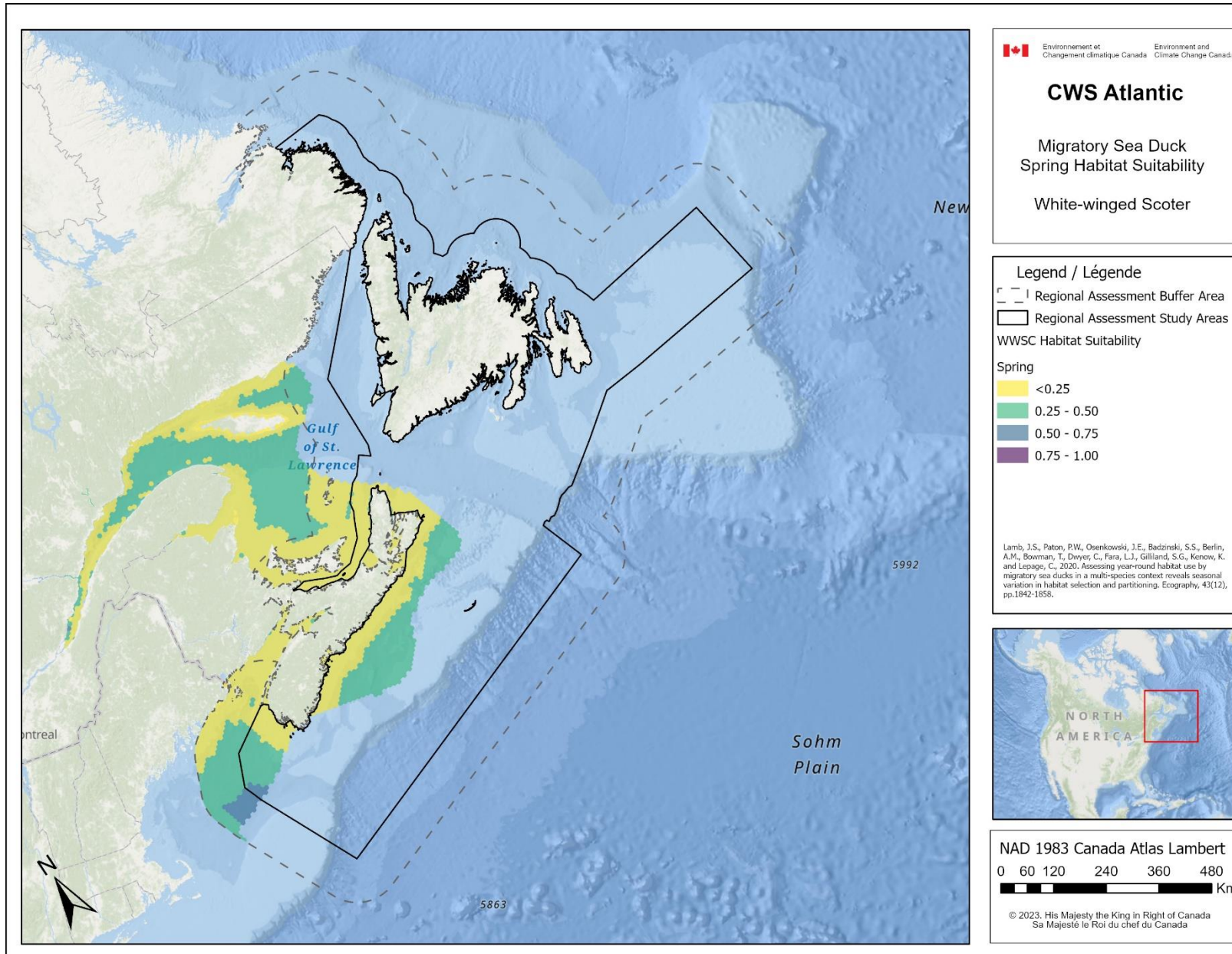


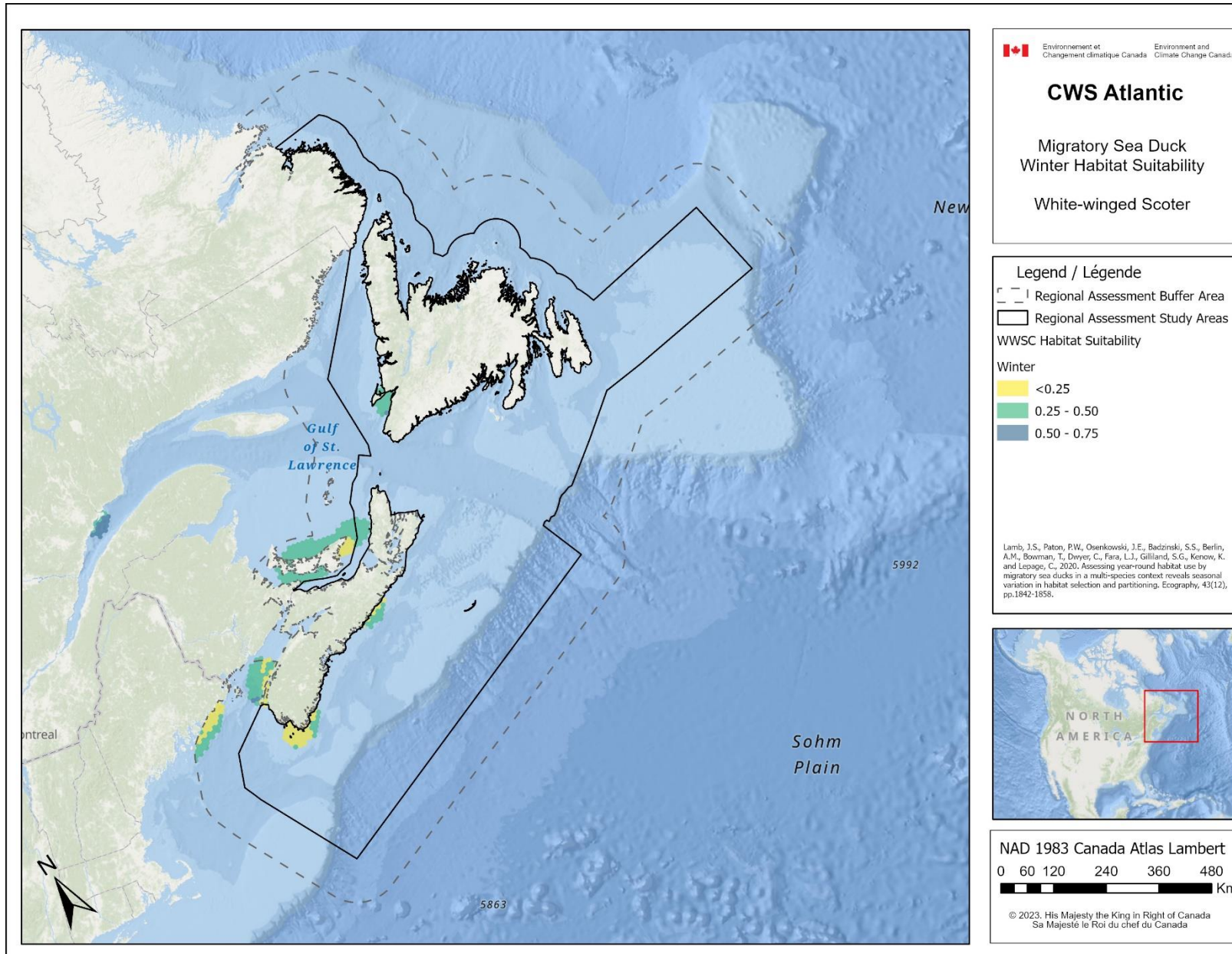




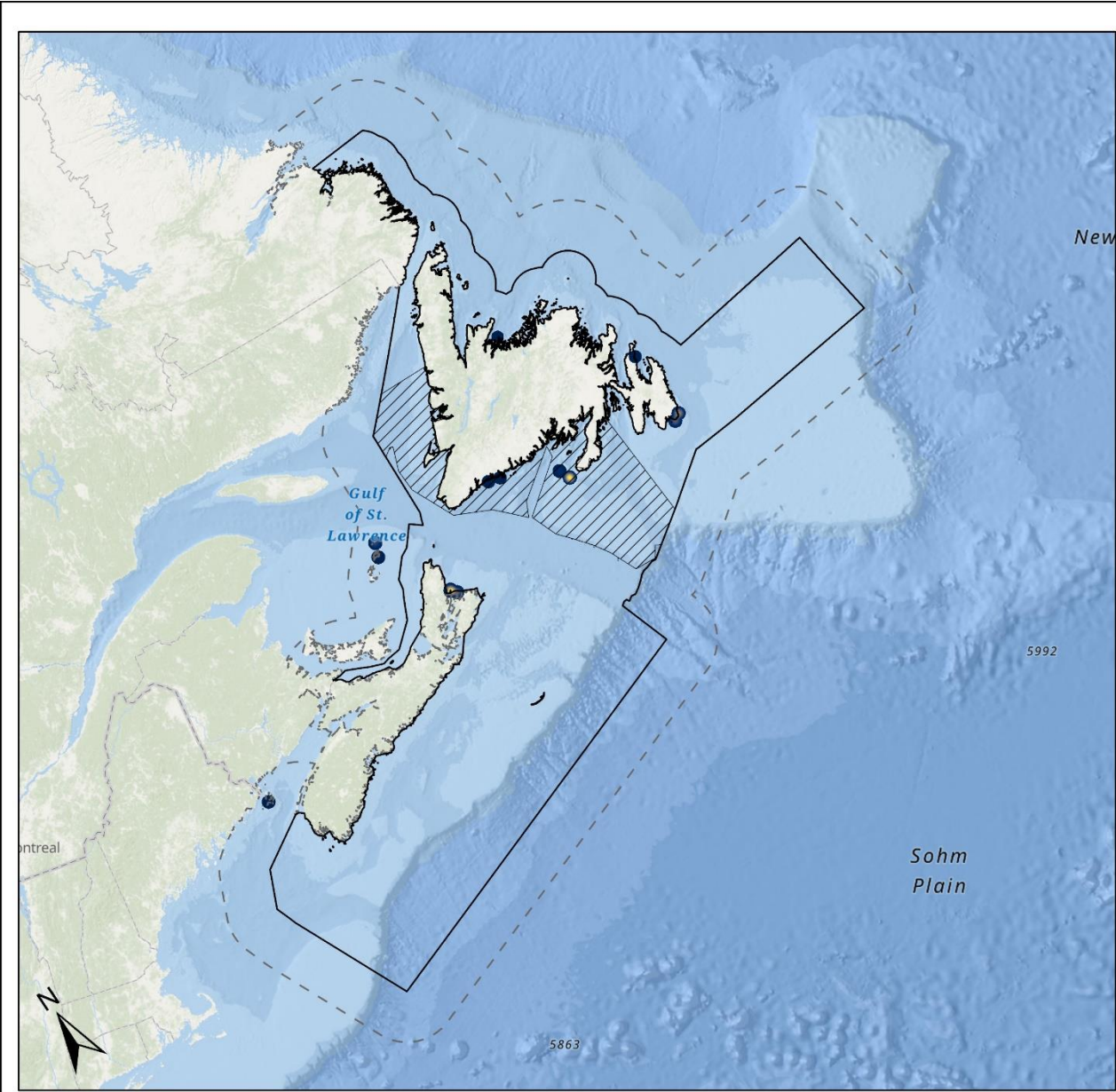








Waterfowl Coastal Density



Environnement et
Changement climatique Canada Environment and
Climate Change Canada

CWS Atlantic

White-winged Scoter
Relative Density

(COEI Triennial Surveys)

Legend / Légende

- Regional Assessment Buffer Area
- Regional Assessment Study Areas
- Newfoundland Focus Areas

