

Appendix 32

Meadowbank and Whale Tail 2024 Marine Mammal and Seabird Report



Meadowbank Complex and Meliadine Mine

Marine Mammal and Seabird
Annual Report, 2024

PREPARED FOR



AGNICO EAGLE

Agnico Eagle Mines Limited

DATE

March 2025

REFERENCE

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Meadowbank Complex and Meliadine Mine

Marine Mammal and Seabird Annual Report, 2024

March 2025

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ACRONYMS AND ABBREVIATIONS

Δ	difference (delta)
\leq	less than or equal to
Agnico Eagle	Agnico Eagle Mines Limited
AIC	Akaike's Information Criterion
AIS	Automatic Identification System
CI	Confidence Interval
ECSAS	Eastern Canada Seabirds at Sea
GIS	geographic information system
GPS	Global Positioning System
Groupe Desgagnés	Groupe Desgagnés, Inc.
km	kilometre
km ²	square kilometre
m	metre
MMMMP	Marine Mammal Management and Monitoring Plan
MMSO	Marine Mammal and Seabird Observer
NA	not applicable
NIRB	Nunavut Impact Review Board
PC	Project Certificate
SE	Standard Error
SMP	Shipping Management Plan
SOP	standard operating procedure
Woodward	Woodward Group and Companies

EXECUTIVE SUMMARY

Agnico Eagle Mines Limited (Agnico Eagle) operates two mines in eastern Nunavut: the Meadowbank Complex (Meadowbank Mine and Whale Tail Mine), approximately 85 kilometres (km) north of the Hamlet of Baker Lake, and the Meliadine Mine, approximately 25 km north of Rankin Inlet. Agnico Eagle supplies these projects through annual sealifts during the open water season. The shipping company Groupe Desgagnés, Inc. (Groupe Desgagnés) ships dry cargo to the Meadowbank Complex and Meliadine Mine, and the Woodward Group of Companies (Woodward) supplies fuel to these two projects.

Agnico Eagle holds three Project Certificates (PCs) from the Nunavut Impact Review Board (NIRB) for Meadowbank Complex (Nos. 004 and 008) and Meliadine Mine (No. 006). These PCs include conditions related to the protection of marine mammals and seabirds, including avoiding sensitive breeding and habitat areas for marine mammals and seabirds, and vessel crew conducting a Marine Mammal and Seabird Observer (MMSO) program (see Table 1 for Compliance to Project Conditions).

The objective of the Marine Mammal and Seabird Annual Report, 2024 was to provide a summary of the MMSO data collected by Groupe Desgagnés and Woodward, and local marine wildlife monitors during the 2024 MMSO program to support Agnico Eagle's 2024 annual report to the NIRB. MMSO results from the previous years for Meliadine Mine (2017 to 2023) and Meadowbank Complex (2018 to 2023) are provided in the report to allow for comparison between years, and to report on compliance.

Similar to previous years, updated training materials continued to be delivered to the vessel crew prior to the shipping season. These training materials were developed to improve the MMSO data collection of shipping companies. When compared to pre-2020 levels, vessel participation in MMSO surveys has increased. In 2024, a total of 23 vessels serviced the projects between July and November: 7 for Meadowbank and 7 for Meliadine, while 9 serviced both Meadowbank and Meliadine. Datasheets were obtained from 19 of the 23 trips in 2024, which is similar to the last 4 years (18 of the 23 trips in 2023, 21 of 27 in 2022, 23 of 29 in 2021, and 19 of 25 in 2020), all of which were greater than in previous years (6 vessels providing datasheets in 2019, and only 2 participating vessels in 2018).

TABLE 1 PROJECT CERTIFICATES, CONDITIONS, COMPLIANCE, AND DOCUMENT SECTION

PC and Condition Number	Compliance	Section
Meadowbank PC 004, Condition 36 Cumberland shall ensure the placement of local area marine mammal monitors onboard all vessels transporting fuel or materials for the Project through Chesterfield Inlet.	In Compliance Local area marine mammal monitors have conducted surveys aboard vessels transiting between Chesterfield Inlet and Baker Lake between 2008 and 2019 and between 2022 to 2024. During 2020 and 2021, due to the COVID-19 pandemic, local monitors could not board vessels, and vessel crew conducted the monitoring.	1.6 Overview 3.4 Results
Meadowbank PC 004, Condition 41 Subject to vessel and human safety considerations, Cumberland shall require shippers carrying cargo to the Project through Chesterfield Inlet to follow the following mitigation procedures in the event that marine mammals are in the vicinity of the shipping activities: <ul style="list-style-type: none"> a. Wildlife will be given right of way; b. Ships will maintain a straight course, constant speed, and will avoid erratic behaviour; and c. When marine mammals appear to be trapped or disturbed by vessel movements, the vessel will stop until the mammals have moved away from the area. 	In Compliance In 2020, Agnico Eagle updated the maps and training materials outlining setbacks and mitigation measures to apply when marine mammals and seabirds are in the vicinity of shipping activities. These training materials were provided to Groupe Desgagnés and Woodward for distribution to all captains and bridge crew of vessels supplying Agnico Eagle Nunavut mines from 2020 through 2024. Where sufficient data are available, vessel tracks show vessels avoiding sensitive areas for marine wildlife.	1.3 Training 1.4 Mitigation 3.1 Results
Whale Tail PC 008, Condition 38 The Proponent shall ensure that marine shipping activities avoid sensitive wildlife habitat and species along the shipping route and use a routing south of Coats Island as the primary shipping route, subject to vessel and human safety considerations.	In Compliance In 2024, Agnico Eagle continued to emphasize the importance of routing south of Coats Island. However, due to safety concerns associated with inclement weather south of Coats Island, travel north of Coats Island was required on three occasions.	3.1 Results
Whale Tail PC 008, Condition 39 The Proponent shall ensure that, subject to vessel safety requirements, a setback distance of at least 500 m is maintained from colonies and aggregations of seabirds and marine mammals during Project shipping transiting through Hudson Strait, Hudson Bay, and Chesterfield Inlet.	In Compliance In 2020, Agnico Eagle updated the maps and training materials outlining setbacks and mitigation measures to be applied when marine mammals and seabirds are observed. These materials were provided to Groupe Desgagnés and Woodward for distribution to all captains and bridge crew of vessels supplying Agnico Eagle from 2020 through 2024. Vessel tracks, where sufficient data are available, show vessels avoiding sensitive areas for marine wildlife.	1.3 Training 1.4 Mitigation 3.1 Results

PC and Condition Number	Compliance	Section
Whale Tail PC 008, Condition 40 The Proponent shall develop and implement a ship-based marine mammal monitoring program, as part of a Marine Mammal Management and Monitoring Plan, in consultation with Fisheries and Oceans Canada, communities, and other interested parties. The Proponent shall report any accidental contact by project vessels with marine mammals or seabird colonies to applicable responsible authorities including Fisheries and Oceans Canada and Environment and Climate Change Canada.	In Compliance In 2020, Agnico Eagle updated the training materials for MMSO monitoring. These materials were provided to Groupe Desgagnés and Woodward for distribution to all captains and bridge crew of vessels supplying Agnico Eagle from 2020 through 2024. Results of MMSO monitoring show compliance with updated training materials. No vessel strikes with marine mammals or seabirds were reported.	1.3 Training 1.4 Mitigation 3.2 Marine Mammal Results 3.3 Seabird Results Appendices A, B, C (training documents including mitigation summary and standard operating procedures)
Meliadine PC 006, Condition 82 The Proponent shall require all contracted shipping companies to provide full-time marine wildlife monitoring using trained observers and established data collection and recording protocols. Monitoring plans should include provisions for all <i>Species At Risk Act</i> (2002) and for the Committee on the Status of Endangered Wildlife in Canada listed species (birds and mammals).	In Compliance In 2020, Agnico Eagle updated the training materials for MMSO monitoring. These materials were presented to Groupe Desgagnés and Woodward for distribution to all captains and bridge crew of vessels supplying Agnico Eagle from 2020 through 2024. Vessel companies assigned MMSO duties to dedicated crew members. Results of MMSO monitoring show compliance with updated training materials. No vessel strikes with marine mammals or marine birds were reported.	1.3 Training 1.4 Mitigation 3.2 Marine Mammal Results 3.3 Seabird Results
Meliadine PC 006, Condition 83 The Proponent shall ensure that, subject to vessel and human safety considerations, all Project shipping adhere to the following mitigation procedures while in the vicinity of marine mammals (including polar bear) and birds: <ul style="list-style-type: none"> a. Marine mammals will be given right of way; b. Ships will, when possible, maintain a straight course and constant speed, avoiding erratic behaviour; and c. When marine mammals appear to be trapped or disturbed by vessel movements, the vessel will implement appropriate measures to mitigate disturbance, including stoppage of movement until wildlife have moved away from the immediate area. 	In Compliance In 2020, Agnico Eagle updated the maps and training materials outlining setbacks and mitigation measures to apply when marine mammals and seabirds are observed. These materials were provided to Groupe Desgagnés and Woodward for distribution to all captains and bridge crew of vessels supplying Agnico Eagle Nunavut mines from 2020 through 2024. Vessel tracks, where sufficient data are available, show vessels avoiding sensitive areas for marine wildlife.	1.3 Training 1.4 Mitigation 3.1 Results

Notes:

Agnico Eagle = Agnico Eagle Mines Limited; Desgagnés = Groupe Desgagnés; MMSO = Marine Mammal and Seabird Observer; m = metre;
 PC = Project Certificate; Woodward = Woodward Group and Companies



Setbacks from Sensitive Habitats

In compliance with Term and Condition 39 of Whale Tail Mine Certificate No. 008, Project vessels must follow a setback distance of 500 metres (m) from colonies and aggregations of seabirds and marine mammals while transiting through the Hudson Strait, Hudson Bay, and Chesterfield Inlet. In addition, vessels must follow a setback distance of 2 km from Marble Island, as per Meliadine's Shipping Management Plan (Agnico Eagle 2022b).

Vessel tracks and identified sensitive areas for wildlife were mapped. Where detailed data were available, vessels were shown to avoid these areas where safe to do so. Groupe Desgagnés and/or Woodward vessel tracks crossed through the 2 km setback polygon at Marble Island on three occasions. Agnico Eagle continues to train vessel captains regularly and remind them of the importance of maintaining sensitive habitat buffers prior to shipping season.

Vessel Mitigation

Vessels are required to transit south of Coats Island whenever the weather is safe to do so. The majority (87 percent [%]) of vessels servicing the Meadowbank and Meliadine projects in 2024 travelled south of Coats Island. Vessels traveled north of Coats Island on three occasions, two in July due to unfavorable sea conditions along the route, and one in October due to inclement weather.

Marine Mammal Monitoring

In 2024, 62 transect and 88 stationary surveys for marine mammals were completed. There was a total of 23 marine mammal sightings (9 during surveys and 14 incidentally) during the 2024 shipping season, compared to 20 (surveys and incidentally) in 2023. Between 2017 and 2024, the majority of marine mammal sightings were recorded in the Hudson Strait or near Marble Island and Chesterfield Inlet. The number of marine mammal sightings was too low to allow for density analysis to be conducted. Groupe Desgagnés and Woodward did not record any marine mammal–vessel interactions (e.g., strikes) in 2024 or in previous years (2017 through 2023).

Seabird Monitoring

No accidental contact between vessels and seabirds was recorded in 2024 or in previous years. In 2024, a total of 97 transects and 136 stationary surveys were completed.

In 2024, 1,339 birds were recorded during moving vessel surveys. Among the 1,339 birds recorded, 22 different species were identified, with 7 different species remaining unidentified. The most common species recorded in 2024 during moving vessel surveys were razorbill ($n = 726$) and northern fulmar ($n = 150$). Seabird detectability and density were estimated using models that account for lower detectability of birds with greater distance from survey transects. Detectability estimates were mostly consistent between years, with the highest estimate in 2022, followed by 2024. Differences in estimated density reflect variability in the effort and number of birds detected between years.

During stationary surveys in 2024, 530 seabird sightings were recorded, belonging to 10 identified species and 5 unknown species. The most commonly recorded species were herring gull ($n = 290$),

unknown duck ($n = 75$), and razorbill ($n = 58$). The detection estimate for stationary seabird surveys were lower in 2024 than in previous years.

Marine Wildlife Observations—Baker Lake

Agnico Eagle conducts a program that involves community wildlife observers on barges ferrying supplies between Helicopter Island and Baker Lake within Chesterfield Inlet. Community wildlife observers record wildlife sightings incidentally. In 2024, local wildlife monitors were on the vessels for a total of 37 days in August, September, and October between Helicopter Island and Baker Lake. Wildlife were observed on 338 occasions in 2024. There were 331 separate sightings of birds (a total of 1,138 individuals) and 1 sighting of an unknown seal species (1 individual). The most frequently recorded birds were unknown gull/tern species. Additional terrestrial wildlife species were observed, including 1 sighting of caribou (6 individuals), 3 sightings of muskox (21 individuals), and 2 sightings of fox (2 individuals).

In addition to community wildlife observers, the shipping companies continued to record marine wildlife sightings while vessels were travelling between Helicopter Island and Baker Lake to supplement the community observer effort. In 2024, crew members onboard the Tuvaq W. recorded one incidental sighting of a harbour seal on 12 August while transiting between Helicopter Island and Baker Lake. In addition, the Tuvaq W. completed 15 seabird surveys, 13 of which had sufficient survey effort information (129 km of surveys with an average of 9.9 km per survey) in 2024, and 54 seabirds (9 different species) were observed during these surveys.

Vessels also completed stationary surveys while anchored at Helicopter Island. In 2024, there were 54 stationary surveys completed for marine mammals at Helicopter Island; however, no marine mammals were observed during the surveys. For seabirds, 79 stationary surveys were completed, (49 of which had survey effort recorded), and 25 seabirds were recorded (6 different species).

1. INTRODUCTION

1.1 PROJECT BACKGROUND

Agnico Eagle Mines Limited (Agnico Eagle) operates two mines in eastern Nunavut: the Meadowbank Complex (Meadowbank Mine and Whale Tail Mine) and the Meliadine Mine. Agnico Eagle contracts the shipping company Groupe Desgagnés to ship cargo and contracts Woodward Group and Companies (Woodward) to ship fuel from Bécancour, Quebec, to its Nunavut Operations. Since 2017, Agnico Eagle has required shipping companies to conduct vessel-based monitoring of marine mammals and seabirds.

This Marine Mammal and Seabird Observer (MMSO) Annual Report summarizes results of the 2024 shipping season and includes results from previous years (2018 through 2023). The MMSO monitoring program and report satisfy the following Project Certificate (PC) conditions from the Nunavut Impact Review Board (NIRB):

- Whale Tail NIRB PC No. 008, Terms and Conditions 38, 39, and 40 (NIRB 2020);
- Meliadine Mine NIRB PC No 006, Terms and Conditions 82 and 83 (NIRB 2022); and
- Meadowbank NIRB PC No. 004, Terms and Conditions 36 and 41 (NIRB 2018).

This monitoring program is described in:

- The Meadowbank Complex Shipping Management Plan (SMP) Version 4 (Agnico Eagle 2022a); and
- The Meliadine Shipping Management Plan Version 9 (Agnico Eagle 2022b).

As initiated in 2020, since the requirements for the Meadowbank Complex and Meliadine Mine are very similar, the 2024 MMSO Annual Report addresses reporting for both projects.

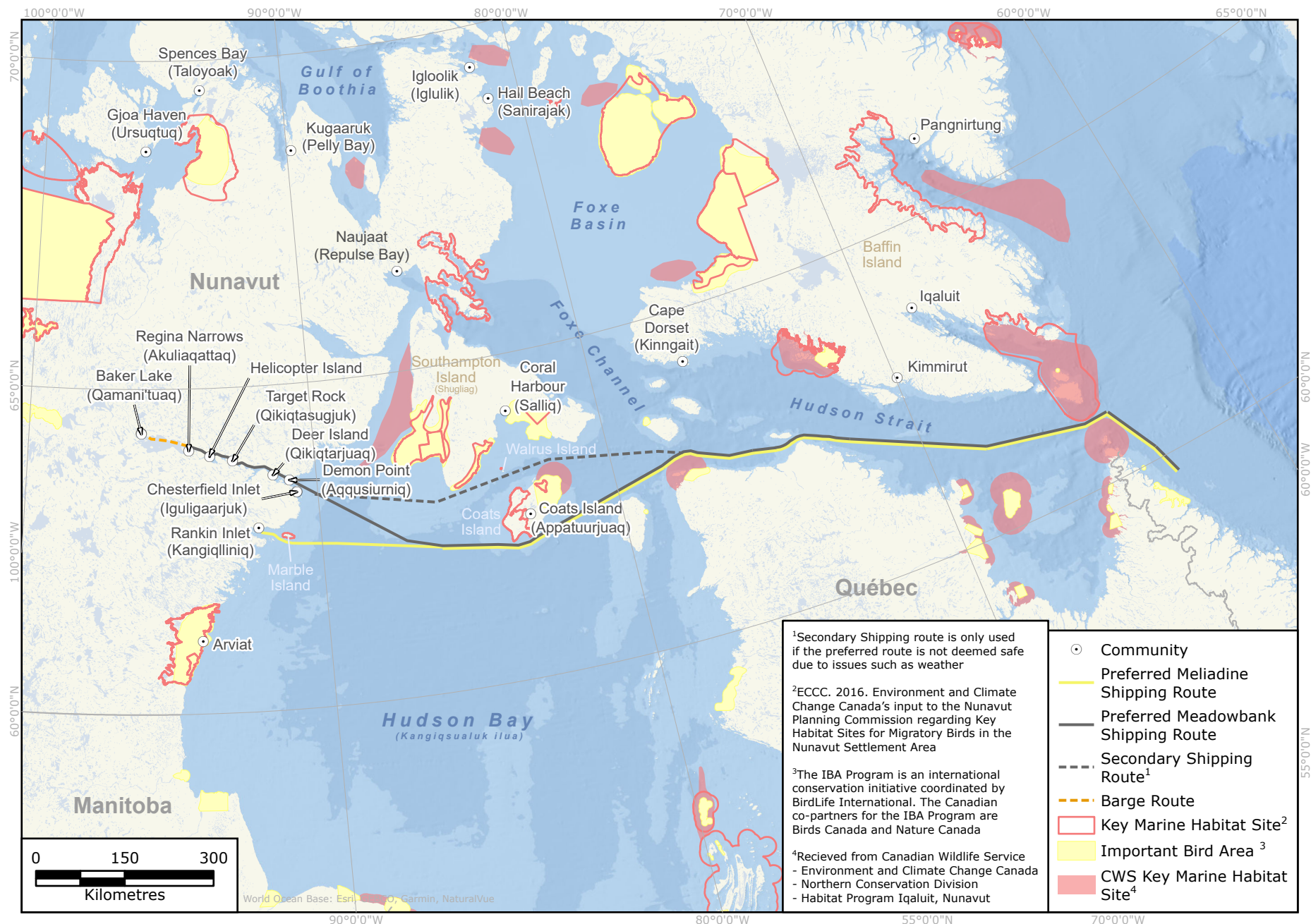
1.1.1 AGNICO EAGLE MEADOWBANK COMPLEX

Agnico Eagle Meadowbank Complex operates the Meadowbank Mine and Whale Tail Mine (Figure 1.1-1). The Meadowbank Complex holds NIRB PC Nos. 004 and 008.

Shipping is carried out during the open water season (typically from July to late October) and follows recommended established shipping routes for the annual sea lift to Chesterfield Inlet, Baker Lake, and other communities. The shipping route extends through the Hudson Strait and across Hudson Bay to Chesterfield Inlet (Figure 1.1-2). At Helicopter Island in Chesterfield Inlet, dry cargo is lightered onto tug-assisted barges, and fuel is lightered onto smaller shuttle tankers for Groupe Desgagnés and/or Woodward through the Baker Lake access passage (Chesterfield narrows, south channel) to the Meadowbank Mine barge unloading facilities and the laydown area in Baker Lake.

To satisfy Term and Condition 36 of Meadowbank Mine PC No. 004, a local area marine wildlife monitor is required to be onboard all vessels transporting fuel or materials for the Meadowbank Mine through Chesterfield Inlet.

FIGURE 1.1-2 MARINE MAMMAL AND SEABIRD OBSERVER PROGRAM STUDY AREA ALONG SHIPPING ROUTE TO MELIADINE MINE AND MEADOWBANK COMPLEX



CLIENT: Agnico Eagle Mines Limited
GIS NUMBER: AEG-15-076-02

DATE: 03/03/2025

PROJECTION: Canada Lambert Conformal Conic
SCALE: 1:9,000,000 when printed at 8.5x11

Term and Condition 39 of Whale Tail Mine Certificate No. 008 requires that Project vessels must follow a setback distance of 500 m from colonies and aggregations of seabirds and marine mammals while transiting through the Hudson Strait, Hudson Bay, and Chesterfield Inlet.

1.1.2 AGNICO EAGLE MELIADINE DIVISION

Agnico Eagle Meliadine Division operates the Meliadine Mine (Figure 1.1-1). The Meliadine Mine holds the NIRB PC No. 006.

Shipping is carried out during the open water season (typically from July to late October) and follows established shipping routes for the annual sea lift to Rankin Inlet and other Kivalliq communities. The shipping route study area extends through Hudson Strait and across Hudson Bay to Rankin Inlet, with vessels anchoring either outside or inside Melvin Bay (Figure 1.1-2).

1.1.3 MARINE MAMMAL AND SEABIRD OBSERVER ANNUAL REPORT OVERVIEW

This MMSO Annual Report provides an overview of the following:

- Training, mitigation, and monitoring required on vessels (Sections 1.3, 1.4, and 1.5);
- The vessels that supplied Meadowbank Complex and Meliadine Mine in 2024 (Section 3.1);
- Mitigation measures conducted by these vessels, including setbacks from sensitive habitats, travelling south of Coats Island, and avoiding marine mammals and seabirds observed at sea (Sections 3.1.1, 3.1.2, and 3.1.3);
- Marine mammal monitoring conducted from 2017 to 2024 (2017 was for Meliadine Mine only; Section 3.2);
- Seabird monitoring conducted from 2018 to 2024 (Section 3.3); and
- Community surveys carried out between Helicopter Island in Chesterfield Inlet and the Hamlet of Baker Lake from 2008 to 2024 (Section 3.4).

1.2 OBJECTIVES

The Meadowbank and Meliadine SMPs outline an MMSO program within the Meadowbank Complex Marine Mammal and Seabird Management and Monitoring Plan (Agnico Eagle 2022c) and Meliadine Marine Environmental Management Plan (Agnico Eagle 2022d) that is implemented by Agnico Eagle shipping contractors (Agnico Eagle 2022a, 2022b). Groupe Desgagnés and Woodward are required to implement an MMSO program during shipping activities in the marine Regional Study Area (Hudson Strait through Hudson Bay) and in Chesterfield Inlet.

The objectives of the MMSO program are to:

- Mitigate interactions between marine mammals and seabirds and project vessels;
- Collect information on marine wildlife presence along the shipping route; and
- Engage local community members to record sightings of wildlife opportunistically while travelling through Chesterfield Inlet.

As the MMSO -related Terms and Conditions are similar for the Meadowbank Complex and Meliadine Mine, the MMSO Program is presented in one consolidated report in 2024, as has been done since 2020. This report presents a summary of the MMSO data collected by Groupe Desgagnés, Woodward, and local MMSO monitors onboard their vessels during the 2024 MMSO Program to provide information to support Agnico Eagle's 2024 annual reports to the NIRB. This report also includes a summary of all data collected between 2017 and 2024.

1.3 MARINE MAMMAL AND SEABIRD OBSERVER TRAINING

Training provided by Agnico Eagle for the assigned MMSOs was updated in 2020. Minor updates to the seabird datasheets were completed in 2021, 2022, and 2023. The seabird standard operating procedure (SOP) was updated in 2023 following comments from Environment and Climate Change Canada to encourage MMSOs to improve data collection using 5-minute survey intervals for seabird surveys (see survey methods in Section 2.3). In 2024, Agnico Eagle held virtual meetings with Groupe Desgagnés and Woodward prior to the shipping season to remind the crews of obligations related to the MMSO Program (PC requirements, mitigation, etc.) and the importance of the program for compliance. Training was also provided to vessel captains and crew, and monthly meetings were held with the shipping companies to provide additional recommendations and feedback on data collection. The enhanced training materials included the following:

- A Marine Shipping Management Plan Summary Brochure (Appendix A), to be reviewed by all captains and MMSOs and to be kept by captains onboard the vessel for reference. This document summarizes guidelines for operation of vessels (e.g., how to transit near animals and preferred routes), mitigation measures for captains based on Section 4.2 of the SMPs, as well as a summary of the monitoring program and survey techniques.
- A pre-trip training presentation/webinar to be reviewed by vessel crew members. The recorded webinar is also available on the ship for MMSOs to review, as needed.
- The Marine Mammal Monitoring SOP (Appendix B) and the Seabird Monitoring SOP (Appendix C), to be understood for proficiency, detailing the methods for marine mammal and seabird surveys.
- Identification guides and updated posters provided for MMSOs and crew to learn to identify marine mammals and seabirds.
- Marine Mammal Sightings Form, Seabird Sightings Form, Incidental Marine Wildlife Sightings Form, and Marine Mammal and Seabird Observer (MMSO) Incident Report Form (Attachments in Appendices B and C) to be completed by MMSOs and captains.
- A one-page fact sheet for marine mammal surveys and a one-page fact sheet for seabird surveys to emphasize survey methodologies for the MMSOs.

In addition, the Marine Mammal Sightings Form, Seabird Sightings Form, Incidental Marine Wildlife Sightings Form, and the MMSO Incident Report Form have been updated between 2020 and 2024 to improve data collection and simplify the process for the MMSOs onboard the vessels. These data sheets are provided as attachments within Appendices B and C.

1.4 MARINE MAMMAL AND SEABIRD MITIGATION

PCs 004, 006, and 008 require vessels supplying the Meadowbank Complex and Meliadine Mine to avoid sensitive marine mammal and seabird habitats such as haul outs and breeding colonies. Mitigation and management measures (summarized from Section 4.2 of the SMPs for Meadowbank Complex and Meliadine Mine; Agnico Eagle 2022a, 2022b) include the following:

- General navigational requirements while travelling through Hudson Strait to Helicopter Island or Rankin Inlet include the following:
 - Ships will, when possible, maintain a straight course and constant speed and avoid erratic behaviour;
 - Marine mammals will be given right of way as safe navigation allows;
 - The ship will not be operated in such a way as to separate (an) individual member(s) of a group of marine mammals from other members of the group;
 - Ships will maintain the required setback distances (500 m) around marine mammals and seabirds on land;
 - Ships will use routing south of Coats Island as the primary shipping route;
 - Ships travelling for the Meliadine Mine will remain at least 2 km from Marble Island to avoid disturbing seals, walruses, and marine birds that might be in the vicinity; and
 - Ships will maintain the required setback distances around marine mammals and seabirds in the water (between 100 and 500 m, depending on group size or behaviour of animals; see Appendix A).
- As part of the shipping companies' SOPs, ship crews will monitor for marine mammals and seabirds from Hudson Strait to the lightering point near Helicopter Island (Meadowbank) or Rankin Inlet (Meliadine).
- The ship's Master will be notified if there is a concern of the ship striking a marine mammal.
- Ship personnel are required to take actions to avoid a possible collision by implementing management measures (e.g., reduce speed and/or stop the vessel until the animal moves away), if safe to do so.
- If a collision occurs, the appropriate people will be contacted, and the incident will be documented.

The vessel routes and their avoidance of sensitive wildlife areas, as well as observations of marine mammals and seabirds that would trigger mitigation and the mitigation that occurred, if any, are provided in Section 3.

1.5 MARINE MAMMAL AND SEABIRD MONITORING

The MMSO Program was developed to meet commitments made during the NIRB hearings related to marine shipping. The MMSO Program is required to be conducted during all routine shipping activities along the shipping route from Hudson Strait to the Project. The marine mammal and seabird monitoring is conducted by the ship's crew, and methods are provided in Section 2 and Appendices B and C. Results of MMSO monitoring at sea are reported in Sections 3.2 and 3.3.

1.6 MARINE WILDLIFE OBSERVATIONS—BAKER LAKE

To satisfy Term and Condition 36 of Meadowbank Mine PC No. 004 a local area marine wildlife monitor is required onboard all vessels transporting fuel or dry cargo for the Meadowbank Mine on barge shipping between Helicopter Island and Baker Lake. Local area marine wildlife observers record all observations of wildlife as incidental sightings. These results are presented in Section 3.4.

In addition to local monitors, both Groupe Desgagnés and Woodward MMSOs continued to complete marine wildlife observations between Helicopter Island and Baker Lake. These results are presented in Sections 3.2 and 3.3 and summarized in Section 3.4.1.

2. METHODS

Groupe Desgagnés and Woodward crew members were assigned MMSO duties and trained to complete the surveys following the SOPs (Appendices B and C) and in accordance with the methods outlined in the SMPs (Agnico Eagle 2022a, 2022b). These methods are summarized below and described in detail in Appendices B and C.

2.1 VESSEL TRACKS

Agnico Eagle provided ERM Consultants Canada Ltd. with a list of vessel names and dates of delivery for shipments to Meadowbank Complex and Meliadine Mine. Transport Canada requires each vessel to transmit Automatic Identification System (AIS) data via a transceiver onboard. Other vessels and Vessel Traffic Services use these data to monitor vessel movements. ERM Consultants Canada Ltd. acquired archived AIS data from Vesseltracker, a commercial AIS supplier that aggregates AIS data from satellite and shore-based stations. These data vary in frequency, based on distance from shore, location of shore-based stations, and position of satellites. In some cases, AIS position data are available on an hourly or sub-hourly basis, but in other cases, position data can include 12 hours or more between fixes.

Tracks for the vessel names and dates Agnico Eagle provided were downloaded from Vesseltracker (2024) and plotted using ArcGIS Pro 3.3.2. Only vessels travelling to Meadowbank Complex or Meliadine Mine are presented in this report. Important bird areas and marine mammal aggregations were buffered by 500 m, and Marble Island was buffered by 2 km, as defined by the SMPs (Agnico Eagle 2022a, 2022b), to establish setback polygons. A geographic information system (GIS) was used to perform an overlay and Near analysis to identify which lines and points intersected or were in close proximity to these buffered areas.

2.2 MARINE MAMMALS

Marine mammal surveys were completed while the vessels were travelling to Agnico Eagle mines. The dedicated MMSO carried out surveys from a high location on the vessel, either on the bow or in the wheelhouse, depending on the weather. One to three surveys were completed daily. It is recommended that marine mammal surveys last for a minimum of 1.5 hours to not more than 2 hours to mitigate observer fatigue and eyestrain. A precise scan routine is carried out throughout the marine mammal observation period, as described in the MMMMP and the Marine Mammal Survey SOP (Agnico Eagle 2022c, 2022d; Appendix B).

Marine mammals observed during the survey periods were recorded on the Marine Mammal Sightings Form (Appendix B), including Global Positioning System (GPS) location, distance to animal, angle to animal, number of individuals, species, and behaviour. If a marine mammal had been observed during the voyage outside of the dedicated marine mammal observation period (i.e., off-effort), this was recorded as an incidental sighting on the Incidental Marine Wildlife Sightings Form (Appendix B).

Further details regarding survey methods for marine mammals are provided in the SOP provided in Appendix B, and within the MMMMP (Agnico Eagle 2022c, 2022d).

2.2.1 MARINE MAMMAL DATA ANALYSIS

This section outlines the methods used to summarize the environmental conditions, observer effort, and marine mammal sightings related to the information recorded by Groupe Desgagnés and Woodward. Not enough marine mammal sightings were recorded during the MMSO programs to conduct a density analysis. However, the possibility for a density analysis will be revisited annually.

2.2.1.1 TEMPORAL AND SPATIAL OBSERVATION EFFORT

Temporal (hours) and spatial (km) survey effort are the effort dedicated to marine mammal surveys as recorded by Groupe Desgagnés and Woodward on the MMSO datasheets. Spatial effort was calculated as linear kilometres using GPS coordinates that were recorded at the start and end of each MMSO survey transect. To determine temporal effort (i.e., the time spent completing marine mammal surveys), start and end times were recorded on the datasheets. If a start or end location, or a start or end time was not entered in the datasheet, then spatial and/or temporal effort could not be calculated for that survey and was excluded from the survey effort.

2.2.1.2 ENVIRONMENTAL VARIABLES

During surveys, environmental variables were recorded on the datasheets. These variables included wind speed and direction, sea state (Beaufort scale), weather (e.g., precipitation and cloud conditions), visibility (in km), and sun glare. Environmental variables were summarized as a percentage of survey time.

2.3 SEABIRDS

Dedicated MMSOs were directed to complete surveys from moving and stationary platforms according to the Eastern Canada Seabirds at Sea (ECSAS) standardized protocol for pelagic surveys from moving and stationary platforms (Gjerdrum et al. 2012). The dedicated MMSOs conducted surveys for seabirds from a high location on the vessel, either on the bridge or in the wheelhouse, depending on the weather. Surveys were carried out at the same location on the vessel as much as possible. Surveys are best completed along a transect line; therefore, it is best to start a seabird observation period when the vessel is and will be moving in a straight line for an extended period (refer to Moving Vessel Surveys, Section 2.4.3 of Appendix C). If the vessel is stationary (e.g., anchored) for a day or a portion of the day, then a seabird survey will be required while anchored to ensure that the minimum of one survey per day is met (refer to Stationary Vessel Survey, Section 2.4.4 of Appendix C).