WWSC Relative Density

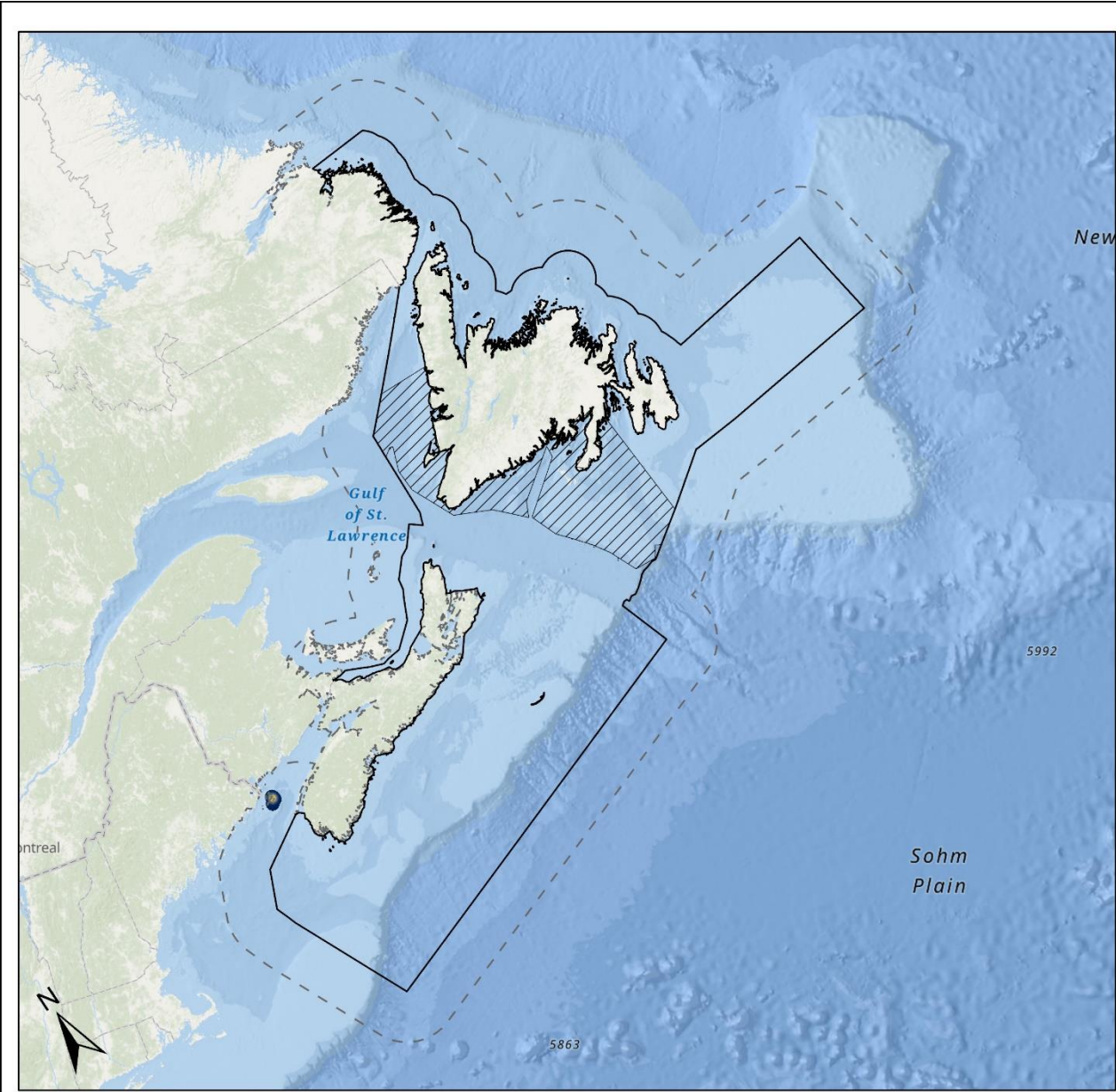
Value



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Environnement et
Changement climatique Canada

Environment and
Climate Change Canada

CWS Atlantic

Atlantic Brant
Relative Density

(COEI Triennial Surveys)

Legend / Légende

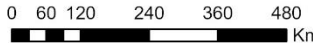
- Regional Assessment Buffer Area
- Regional Assessment Study Areas
- Newfoundland Focus Areas

ATBR Relative Density

Value



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