For both survey types (moving and stationary), binoculars or spotting scopes were used to confirm species identification and other observation details when necessary. All seabirds observed during surveys were recorded, including species, number of individuals, location (in flight or on water), distance to the vessel, breeding plumage, and behaviour. Additional information regarding the seabird surveys can be found in Appendix C.

MMSOs were directed to complete each seabird survey period on a moving vessel during six consecutive 5-minute periods, repeated three times a day to capture morning, afternoon, and evening periods, when possible. A precise scan routine was conducted within 300 m from the vessel, as described in the MMMMP and the Seabird Survey SOP (Agnico Eagle 2022c, 2022d;

Appendix C). All birds observed within this 300 m transect, whether flying or on the water, were recorded and considered in-transect sightings.

Stationary vessel surveys were carried out as a 180 degrees semi-circle scan of the surrounding area from the front (bow) of the vessel. All birds observed within 300 m were recorded and considered to be in the transect. The survey interval ended when all seabirds within the semi-circle had been recorded. If no seabirds were seen during the initial scan, the survey was considered complete.

During the voyage, if a seabird was observed outside of the dedicated seabird observation period (i.e., off-effort), this was recorded as an incidental sighting on the Incidental Marine Wildlife Sightings Form (Appendix B).

2.3.1 SEABIRD DATA ANALYSIS

2.3.1.1 TEMPORAL AND SPATIAL OBSERVATION EFFORT

Starting in 2022, crew member training focused on emphasizing 5-minute interval surveys, as per the ECSAS standardized protocol for pelagic surveys from moving and stationary platforms (Gjerdrum et al. 2012). Shipping companies recorded the start and end times and positions for each 5-minute interval of a survey (for moving vessel surveys). Each survey consisted of six 5-minute intervals. Survey effort was summarized by incorporating all six intervals. However, each 5-minute interval was considered separately for distance models, because the precise start and end locations are required for modelling.

For seabird surveys, the number of survey hours and kilometres surveyed were recorded as indices of effort. Spatial effort is recorded for moving vessel surveys only, while temporal effort is reported for both moving vessel and stationary vessel surveys. Seabird spatial effort was calculated as linear kilometres using GPS coordinates recorded by Groupe Desgagnés and Woodward at the start and end of each survey interval. Start and end times recorded on datasheets were used to determine temporal effort (i.e., the time spent completing the seabird surveys).

2.3.1.2 ENVIRONMENTAL VARIABLES

Environmental conditions were recorded on survey datasheets, namely wind speed (Beaufort scale) and direction, sea state, weather (e.g., precipitation and cloud conditions), visibility, and sun glare. Environmental variables were summarized according to the number of seabird detections so that any trends with poorer weather or visibility conditions could be visually assessed.

2.3.1.3 DATA ANALYSIS

Distance analyses estimate the diminishing detectability of objects (e.g., birds) with greater distance from observers. For example, a bird flying within 50 m is more likely to be seen and identified than a bird flying 300 m away from an observer. Because birds at greater distances are more likely to be missed during surveys, the number of birds recorded does not represent the true abundance of birds in the area. Distance models take these detectability changes into account and allow for a more accurate estimation of seabird density (Buckland et al. 2001). Distance software adapted for R (Distance package v 1.0.7, run on R v 4.1.1; Miller et al. 2019; R Core Team 2021) was used for

analysis of seabird data. Distance analysis involves two steps: 1) model fitting for detectability curve, and 2) density estimates (for moving vessel surveys), as described below.

Prior to completing the distance analysis, the observation data were binned into distance categories for analysis: 0 to 50 m, 50 to 100 m, 100 to 200 m, and 200 to 300 m. The closest distance bins were further investigated for grouping in case evasive movements were causing an abnormal detection distribution (e.g., if there were more sightings further than 50 m away because birds dove or flew away as the ship approached); however, no abnormal detection distribution was observed. Therefore, no changes were required to the distance binning categories.

Distance model selection did not include environmental variables, due to low sample size limiting modelling fitting capabilities (Buckland et al. 2001). To determine if any major anomalies were present with poor weather (e.g., rain, snow or fog), a visual assessment of variation in detection rate according to environmental variables was conducted.

Model key functions are first fit to the data to determine which model best describes the observed change in detection with distance (the detectability). The three main key functions are hazard rate, half-normal, and uniform. Hazard rate curves indicate that detection rates remain high at closer distances (i.e., birds are just as likely to be detected between 0 and 100 m of an observer) but drops off steeply as distance increases beyond 100 m. Half-normal curve detection rates decrease slightly up to a certain distance, at which the detection rate decreases rapidly (i.e., the likelihood of a bird being detected between 0 and 100 m decreases slightly and decreases drastically past 100 m; Miller et al. 2019). These key functions can have additional adjustment terms that refine the main model fit, namely cosine, simple polynomial, and hermite polynomial adjustments. All model key function and adjustment combinations were tested to ensure model fit. Models accounted for variable detection according to group size. Analyses included only on-transect sightings and did not use re-sightings of the same birds or incidental survey intervals that were missing effort data.

Models were selected using the minimum Akaike's Information Criterion (AIC; Akaike 1973). The AIC is a number that is helpful for comparing models, as it includes measures of both how well the model fits the data and how complex the model is (simpler is usually better). The top models were identified as having a low AIC and were within a two-unit difference in AIC (Δ AIC is less than or equal to 2) of the top-ranked model (i.e., the model with the lowest AIC; Burnham and Anderson 2004). This is the industry standard for identifying models that are essentially "equally good" at explaining the data. Models with a difference in AIC (Δ AIC) of two to four from the top model are generally considered to have "limited support" (Burnham and Anderson 2004). Top models were also checked for adequate goodness of fit indices, including plotting model curves against the data.

The density of seabirds was estimated via distance modelling from moving vessel surveys, and density estimates are presented as individuals per square kilometre (km²). Seabird density is not calculated for stationary vessel surveys because points lack spatial effort, and, despite multiple surveys per point, the data are too sparse to model.

2.4 MARINE WILDLIFE OBSERVATIONS—BAKER LAKE

When transporting equipment and fuel from Bécancour to Baker Lake, deep-water vessels can enter Chesterfield Inlet but must stop at Helicopter Island at the west end of the inlet. The material is then loaded aboard barges, and tugs move the barges through the narrow passage connecting Chesterfield Inlet to Baker Lake, and then on to the hamlet of Baker Lake.

To satisfy Term and Condition 36 of Meadowbank Mine PC No. 004, a local area marine wildlife monitor is required onboard all vessels transporting fuel or materials for the Meadowbank Complex on barge shipping between Helicopter Island and Baker Lake. Local area marine wildlife observers record all observations of wildlife as incidental sightings. Note that in 2020 and in 2021, community members were not permitted to board vessels due to health and safety restrictions in place related to the COVID-19 pandemic. Therefore, during those years, Groupe Desgagnés and Woodward had their MMSOs record sightings of marine mammals and seabirds when possible while travelling on the barge, following methods described in Sections 2.2 and 2.3. Local monitors completed the marine wildlife surveys in 2024. Additional surveys completed by Groupe Desgagnés and Woodward MMSOs are presented in Sections 3.2 and 3.3 and summarized in Section 3.4.1.

3. RESULTS

3.1 SHIPPING ACTIVITY IN 2024

During the 2024 shipping season, a total of 23 vessels, (2 that were tugs, 11 that were cargo, and 10 that were fuel) travelled to Meadowbank (7 vessels), Meliadine (7 vessels), or to both Meadowbank and Meliadine (9 vessels) between 26 June and 19 November 2024 (Table 3.1-1; Figures 3.1-1 through 3.1-5). Vessel tracks broadcast using AIS vessel positioning were downloaded from Vesseltracker (2024) and plotted using ArcGIS Pro 3.3.2.

TABLE 3.1-1 SUMMARY OF GROUPE DESGAGNÉS AND WOODWARD VESSELS DURING THE SHIPPING SEASON, JULY TO NOVEMBER 2024

Vessel Name	Fuel or Cargo	Project and Number of Trips			Total Trips
		Meadowbank	Meliadine	Meadowbank and Meliadine	
Kivalliq W	Fuel	-	-	2	2
Kitikmeot W	Fuel	-	1	-	1
Tuvaq W ^a	Fuel	2	-	-	2
Marlin Hera	Fuel	-	-	2	2
Qikiqtaaluk W ^b	Fuel	-	2	1	3
Nordika Desgagnés	Cargo	-	2	1	3
Atlantic Elm Tug ^c	Cargo	1	-	-	1
Atlantic Beech Tug ^c	Cargo	1	-	-	1
Marcellin A. Desgagnés	Cargo	-	1	1	2
Berthe A. Desgagnés	Cargo	1	-	-	1
Acadia Desgagnés	Cargo	-	1	-	1
Miena Desgagnés	Cargo	2	-	1	3
Zeleda Desgagnés	Cargo	-	-	1	1
Total		7	7	9	23

Notes:

Groupe Desgagnés = Groupe Desgagnés, Inc.; Woodward = Woodward Group and Companies

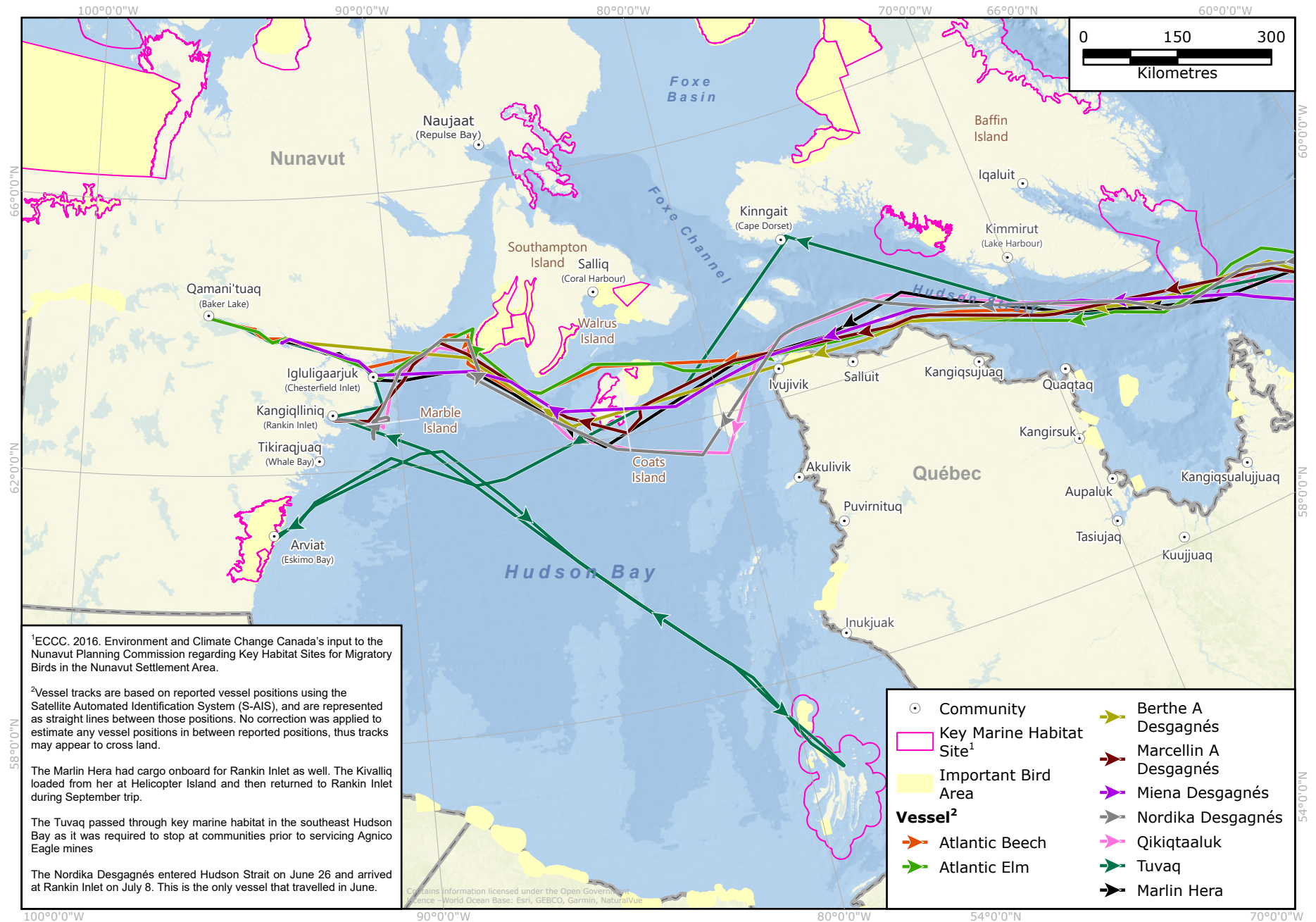
Dashes (-) indicate none observed.

^a Between 29 July and 2 September, and between 22 October and 28 October, the Tuvaq W. also transited between Helicopter Island and Baker Lake for the Meadowbank Complex; however, these transitions are not included as separate trips due to the nature of the vessel transiting only locally during these times.

^b The Qikiqtaaluk W. loaded off the Seaways Mia, which was anchored at Grosswater Bay off the coast of Labrador.

^c Between July and October, the Atlantic Elm and Atlantic Beech tugs were also transiting between Helicopter Island and Baker Lake for the Meadowbank Complex; however, these are not all considered separate trips due to the nature of the tugs transiting only locally.

FIGURE 3.1-1 GROUPE DESGAGNÉS AND WOODWARD SHIPPING TRACKS, JUNE & JULY 2024



CLIENT: Agnico Eagle
GIS NUMBER: AEG-23-035-01

DATE: 03/17/2025

PROJECTION: Canada Lambert Conformal Conic
SCALE: 1:8,500,000 when printed at 8.5x11

FIGURE 3.1-2 GROUPE DESGAGNÉS AND WOODWARD SHIPPING TRACKS, AUGUST 2024

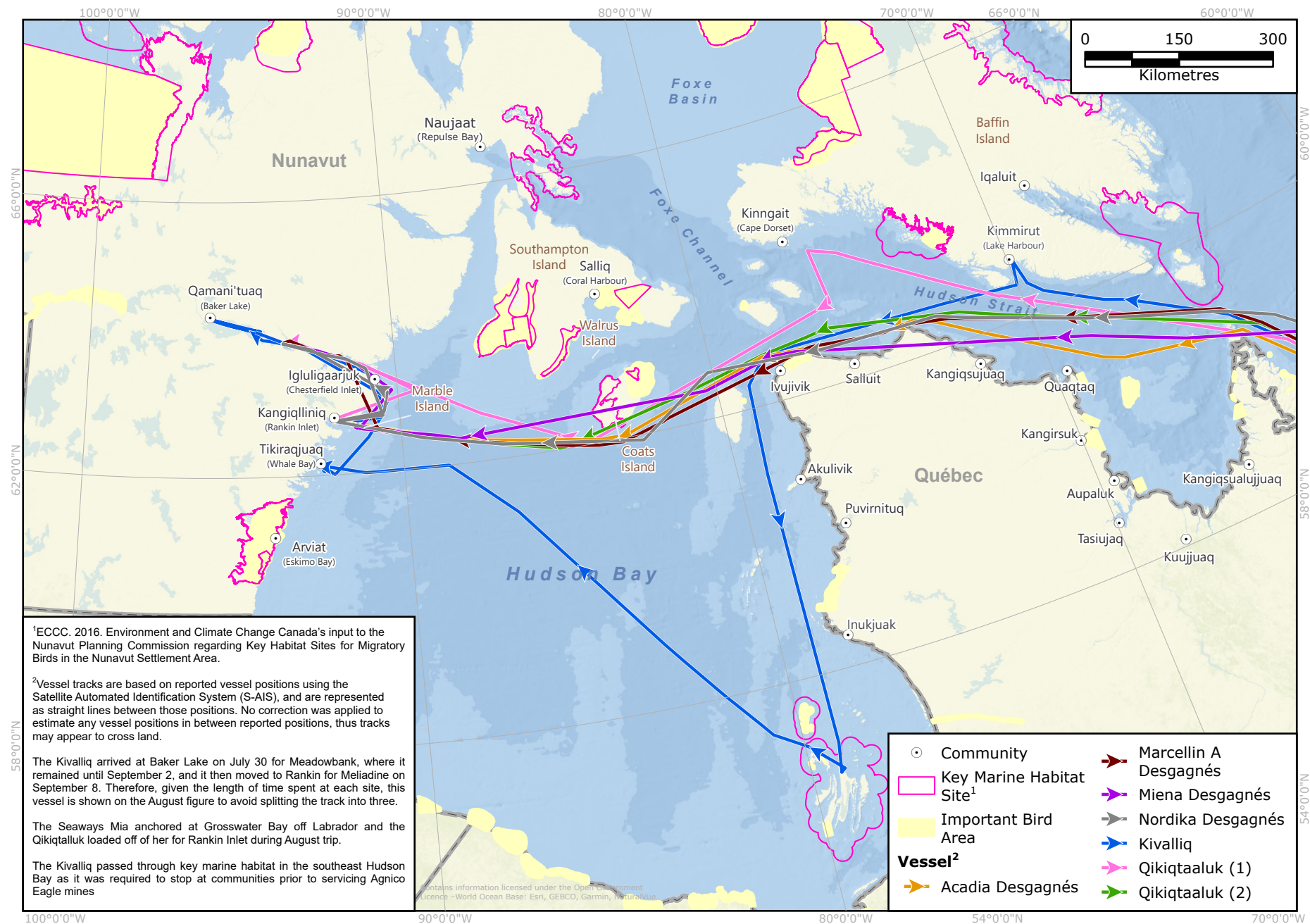


FIGURE 3.1-3 GROUPE DESGAGNÉS SHIPPING TRACKS, SEPTEMBER 2024

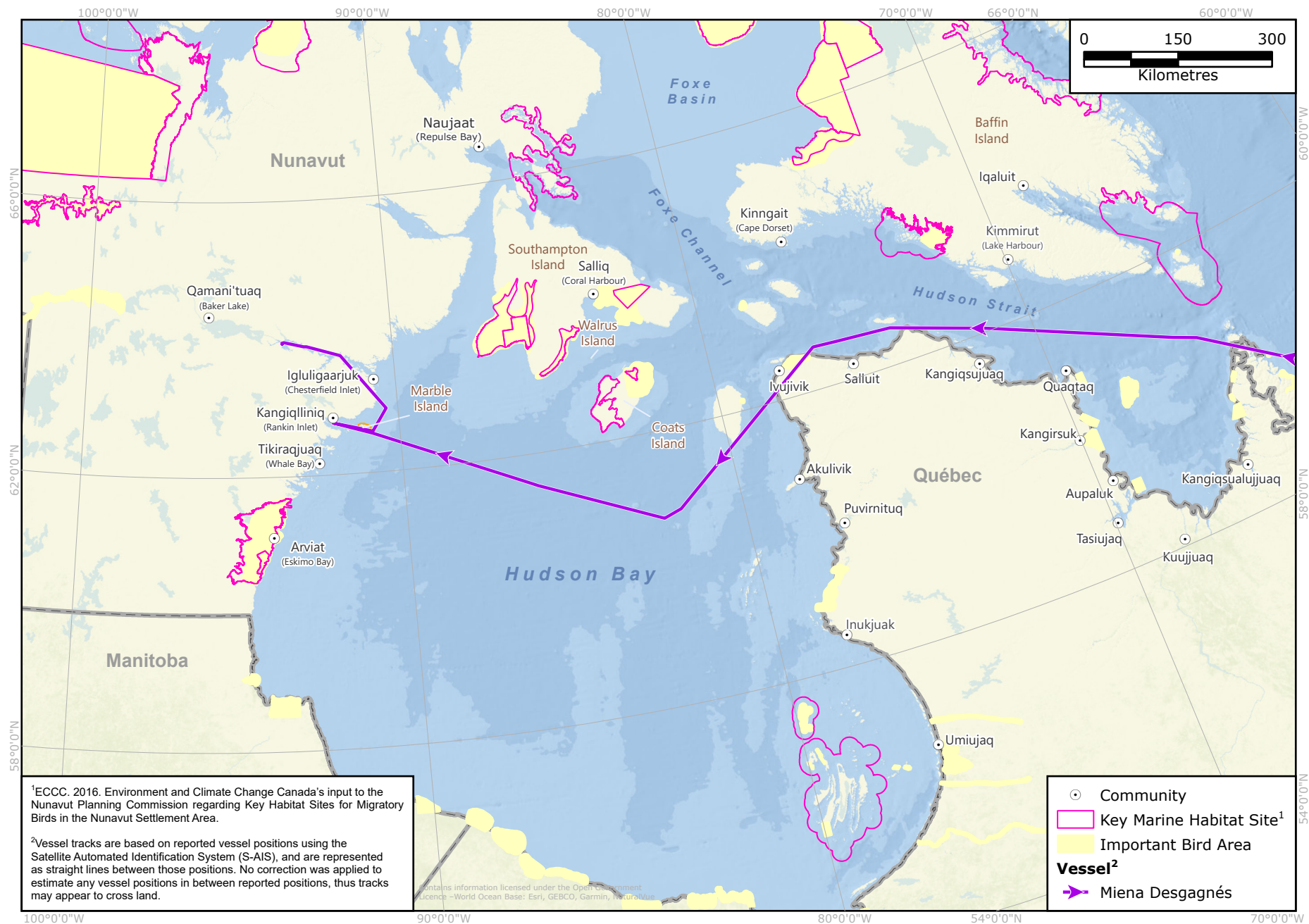


FIGURE 3.1-4 GROUPE DESGAGNÉS AND WOODWARD SHIPPING TRACKS, OCTOBER 2024

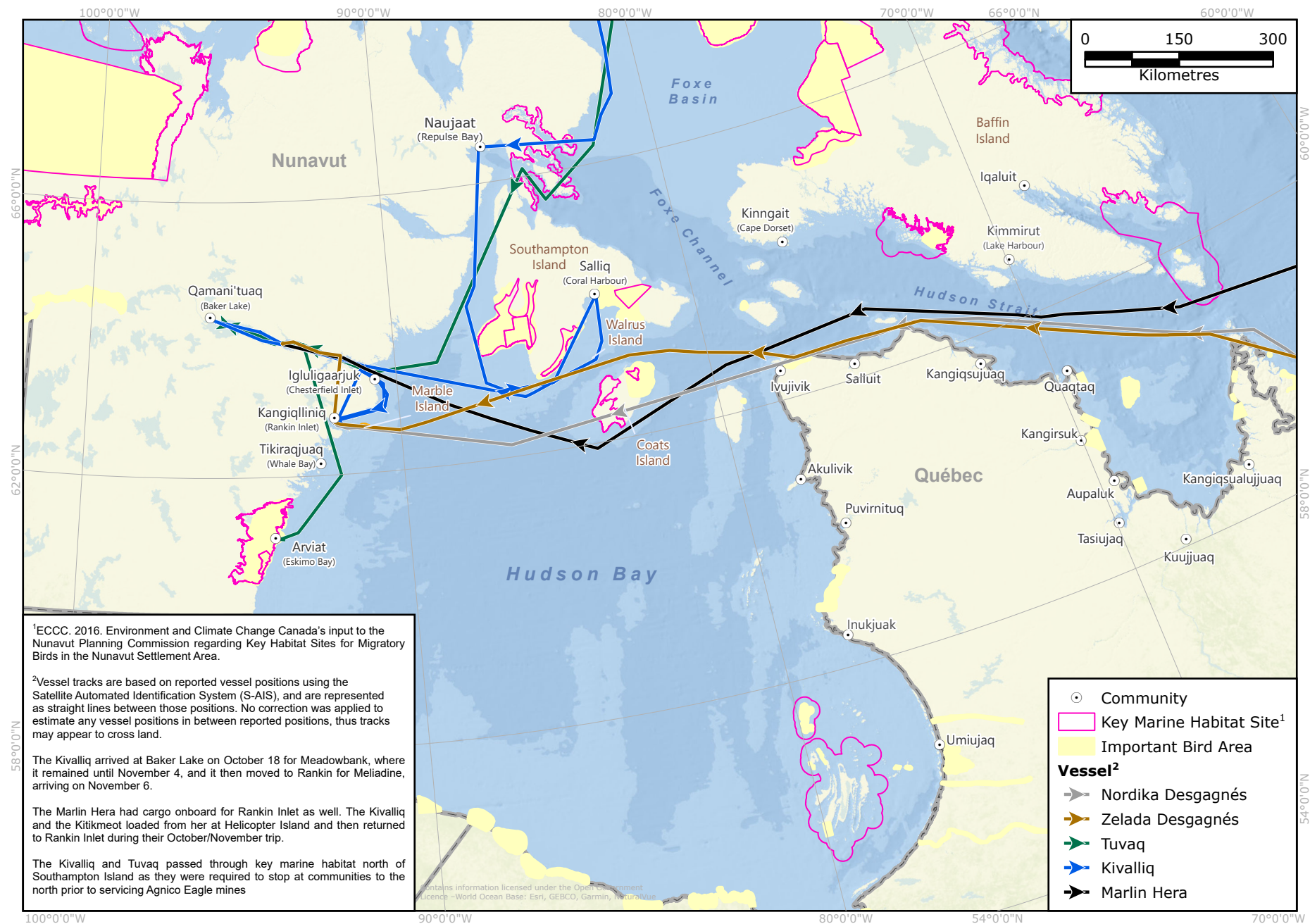
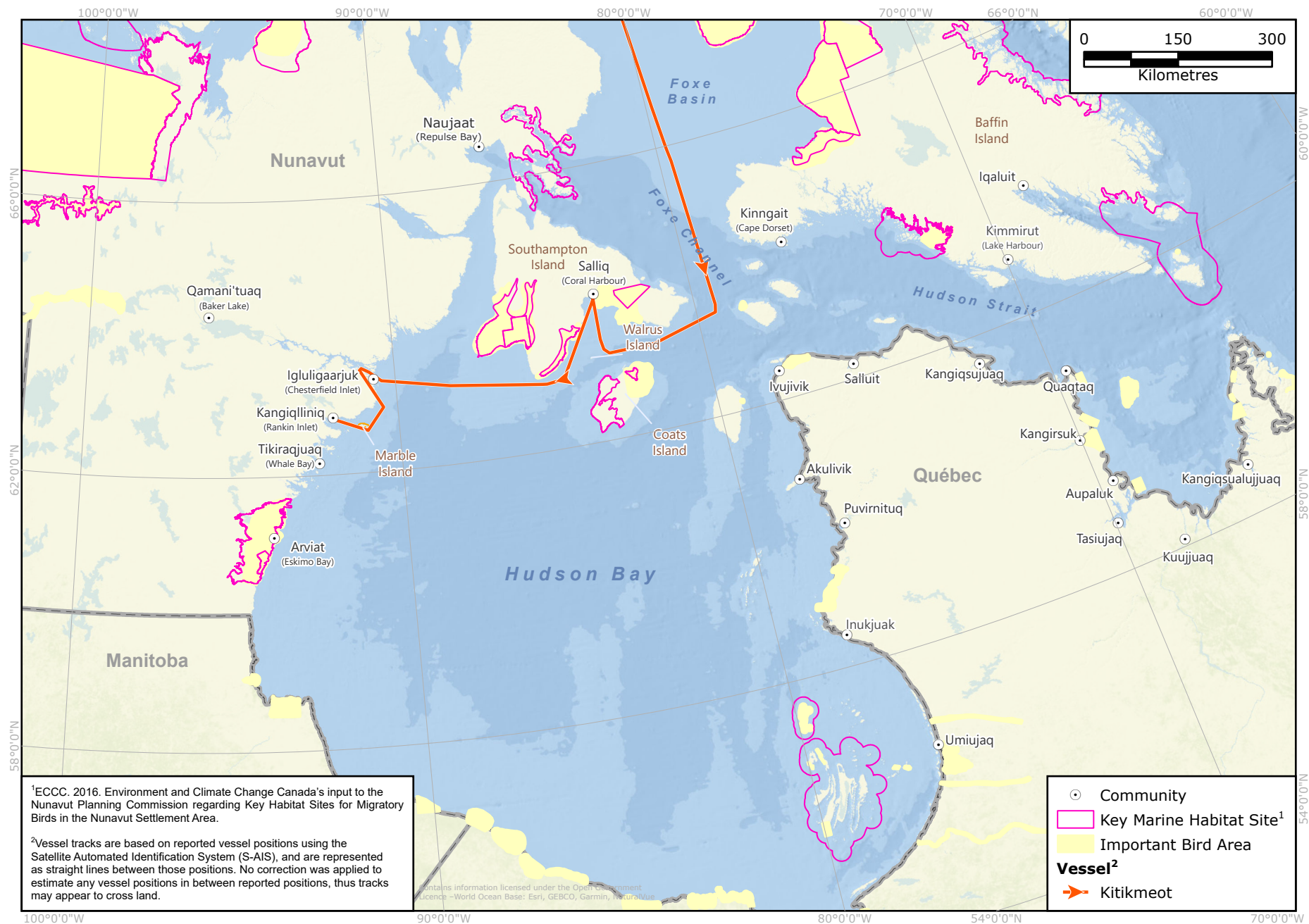


FIGURE 3.1-5 WOODWARD SHIPPING TRACKS, NOVEMBER 2024



Most (74%) of these vessels delivered cargo and fuel exclusively for Agnico Eagle, while six trips also conducted community resupply before visiting Agnico Eagle mines, including the following:

- One vessel in July (Tuvaq W.; Figure 3.1-1);
- Two vessels in August (Kivalliq W. and Qikiqtaaluk; Figure 3.1-2);
- Two vessels in October (Tuvaq W. and Kivalliq W; Figure 3.1-4); and
- One vessel in November (Kitikmeot; Figure 3.1-5).

3.1.1 MITIGATION MEASURES—SETBACKS FROM SENSITIVE HABITATS

All vessels are required to follow a setback distance of 500 m from colonies and aggregations of seabirds and marine mammals while transiting through the Hudson Strait, Hudson Bay, and Chesterfield Inlet, and a setback distance of 2 km from Marble Island, as defined by the SMPs (Agnico Eagle 2022a, 2022b). Maps were produced that included these locations, buffers, and vessel tracks.

Where AIS data were recorded frequently (every hour), most vessel tracks avoided the setback areas. In some cases, the AIS data were recorded less frequently (approximately every 5 to 22 hours). These long delays between position fixes create erroneous vessel tracks, with vessels in some cases appearing to cross dry land and, in other cases, appearing to cross the setback areas. For example, during a vessel trip by the *Berthe A. Desgagnés* in July (Figure 3.1-1), no positions were recorded over approximately 23 hours between 11 July and 12 July. Therefore, the vessel track appears as a straight line going directly across Coats Island, while, in fact, the vessel travelled south of Coats Island. In August, the *Miena Desgagnés* appears to cross over Coats Island (Figure 3.1-2), as no positions were recorded over 19 hours, while it in fact traveled south of Coats Island. Due to the poor resolution of these data, information (e.g., routes and setbacks) regarding these trips cannot be extrapolated with confidence.

Track data are based on satellite positioning; therefore, ship track intersections likely occurred due to a lack of ship track resolution and the intersection of existing points to create a continuous shipping track. Groupe Desgagnés and/or Woodward vessel tracks appeared to potentially cross through the 2 km setback polygon at Marble Island on 10 occasions, and at the Coats Island setback polygon on 8 occasions (3 of these tracks appeared to cross both setback polygons, therefore a total of 15 vessels appear to have crossed setbacks; Figures 3.1-1 through 3.1-5). However, when examining the data, it appears that a vessel only entered the 2 km Marble Island buffer on three occasions, as described below.

In all cases where track lines appeared to intersect the setbacks, the point locations were investigated further. From the 15 vessel tracks that appeared to cross a setback polygon, only 3 location points received from the satellite AIS were located within the setback polygons: 1) in June, the Qikiqtaaluk W.'s track shows a point location recorded 0.9 km from Marble Island; 2) in August, the *Miena Desgagnés* was within the 2 km buffer around Marble Island (1.2 km from Marble Island), and 3) in September, the *Miena Desgagnés* was 1.1 km from Marble Island. No other points were recorded within the Marble Island setback. The closest ship track point to the Coats Island setback was recorded by the *Acadia Desgagnés* in August, 12.3 km from the setback polygon.

Therefore, it is unlikely that the ship passed directly through the setbacks and the intersections are likely due to a lack of ship track resolution. Vesseltracker, however, remains the most reliable way to obtain vessel tracks in the Arctic at this time. Vessel captains will be reminded of the importance of maintaining a 2 km buffer around Marble Island prior to the start of the 2025 shipping season.

3.1.2 MITIGATION MEASURES—COATS ISLAND

The community of Coral Harbour identified the corridor between Southampton and Coats islands as an important breeding ground for walrus and marine birds, and as a potential migration route for marine mammals. Due to concerns that vessel traffic between Coats Island, Walrus Island (north of Coats Island), and Southampton Island may disturb these animals, vessels are required to transit south of Coats Island whenever the weather is safe to do so.

Of the 23 vessels servicing the Meadowbank Complex and Meliadine Mine in 2024, the majority (87%, 20 trips) travelled south of Coats Island. Vessels travelled north of Coats Island on the following 3 occasions (Figures 3.1-1 and 3.1-4):

1. On 3 July, the Atlantic Beech travelled north of Coats Island to avoid unsafe sea conditions south of the Island.
2. On 4 July, the Atlantic Elm was required to travel north due to unfavourable weather conditions along the shipping route to the south of Coats Island.
3. Around 3 October, the Zelada Desgagnés was required to use the north passage due to unsafe conditions along the shipping route south of Coats Island.

The Kivalliq W. vessel (Figure 3.1-4) and the Kitikmeot vessel (Figure 3.1-5) also travelled between the two islands in October and November, respectively; however, both vessels were required to stop in Coral Harbour (Salliq) on the way to the mine sites.

3.1.3 MITIGATION MEASURES—AVOIDANCE OF MARINE MAMMALS AND SEABIRDS

Ships are required to follow mitigation measures outlined in Section 4.2 of the SMPs (Agnico Eagle 2022a, 2022b), summarized in Section 1.4 and Appendix A. In 2024, none of the marine mammal or seabird sightings triggered mitigation measures, such as slowing the vessel or changing course. No incidents with marine mammals or seabirds were reported for the 2024 shipping season.

3.2 MARINE MAMMAL OBSERVATIONS

3.2.1 SURVEY EFFORT

In 2024, dedicated vessel crew members conducted marine mammal surveys between Hudson Strait and Rankin Inlet/Helicopter Island between 27 June and 18 November onboard various Groupe Desgagnés and Woodward vessels during 13 of the 23 trips. A total of 174 marine mammal surveys were conducted in 2024. However, of the 174 surveys, 24 (16 moving vessel surveys and 8 stationary surveys) were excluded from the analysis of survey effort due to missing start and/or end times, or missing start and/or end latitudes or longitudes. Datasheets with missing survey information were not incorporated into the effort analysis. Sightings during these surveys are reported as incidental observations (Section 3.2.2). Therefore, a total of 150 marine mammal surveys (62 while the vessel was moving, and another 88 surveys while the vessel was stationary) were completed in 2024 with sufficient survey effort data. The 62 transects surveyed while the vessel was moving included a total spatial effort of 2,066.5 km of marine mammal transects over 89.9 hours (Figure 3.2-1; Table 3.2-1). An additional 119.0 hours of surveying was completed while the vessel was anchored. Of the 88 stationary surveys completed while the vessel was anchored, the majority were conducted near Chesterfield Inlet and Rankin Inlet (Figure 3.2-1). Appendix D summarizes all marine mammal surveys and sightings information.

TABLE 3.2-1 MARINE MAMMAL SURVEY EFFORT, 2017 TO 2024

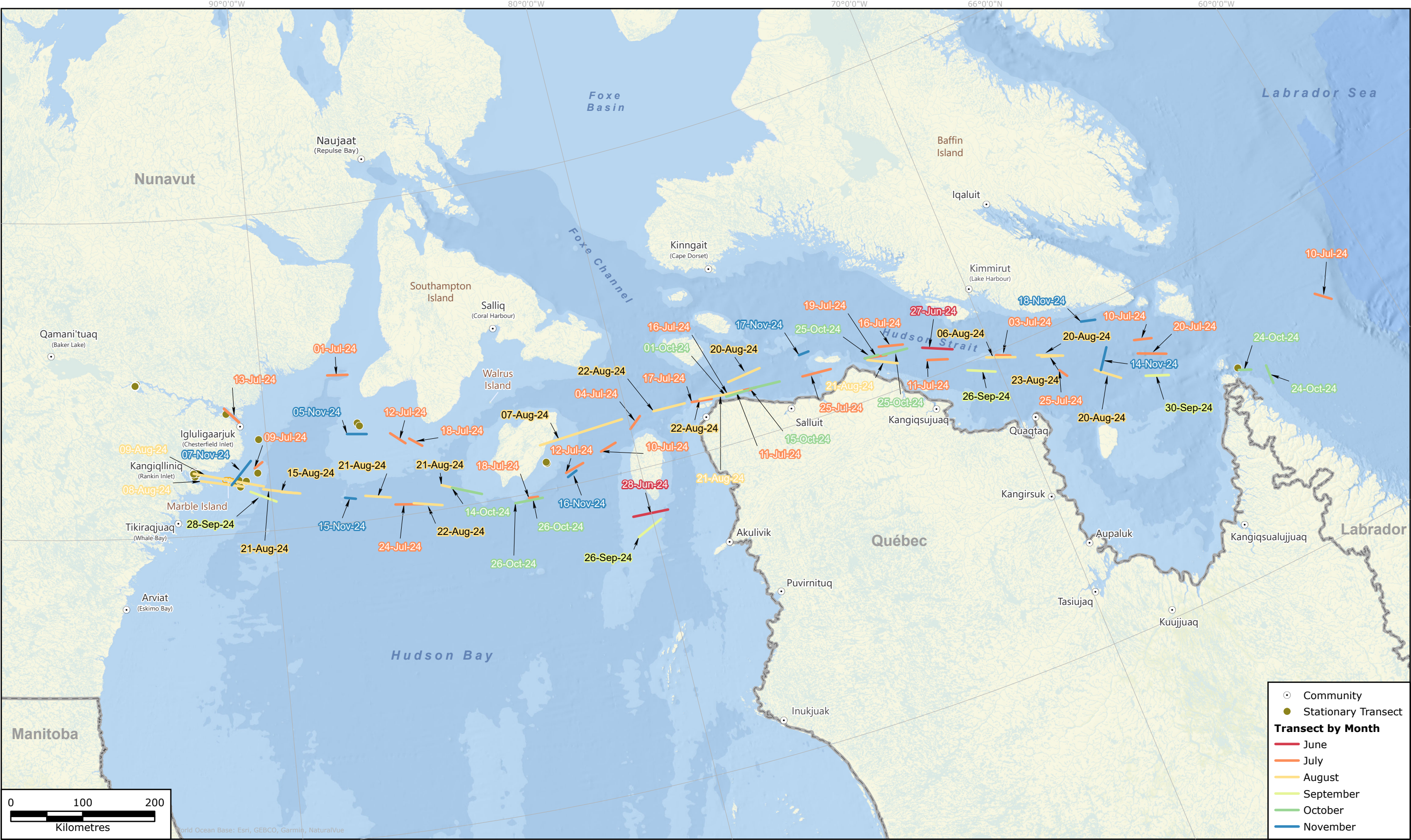
Year of Survey	Moving Surveys			Stationary Surveys
	Number of Transects Surveyed	Total Distance (km) Surveyed (Spatial Effort)	Total Time (Hours) Surveyed (Temporal Effort)	Total Time (Hours) Anchored Vessel
2017	11	NA ^b	10.3	0.00
2018	31	1,155.7	29	0.00
2019	38	1,898.3	62.8	59.3
2020	58	2,354.7	112.3	92.5
2021	56	2,824.9	110.5	80.4
2022	92	2,765.8	109.3	56.6
2023	64	1,996.4	79.7	72.4
2024 ^a	62	2,066.5	89.9	119.0
Total	412	15,062.3	603.8	480.2

Notes: Agnico Eagle = Agnico Eagle Mines Limited; km = kilometre; NA = not applicable

^a A total of 174 surveys were completed in 2024 (78 moving and 96 stationary); however, due to incomplete survey effort being recorded (start or end positions or times missing), they are not all included in the calculation of survey effort. Fewer surveys were completed in 2024 due to fewer vessels travelling to Meliadine Mine and Meadowbank Complex in 2024 (similarly to 2023, with 23 vessels in both years), compared to previous years (e.g., 27 vessels in 2022 and 29 vessels in 2021).

^b Spatial data for the 2017 surveys are not available.

FIGURE 3.2-1 MARINE MAMMAL SURVEY TRANSECTS AND STATIONARY SURVEY LOCATIONS, JUNE TO NOVEMBER 2024



According to the observation datasheets completed by Groupe Desgagnés and Woodward, overall marine mammal survey effort in 2024 was relatively similar to 2020, 2021, 2022, and 2023 (Table 3.2-1) but lower for moving surveys in both 2024 and 2023. In 2024, observer effort during transit was 89.9 hours and 2,066.5 km, plus an additional 119.0 hours of effort while the vessel was anchored. Similarly to 2023, the reduced number of vessels travelling to Agnico Eagle in 2024 (23 vessels compared to 27 in 2022 and 29 in 2021) contributed to the lower reportable moving vessel survey effort for 2024.

3.2.1.1 ENVIRONMENTAL VARIABLES AND WEATHER CONDITIONS

The weather conditions (Figure 3.2-2a) for the 2024 marine mammal observation program were predominantly partly cloudy, 100% cloud, or clear (37%, 27%, and 21% of the survey effort, respectively). Rain and fog were present for a combined 11% of the survey time, while snow was present for 4% of the survey effort. Average visibility extended to approximately 13 km, with a maximum estimate of 50 km and a minimum estimate of 200 m.

The sea state (Figure 3.2-2b) ranged from sea state 0 (calm) to sea state 7 (sea heaps up and blowing white foam from breaking waves). However, the sea state fell predominantly within states 1 (ripples), 2 (small wavelets all over), and 3 (large wavelets, few whitecaps), accounting for 31%, 33%, and 12% of the survey effort, respectively. Sea states were 0 and 4 (small waves, frequent whitecaps) for 9% and 11% of the survey effort, respectively. Sea state five (moderate waves, many whitecaps), six (large waves and white foam crests), and seven occurred rarely (3%, 1%, and 1% of survey effort, respectively), and 1% of the survey effort lacked sea state data.

Glare conditions were generally favourable during surveys in 2024; however, 9% of the 2024 marine mammal surveys proceeded with bright glare (Figure 3.2-2c). Glare was recorded as none and slight/grey 65% and 18% of the time, respectively, and glare data are absent for 7% of the survey effort.

3.2.2 MARINE MAMMAL OBSERVATIONS 2024

Marine mammals were observed during dedicated surveys and incidentally in 2024. Survey results, incidental sightings, and species descriptions are provided in the following sections.

3.2.2.1 MARINE MAMMAL OBSERVATIONS DURING SURVEYS, 2024

During dedicated marine mammal surveys, Groupe Desgagnés and Woodward MMSOs recorded 9 separate sightings of marine mammals (12 animals) in 2024 (Table 3.2-2; Figure 3.2-3). Species recorded by the MMSOs included harp seal (*Pagophilus groenlandicus*), harbour seal (*Phoca vitulina*), common dolphin (*Delphinus delphis*), and white-sided dolphin (*Lagenorhynchus acutus*). In addition, there were four separate sightings of seals that were not identified to species.

FIGURE 3.2-2 PERCENT WEATHER, SEA STATE, AND GLARE CONDITIONS DURING MARINE MAMMAL SURVEYS CONDUCTED IN 2024

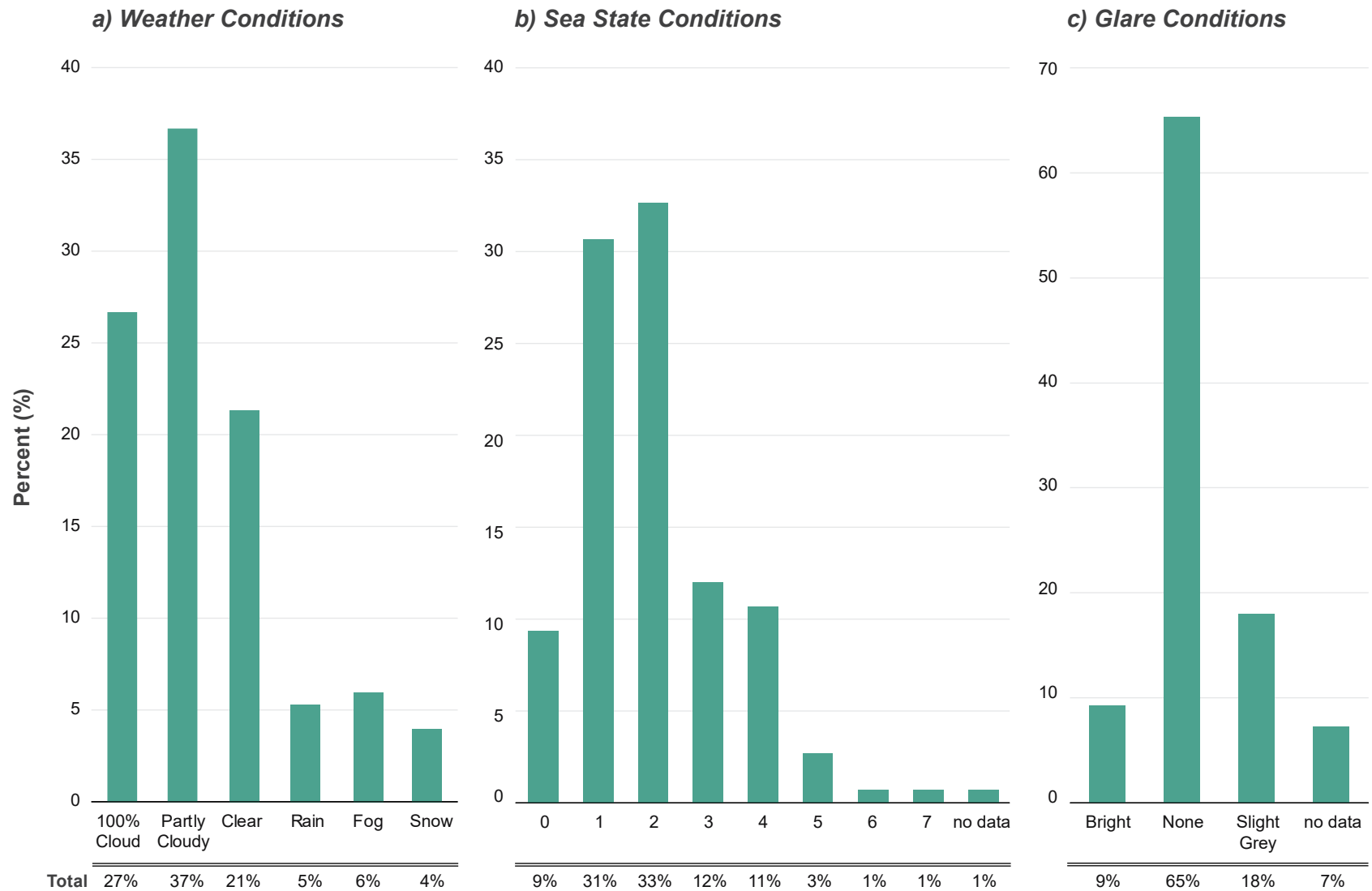


FIGURE 3.2-3 MARINE MAMMALS OBSERVED DURING SURVEYS, JULY TO OCTOBER 2024



TABLE 3.2-2 MARINE MAMMAL OBSERVATIONS DURING SURVEYS, JULY TO OCTOBER 2024

Month	Species Observed	Number of Sightings	Number of Animals Observed
July	Harbour seal	1	1
	Unknown seal	4	4
August	Common dolphin ^a	1	2
September	White-sided dolphin ^a	2	4
October	Harp seal	1	1
Total		9	12

Note:

^a Species is unlikely to occur in the study area and could therefore be a misidentified species.

Most of the sightings occurred in July (five sightings). September had two sightings, while August and October both had one sighting each. Dolphins were observed the most (six individuals), with observers recording the species as common dolphins and white-sided dolphins. However, it is unlikely that these species were identified accurately, as described in Section 3.2.2.3. One harbour seal and one harp seal were identified (in July and October, respectively), and an additional four individuals of an unknown seal species were observed in July. Of the observed seals where the species was unknown, one was suspected to be either a harp or harbour seal. No additional notes were taken to assist in species identification.

3.2.2.2 MARINE MAMMALS OBSERVED INCIDENTALLY, 2024

Incidental observations of marine mammals are sightings of animals while on the vessel, but outside of the dedicated MMSO survey time (i.e., “off-effort” sightings). There were 14 incidental observations of 43 animals during 2024 (Table 3.2-3; Figure 3.2-4). Marine mammals were observed incidentally between July and October 2024.

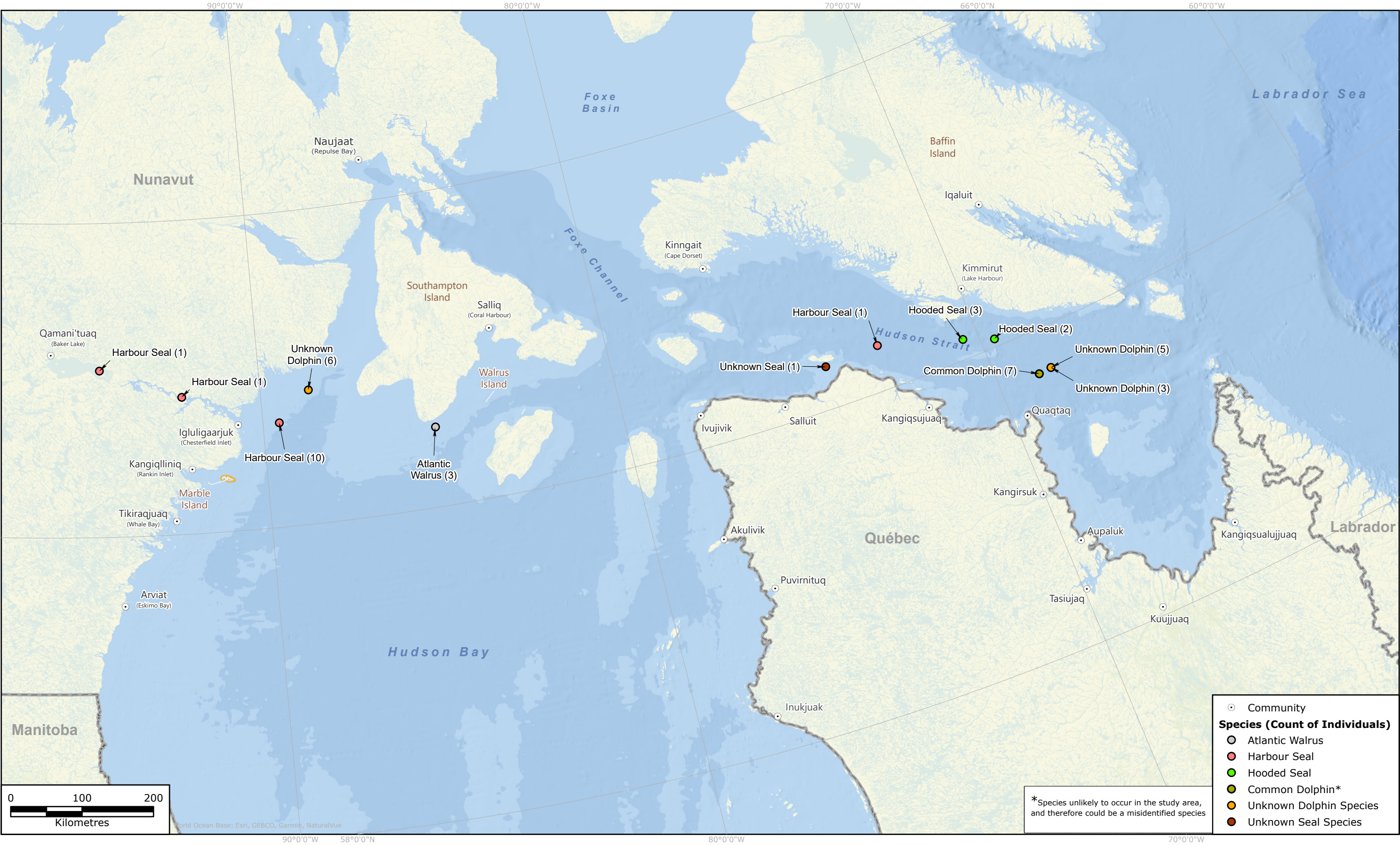
TABLE 3.2-3 INCIDENTAL OBSERVATIONS OF MARINE MAMMALS, JULY TO OCTOBER 2024

Month	Species Observed	Number of Sightings	Number of Animals Observed
July	Harbour seal	2	11
	Hooded seal	2	5
	Unknown dolphin	1	6
August	Harbour seal	2	2
	Unknown dolphin	2	8
September	Common dolphin ^a	1	7
	Unknown seal	1	1
October	Atlantic walrus	3	3
Total		14	43

Note:

^a Species is unlikely to occur in the study area and could therefore be a misidentified species

FIGURE 3.2-4 INCIDENTAL OBSERVATIONS OF MARINE MAMMALS, JULY TO OCTOBER 2024



3.2.2.3 SPECIES OBSERVED IN 2024

A summary of the marine mammal sightings by the MMSOs in 2024 is provided in the following subsections.

Atlantic Walrus

A total of three separate sightings of individual Atlantic walrus (*Odobenus rosmarus rosmarus*) were recorded in 2024. All three sightings of the Atlantic walrus were observed during the same survey transect within 10 minutes of each other on 3 October 2024; however, end times and coordinates for the survey were missing, so the sighting is considered an incidental observation. The three individuals were observed just south of Southampton Island (Figure 3.2-4). The animals were observed swimming in the opposite direction of the ship, passing the vessel 50 to 100 m away. One individual was identified as a male due to the presence of tusks, another as a female, and the third was identified as unknown. No additional information regarding this sighting was recorded.

Dolphin Species

A total of 7 groups of dolphins (approximately 27 animals) were recorded in 2024. On 1 July, a group of 6 dolphins was observed incidentally swimming between Southampton Island and Chesterfield Inlet (Figure 3.2-4). On 6 August, two separate groups of unidentified dolphin species were observed incidentally (one group of three individuals and one group of five individuals) at the same location within Hudson Strait. It is likely that these were the same animals recorded on two separate occasions.

On 20 August during a dedicated survey, a group of two common dolphins was recorded in Hudson Strait. On 6 September, another group of seven common dolphins was observed incidentally in Hudson Strait. It is unlikely that these were, in fact, common dolphins, as Hudson Strait is north of the range of common dolphins, and it is more likely that these sightings were of white-beaked dolphins (*Lagenorhynchus albirostris*).

On 30 September, two groups of white-sided dolphins were recorded during dedicated surveys, all of which were within Hudson Strait (Figures 3.2-2 and 3.2-3). During 2021, white-sided dolphins were also recorded incidentally on two occasions at the eastern edge of the Regional Study Area, east of Hudson Strait. It is possible that these, as well as the sightings in 2024, were, in fact, white-beaked dolphins but were misidentified. This is because white-sided dolphins are generally observed further south and are similar in appearance to the white-beaked dolphin, which makes it difficult to tell them apart. This is the first time MMSOs recorded common dolphins and the second time they recorded white-sided dolphins.

The majority of the dolphin sightings were not identified to the species level but were likely groups of white-beaked dolphins, as this species was observed in this general area in 2020 and 2021, and because this is the only dolphin species that has been observed this far north. Dolphins are a rare sighting in the Arctic, and this is the third time they have been recorded during MMSO surveys for the Project. The first time they were observed was in 2020, when groups of 15 dolphins were observed in Hudson Strait at the eastern edge of the Project Regional Study Area during August and September. Over the last 15 years, there have been occasional sightings of white-beaked dolphins in the Arctic, including around Baffin Island (Reinhart et al. 2014).

Seals

A total of 13 separate sightings of seals were recorded in 2024: 6 separate occasions during dedicated marine mammal surveys (Figure 3.2-3) and 7 separate incidental sightings (Figure 3.2-4). During dedicated surveys, a harp seal was observed on one occasion south of Coats Island, one harbour seal was observed in the Hudson Strait, and there were four separate sightings of unknown seal species—near Marble Island (one sighting) and near Chesterfield Inlet (three sightings). Of the unknown seal observations, suspected species include harp seal and harbour seal. Seals were observed in July and October during dedicated surveys (six separate sightings of one individual each; Table 3.2-2).

Seals were also observed incidentally (i.e., off-effort) on an additional seven occasions in 2024 (Figure 3.2-4). Two separate sightings of hooded seal occurred in Hudson Strait in July (five individuals in total). Harbour seals were observed on 2 separate occasions in Hudson Strait and near Chesterfield Inlet in July (11 individuals total), and on 2 separate occasions in August (2 individuals total) north of Christopher Island and between Chesterfield Inlet and Helicopter Island. One sighting of an unknown seal species (one individual) occurred south of Charles Island in September, which was suspected to be a harp seal (Figure 3.2-4; Table 3.2-3).

The largest group of seals observed was of approximately 10 harbour seals, observed on 19 July near Chesterfield Inlet.

3.2.3 MARINE MAMMAL OBSERVATIONS 2017 TO 2024

Marine mammals have been observed during surveys (Figure 3.2-5) and incidentally (Figure 3.2-6) between 2017 and 2024. A total of six different species were identified along the shipping route in 2024, plus an additional two unknown species (unknown dolphin species and unknown seal species). This is a similar number to previous years, apart from 2021, when more species were observed. Six species were reported in 2023, 7 in 2022, 13 in 2021, 4 in 2020, 5 in 2019, and none in 2017 and 2018. However, marine mammals were observed incidentally in 2017 (Table 3.2-4). From 2017 to 2022, the number of marine mammal individuals observed increased (Figure 3.2-7) before dropping in numbers in 2023, with 2024 presenting the lowest number of individuals observed since 2020. The diversity of species (i.e., number of different species observed) has fluctuated (Figure 3.2-7), with the highest diversity observed in 2021 (13 species, excluding unknowns) and 2022 (7 species, excluding unknowns). Species observed in previous years are summarized in Table 3.2-4.

FIGURE 3.2-5 MARINE MAMMALS OBSERVED DURING SURVEYS, 2019 TO 2024

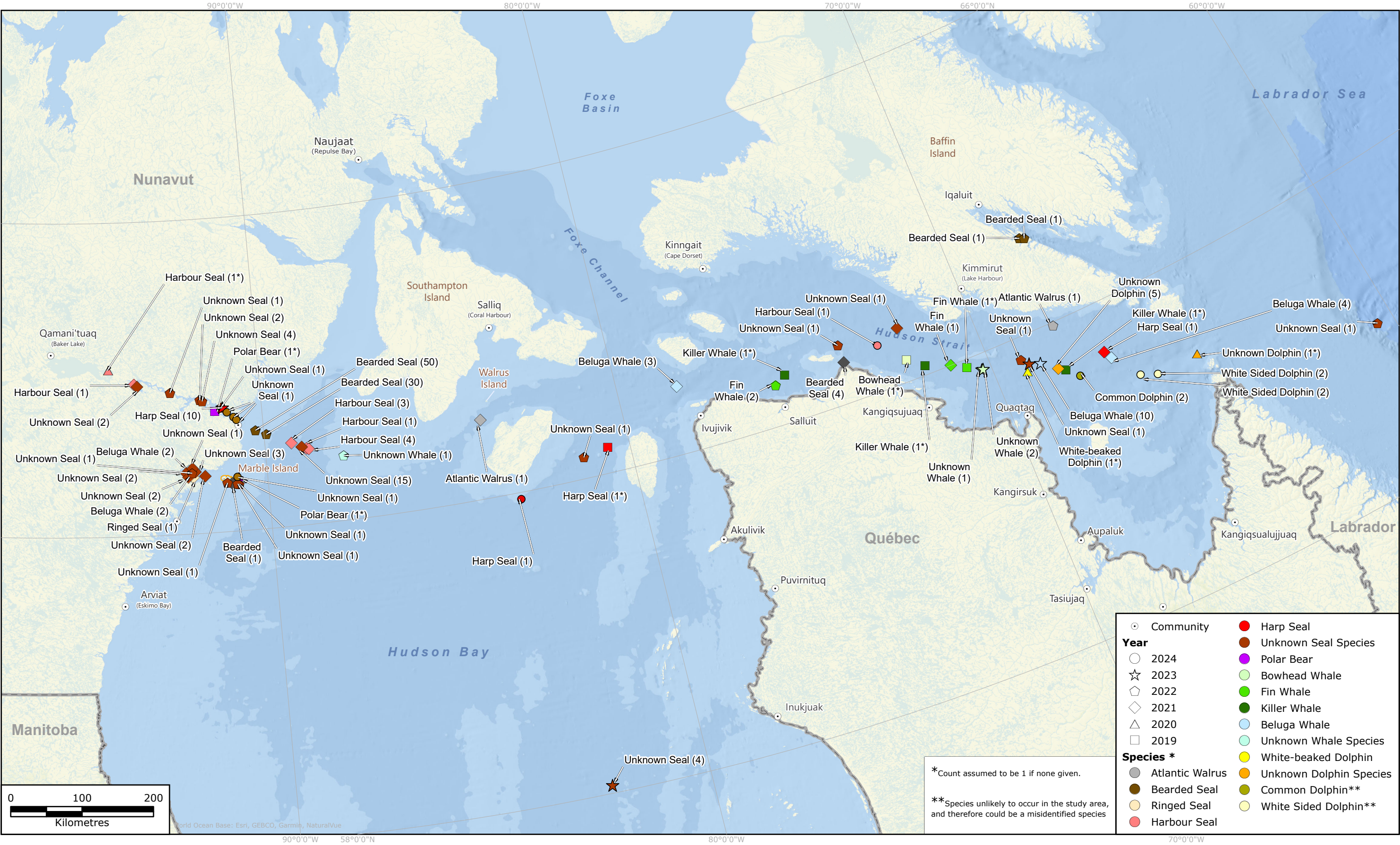


FIGURE 3.2-6 INCIDENTAL OBSERVATIONS OF MARINE MAMMALS, 2019 TO 2024

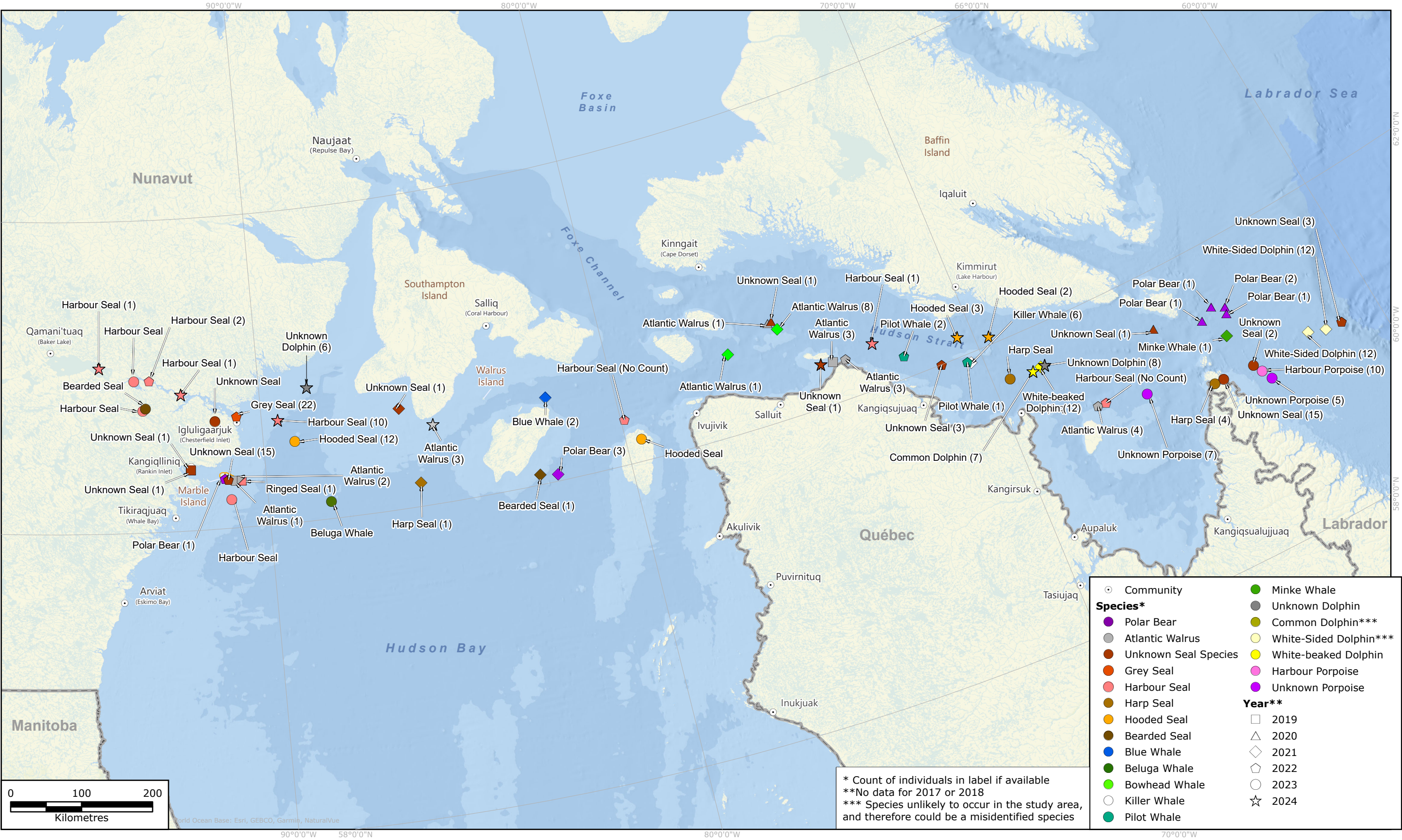


FIGURE 3.2-7 NUMBER OF MARINE MAMMAL INDIVIDUALS AND NUMBER OF SPECIES OBSERVED, 2017 TO 2024

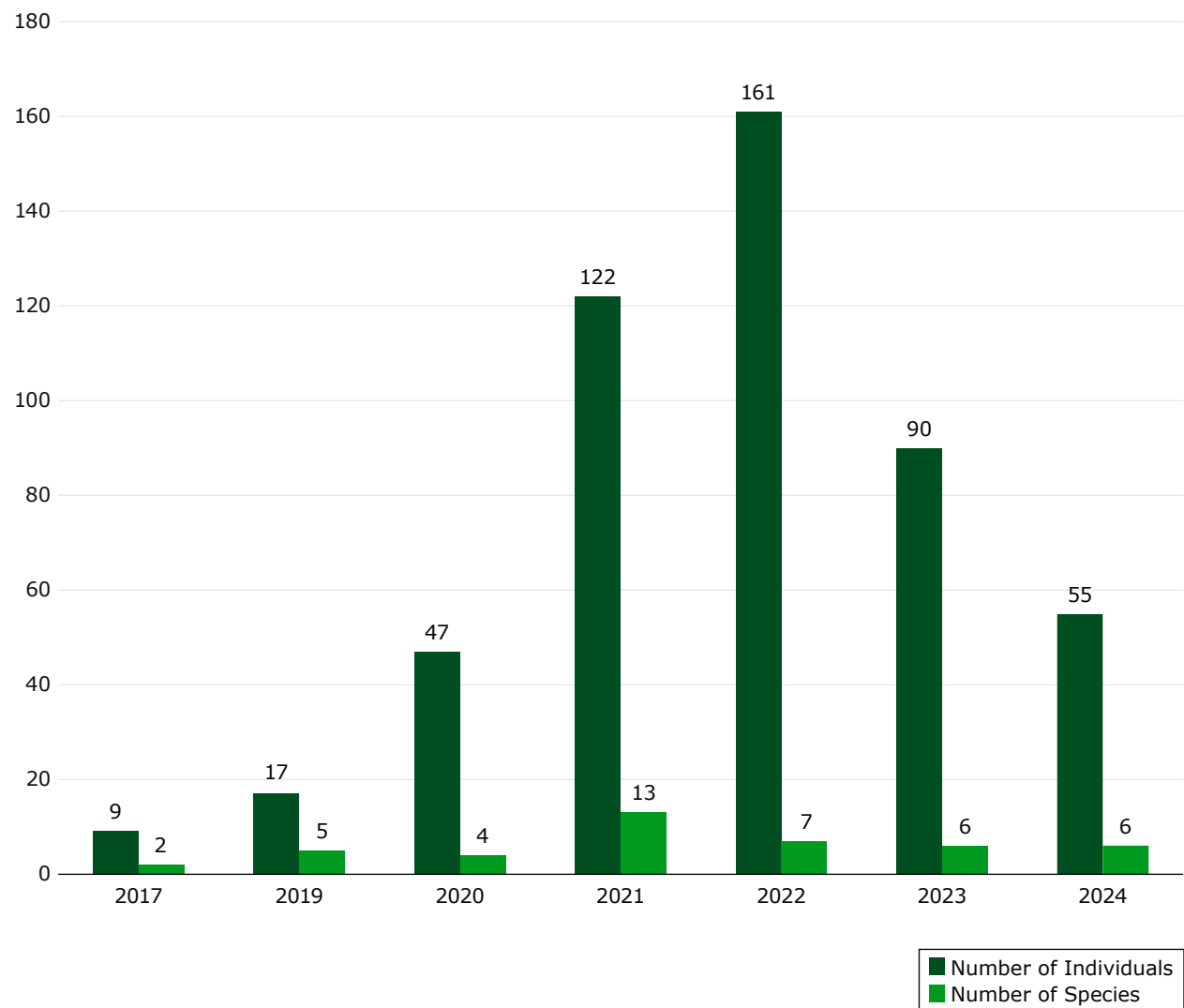


TABLE 3.2-4 NUMBER^a OF MARINE MAMMALS OBSERVED DURING SURVEYS AND INCIDENTALLY^b BETWEEN 2017 AND 2024^c

Species	2017	2019	2020	2021	2022	2023	2024	Total
Atlantic walrus	6	-	4	10	8	-	3	31
Bearded seal	-	-	-	6	82	1	-	89
Beluga whale	-	-	-	11	-	11	-	22
Blue whale ^{d,e}	-	-	-	2	-	-	-	2
Bowhead whale	-	3	-	-	-	-	-	3
Common dolphin ^f	-	-	-	-	-	-	9	9
Fin whale ^d	-	1	-	1	2	-	-	4
Grey seal	-	-	-	-	22	-	-	22
Harbour porpoise	-	-	-	-	-	10	-	10
Harbour seal	-	-	1	9	5	3	14	32
Harp seal	-	4	-	2	-	15	1	22
Hooded seal	-	-	-	-	-	13	5	18
Killer whale	-	8	-	6	-	-	-	14
Long-finned pilot whale	-	-	-	-	3	-	-	3
Minke whale	-	-	-	1	-	-	-	1
Polar bear ^d	-	1	8	3	1	-	-	13
Ringed seal	1	-	-	1	-	-	-	2
White-beaked dolphin	-	-	15	12	-	-	-	27
White-sided dolphin ^f	-	-	-	24	-	-	4	28
Unknown dolphin species	-	-	15	5	-	-	14	34
Unknown porpoise	-	-	-	-	-	12	-	12
Unknown seal	2	-	4	29	37	23	5	100
Unknown whale	-	-	-	-	1	2	-	3
Total	9	17	47	122	161	90	55	501

Notes:

Dashes (-) indicate none observed.

^a Numbers are given as individuals observed, not number of separate sightings.

^b Marine mammals observed both during dedicated surveys and off-effort are included in the table. Note that all sightings in 2017 were incidental, all sightings in 2019 were during dedicated surveys, and all sightings from 2020 through 2024 were both during surveys and incidental.

^c No sightings were recorded in 2018.

^d Species listed on Schedule 1 of the federal *Species at Risk Act* (2002).

^e It is possible that the blue whale sighting was not identified properly while on the vessel, as it would be a rare occurrence for a blue whale to be recorded in Hudson Bay.

^f Species is unlikely to occur in the study area and could therefore be a misidentified species.

3.3 SEABIRD OBSERVATIONS

3.3.1 SURVEY EFFORT

Since 2018, seabird surveys have been completed every year. In 2024, dedicated vessel crew members completed seabird surveys between 26 June and 19 November between Hudson Strait and Rankin Inlet/Helicopter Island onboard various Groupe Desgagnés and Woodward vessels during 20 of the 23 trips. A total of 364 seabird surveys were completed in 2024 (159 moving vessel transects and 205 stationary surveys); however, 131 surveys (62 moving vessel surveys and 69 stationary surveys) were excluded from the analysis of survey effort due to missing start and/or end times, or missing start and/or end latitudes or longitudes (Table 3.3-1). Therefore, a total of 233 seabird surveys (97 while the vessel was moving, and 136 while the vessel was stationary) were completed in 2024, with sufficient survey effort data. Appendix E summarizes all 2024 seabird survey intervals and Appendix F summarizes all 2024 seabird sightings. Seabirds observed during moving surveys with missing spatial effort or missing temporal effort on stationary surveys were removed from the analysis but reported in species and survey summaries.

TABLE 3.3-1 TEMPORAL AND SPATIAL EFFORT FOR MOVING VESSEL SEABIRD SURVEYS, 2018 TO 2024

Year	Temporal Effort			Spatial Effort		
	Effort (Hours)	Number of Transects with Effort	Number of Transects with No Effort ^b	Effort (km)	Number of Transects with Effort	Number of Transects with No Effort ^d
2018	139.9	72	7	407.1	33	46
2019	119.9	87	4	2,290.8	79	12
2020	111.9	84	14	3,614.8	79	20
2021	173.9	173	24	7,176.7	170	27
2022	79.6	157	71	9,839.8	140	88
2023 ^a	58.3	123	5	2,643.3	109	28
2024 ^a	84.7	129	30	1,732.9	97 ^c	62

Notes:

km = kilometre

^a Fewer vessels travelled to Agnico Eagle in 2023 and 2024 (23 vessels in 2023 and 2024, compared to 27 vessels in 2022 and 29 in 2021), partially accounting for the lower survey effort.

^b Surveys without distance effort did not have location coordinates recorded at the start and/or end of the surveys.

^c Total number of transects that had both spatial and temporal effort recorded (i.e., the 30 transects with missing temporal effort also had missing spatial effort).

^d Surveys without temporal effort did not have the start and/or end times recorded.

Fifteen of the moving vessel transects were completed between Helicopter Island and Baker Lake, 13 of which had spatial and temporal survey effort data recorded. Results from these surveys are presented here and summarized in Section 3.4-1.

Of the 97 moving vessel transects with known temporal and spatial effort, a total of 1,733 km were surveyed over 85 hours, with an average of 0.66 hours per survey (Table 3.3-1; Figure 3.3-1). An additional 69 hours were completed during 136 stationary surveys while vessels were anchored (Table 3.3-2). The duration of stationary surveys ranged from 0.43 hours (approximately 25 minutes) to 1.3 hours; therefore, some of the surveys appear to have been conducted, following the six 5-minute survey interval method for moving transect surveys.

TABLE 3.3-2 TEMPORAL EFFORT FOR STATIONARY SEABIRD SURVEYS, 2018 TO 2024

Year	Effort (Hours)	Number of Points with Effort	Number of Points with No Effort^b
2018	18.8	5 ^a	0
2019	19.8	15	27
2020	152.0	104	40
2021	152.4	111	3
2022	14.9	29	112
2023	82.6	122	43
2024	69.0	136	69

Notes:

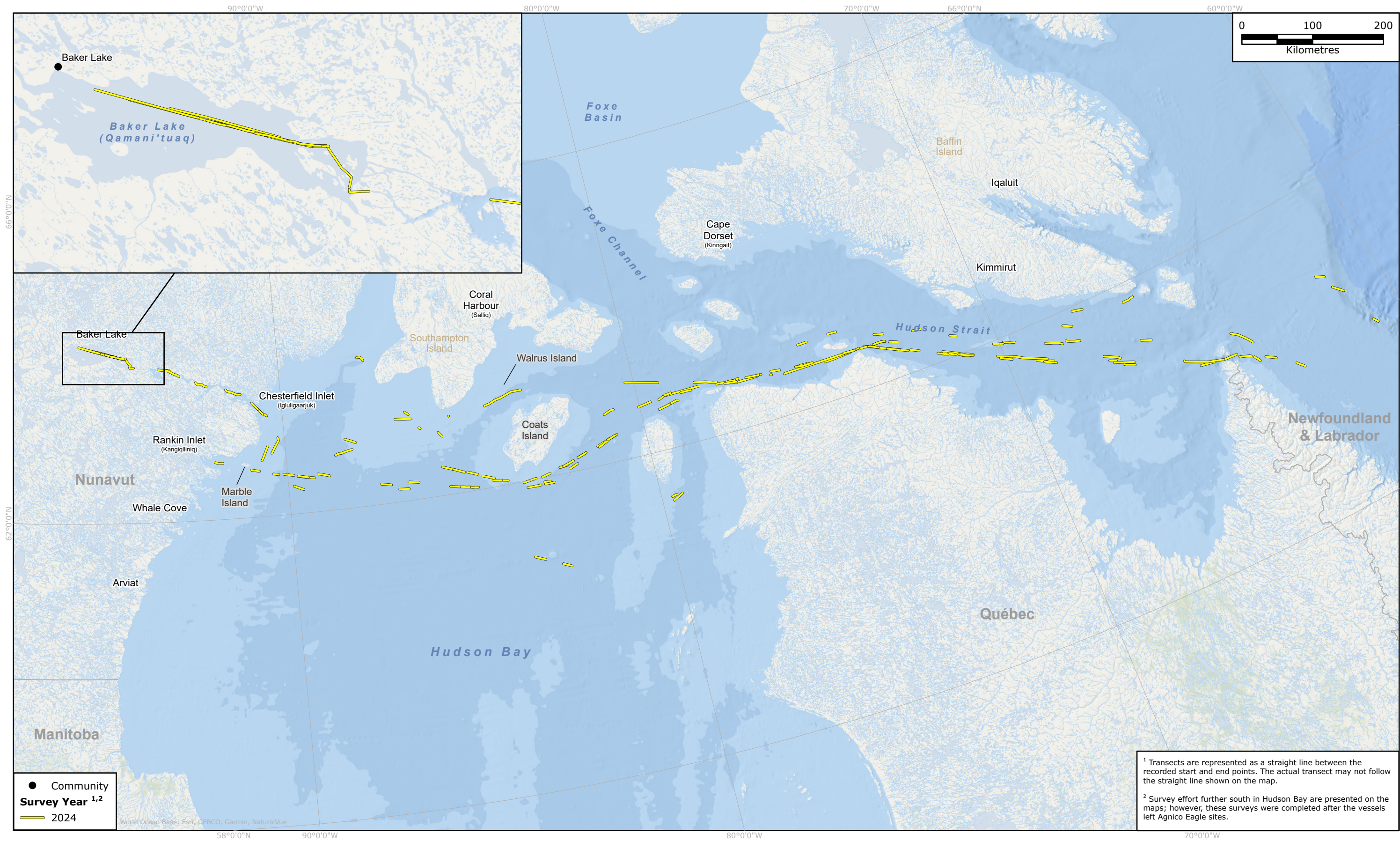
^a Surveys in 2018 did not include locations; therefore, these observations were not used in analysis.

^b Surveys with No Effort did not have start and/or end times recorded.

Spatial effort for moving surveys increased with each survey year between 2018 and 2022, but in 2023 and 2024 spatial effort appears to decrease. Fewer vessels travelling to Agnico Eagle in 2023 and 2024 (23 vessels in 2023 and 2024, compared to 27 in 2022) and the shift in survey methods, based on requests from Environment and Climate Change Canada are plausible contributors to lower spatial effort reporting in 2023 and 2024. There was an emphasis in 2023 and 2024 to ensure seabird surveys were completed following the ECSAS methods (see Section 2.3.1), which required MMSOs to shift their methods from completing a 1-hour continuous survey to the ECSAS methods, where each survey consisted of six 5-minute intervals (Section 2.3.1). This change in survey method may have resulted in shorter surveys (approximately 30 minutes per survey, compared to 1 hour or more), and therefore less spatial effort. Additionally, in 2024, fewer survey forms had complete spatial effort recorded (62% of surveys in 2024 and 79% in 2023). This change in survey methodology, along with fewer vessels in 2024 and a decrease in spatial and temporal effort reporting, could explain the lower spatial and temporal survey effort observed in 2023 and 2024 (Table 3.3-1).

The number of stationary vessel surveys was similar to recent years; however, temporal effort has been variable over the course of data collection. Temporal effort in 2024 was approximately 69 hours, compared to 83 hours in 2023, 15 hours in 2022, 152 hours in both 2021 and 2020, 20 hours in 2019, and 19 hours in 2018 (Table 3.3-2). Temporal effort was successfully recorded for 66% of the stationary surveys in 2024, lower than in 2023 (74%), and higher than in 2022 (21%).

FIGURE 3.3-1 MOVING TRANSECT SEABIRD SURVEY EFFORT, 2024



3.3.1.1 ENVIRONMENTAL VARIABLES AND WEATHER CONDITIONS DURING SURVEYS

Environmental variables that have the potential to impact seabird detection were plotted for visual assessments of trends in detection (Figure 3.3-2). Detections varied across weather conditions and years without clear trends in most cases; this indicates that detectability was not greatly affected by variable weather conditions. Detections appear lower in some severe adverse weather, including snow, gale-force winds, and very rough sea states (Figure 3.3-2). However, relatively few surveys were conducted during these weather conditions, making trends difficult to determine. Models were created without covariates like weather variables due to low sample sizes restricting model fit. However, visual assessment indicates this omission is not likely impacting modelling results.

3.3.2 MOVING VESSEL SEABIRD OBSERVATIONS 2018 TO 2024

Analyses of moving vessel survey data included only on-transect sightings and did not use re-sightings of the same birds. Table 3.3-3 summarizes sample sizes for surveys (transects), detections (groups), and individuals (total number of birds). Moving vessel transect sample sizes include only surveys with recorded spatial and temporal effort.

TABLE 3.3-3 SEABIRD SURVEY SAMPLE SIZES AND DETECTION AVERAGES FOR MOVING VESSEL SURVEYS, 2018 TO 2024

Year	Moving Vessel Surveys				
	Transects	Detections	Individuals	Average Individual/ Detection	Average Detection/ Transect
2018	33	150	574	3.83	4.55
2019	56	176	837	4.76	3.14
2020	81	122	677	5.55	1.51
2021	165	460	2,649	5.76	2.79
2022	140	473	1,761	3.72	3.38
2023	109	219	783	3.58	2.01
2024	96	125	498	3.98	1.30

The number of seabird detections (groups) during moving vessel surveys in 2024 was lower than in previous years (Table 3.3-3). The average detection rate per transect has been declining since 2022 (3.38 detections per survey in 2022, 2.01 in 2023, and 1.30 in 2024). In comparison, the average number of individuals per detection increased to 3.98 in 2024, compared to 3.58 in 2023, representing an increase of 11% (Table 3.3-3). This suggests that, on average, larger groups of birds but a smaller number of separate groups were observed in 2024 during moving vessel surveys, as compared to previous years. This may be influenced by a greater number of gregarious species being observed in 2024, including the glaucous gull (*Larus hyperboreus*) and razorbill (*Alca torda*), and a decrease in birds that have solitary breeding and/or foraging life history traits, including the northern fulmar (*Fulmarus glacialis*) and Wilson's storm-petrel (*Oceanites oceanicus*; Table 3.3-4).

FIGURE 3.3-2 WEATHER VARIABLES SUMMARIZED BY SEABIRD DETECTIONS

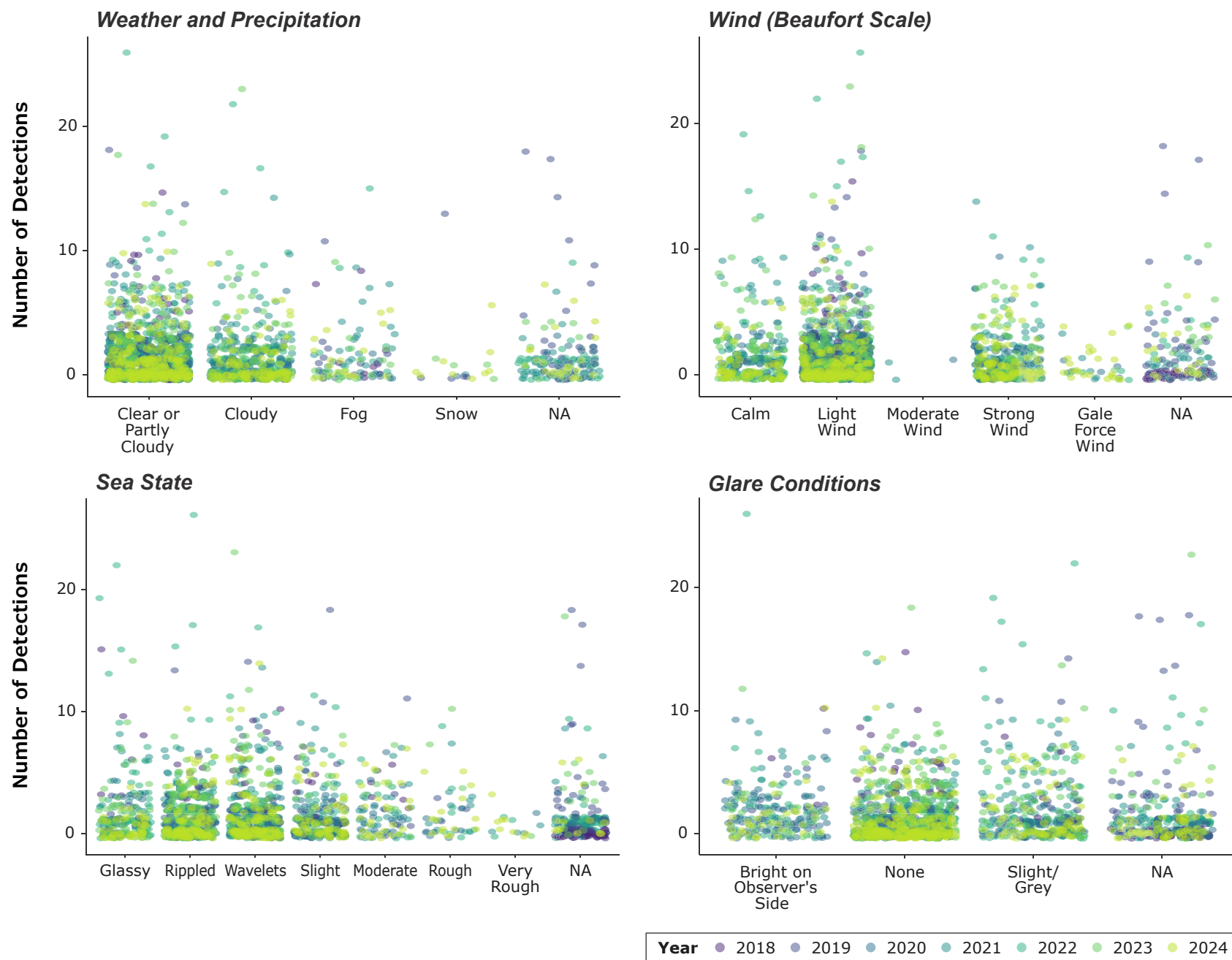


TABLE 3.3-4 BIRD SPECIES RECORDED DURING MOVING VESSEL SURVEYS, 2018 TO 2024

Species	Scientific Name	2018	2019	2020	2021	2022	2023	2024	Total
Arctic tern	<i>Sterna paradisaea</i>	0	0	0	5	0	0	0	5
Bald eagle	<i>Haliaeetus leucocephalus</i>	0	2	0	1	1	1	0	5
Black-legged kittiwake	<i>Rissa tridactyla</i>	0	12	3	0	0	10	0	25
Black guillemot	<i>Cephus grylle</i>	137	14	0	6	61	6	1	225
Black scoter	<i>Melanitta americana</i>	0	4	2	4	2	0	0	12
Cackling / Canada goose	<i>Branta hutchinsii/canadensis</i>	0	100	0	15	8	87	0	210
Common eider	<i>Somateria mollissima</i>	4	12	81	76	5	11	3	192
Common loon	<i>Gavia immer</i>	1	32	2	10	5	5	6	61
Common murre	<i>Uria aalge</i>	0	40	3	538	161	2	47	791
Dovekie	<i>Alle alle</i>	76	27	19	87	41	15	29	294
Glaucous gull	<i>Larus hyperboreus</i>	91	84	33	77	15	26	56	382
Great cormorant	<i>Phalacrocorax carbo</i>	0	0	8	1	2	0	0	11
Great shearwater	<i>Puffinus gravis</i>	0	0	1	0	1	0	4	6
Great skua	<i>Stercorarius skua</i>	0	0	48	1	2	1	40	92
Greater scaup	<i>Aythya marila</i>	0	0	0	0	0	0	1	1
Harlequin duck ^a	<i>Histrionicus histrionicus</i>	10	0	0	0	0	0	0	10
Herring gull	<i>Larus argentatus</i>	0	288	73	111	178	515	29	1,194
Iceland gull	<i>Larus glaucoides</i>	78	0	4	30	3	8	3	126
Ivory gull ^b	<i>Pagophila eburnea</i>	2	0	0	0	0	0	0	2
Leach's storm-petrel	<i>Oceanodroma leucorhoa</i>	0	8	0	16	5	1	0	30
Least sandpiper	<i>Calidris minutilla</i>	0	5	1	0	0	0	0	6
Long-tailed duck	<i>Clangula hyemalis</i>	3	4	0	14	7	0	12	40
Long-tailed jaeger	<i>Stercorarius longicaudus</i>	1	6	0	1	5	0	2	15
Manx shearwater	<i>Puffinus puffinus</i>	0	3	0	122	6	0	0	131
Northern fulmar	<i>Fulmarus glacialis</i>	43	153	300	391	678	607	150	2,322
Parasitic jaeger	<i>Stercorarius parasiticus</i>	0	0	14	25	7	24	1	71
Peregrine falcon	<i>Falco peregrinus</i>	0	3	1	3	0	0	0	7
Pomarine jaeger	<i>Stercorarius pomarinus</i>	1	7	48	1	24	12	7	100

Species	Scientific Name	2018	2019	2020	2021	2022	2023	2024	Total
Razorbill	<i>Alca torda</i>	0	0	2	63	235	184	726	1,210
Red-breasted merganser	<i>Mergus serrator</i>	0	0	2	5	4	1	0	12
Ruddy turnstone	<i>Arenaria interpres</i>	0	1	0	0	0	2	0	3
Sabine's gull	<i>Xema sabini</i>	3	1	5	0	0	0	20	29
Snow goose	<i>Chen caerulescens</i>	0	542	10	1	32	0	0	585
Snowy owl	<i>Bubo scandiacus</i>	0	1	0	7	0	0	2	10
Sooty shearwater	<i>Ardenna grisea</i>	0	0	2	9	15	0	0	26
Surf scoter	<i>Melanitta perspicillata</i>	0	0	0	0	0	7	4	11
Thayer's gull	<i>Larus thayeri</i>	0	5	1	0	0	0	1	7
Thick-billed murre	<i>Uria lomvia</i>	141	228	90	800	84	0	1	1,344
White-winged scoter	<i>Melanitta deglandi</i>	0	0	5	3	0	0	0	8
Wilson's storm-petrel	<i>Oceanites oceanicus</i>	23	8	0	23	4	179	0	237
Unknown bird	NA	0	87	0	101	2	15	15	220
Unknown duck	NA	27	76	3	73	40	0	39	258
Unknown falcon	NA	0	1	2	2	0	0	0	5
Unknown goose	NA	0	0	0	6	1	43	30	80
Unknown gull	NA	34	48	152	108	234	0	85	661
Unknown hawk	NA	0	2	0	1	0	79	2	84
Unknown jaeger	NA	0	3	0	0	0	143	4	150
Unknown murre	NA	0	0	43	113	460	0	19	635
Unknown sandpiper	NA	6	0	0	0	0	0	0	6
Total		681	1,807	958	2,850	2,328	1,984	1,339	11,947

Notes:

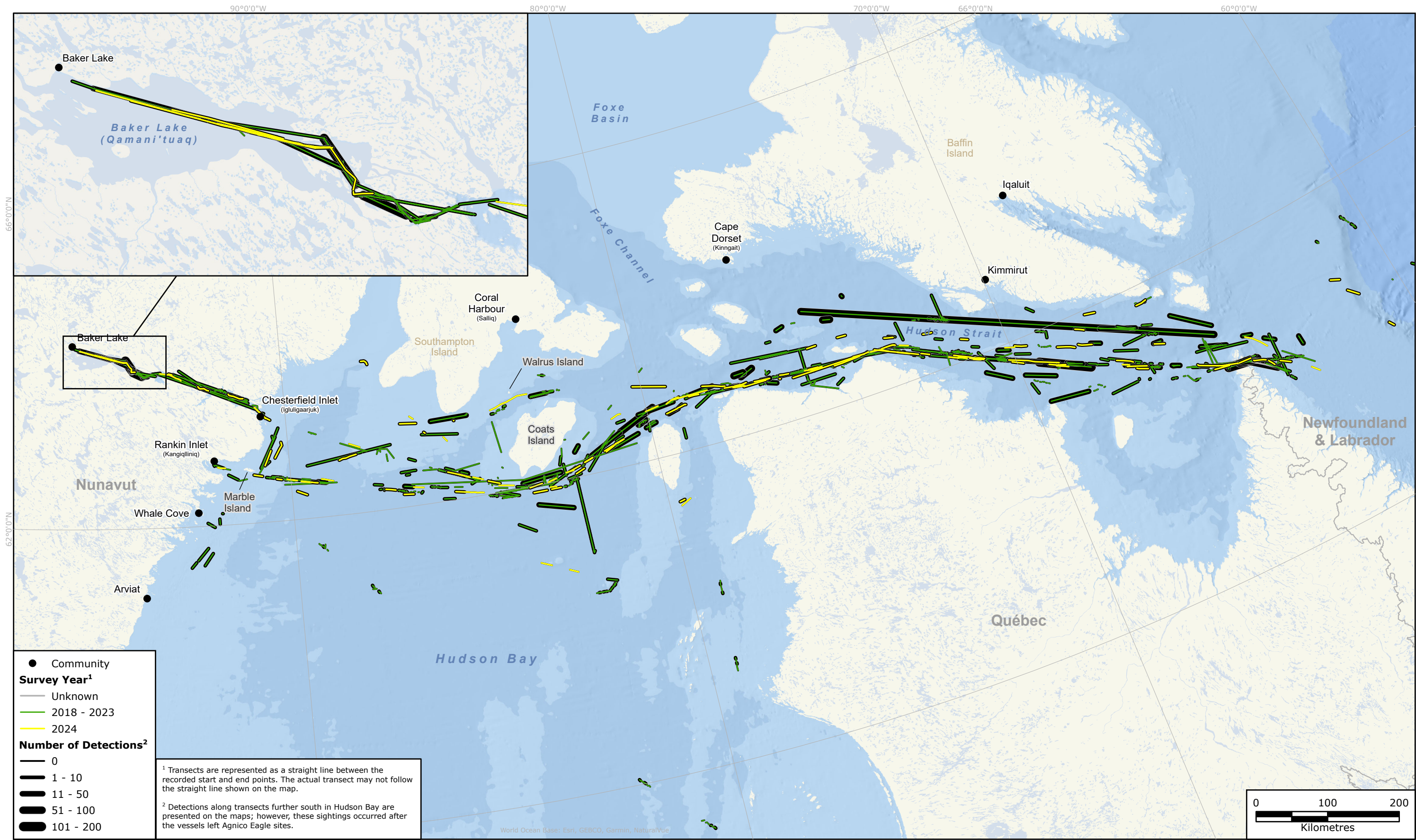
^a Species listed as Special Concern on Schedule 1 of the federal *Species at Risk Act* (2002).

^b Species listed as Endangered on Schedule 1 of the federal *Species at Risk Act* (2002).

3.3.2.1 SEABIRD SPECIES OBSERVED

The total number of seabird sightings in 2024 (including surveys without effort recorded and incidentals) were lower than in the previous 3 years, with a total of 1,339 individual birds (22 different species and an additional 7 unknown species; Table 3.3-4). Across all 7 years of survey effort between 2018 and 2024, 11,947 individual birds belonging to 39 known species and 9 unknown species have been recorded during moving vessel surveys (Table 3.3-4; Figure 3.3-3).

FIGURE 3.3-3 SURVEY DETECTIONS DURING MOVING VESSEL SURVEYS, 2018 TO 2024



The most common species recorded in 2024 were razorbill ($n = 726$) and Northern fulmar ($n = 150$). Razorbill and Northern fulmar continue to be two of the most common species recorded, which has been consistent across all survey years. Razorbill makes up approximately 54% of observations in 2024. Greater scaup (*Aythya marila*) was recorded for the first time during moving surveys in 2024, with just one observation of the species. This species was also recorded during stationary surveys in 2023 (Section 3.3.3). The total number of individuals from unidentified species in 2024 was notably lower than in previous years (194 in 2024, compared to 280 in 2023, 737 in 2022, and 404 in 2021); therefore, surveyors may be improving seabird identification skills.

3.3.2.2 DISTANCE ANALYSIS: SEABIRD DETECTION AND DENSITY ESTIMATES

Distance analysis was conducted for moving vessel surveys for each year between 2019 and 2024 and for all years combined (2018 to 2024). No distance model was fit independently for 2018 due to a low number of surveys. Distance analysis accounts for the fact that animals are more likely to be seen when they are closer to the observer, and the analysis involves two steps, namely model fitting for detectability curve and density estimates, as described below.

Model fitting was mostly consistent across years, indicating that the detectability curve was the same between years of the study (according to AIC rankings and detectability estimates; Appendix G). The best model fits across years were hazard rate functions, which means that detection remains high at closer distances (i.e., birds are just as likely to be detected between 0 and 100 m of an observer) but drops off steeply as distance increases beyond 100 m (Table 3.3-5).

TABLE 3.3-5 TOP AKAIKE'S INFORMATION CRITERION-RATED DISTANCE MODELS, MOVING VESSEL SURVEYS, 2019 TO 2024

Model Key and Adjustment	Detection Estimate ^a	Detection SE ^b	Δ AIC ^c
Hazard rate (all adjustments)	0.437	0.014	0.000
Uniform with cosine adjustment	0.429	0.166	6.331
Uniform with polynomial adjustment	0.447	0.025	23.16

Notes:

Δ = difference; AIC = Akaike's Information Criterion; SE = Standard Error

^a The detection estimate represents the average probability of detection. A higher detection estimate indicates that there is a greater probability of detecting an object at a given distance.

^b Standard error is a measure of variability where values indicate the statistical accuracy of the detection estimate.

^c Values provide relative rankings between models fit with the same data, where the lowest AIC-ranked model is considered the best fit to the data.

Detectability estimates (i.e., the probability of detecting a bird within 300 m of the observer) were also consistent between years, ranging from a low of 0.317 in 2020 to a high of 0.497 in 2022, with 2024 estimates consistent with 2021 (0.424 detection estimate in 2024, 0.432 in 2021; Table 3.3-6). A higher detection estimate indicates that seabirds are more likely to be seen and recorded, even if

they are a greater distance away from the ship/observer. The detectability estimate itself is not a key result, but consistency in estimates indicates that data are similar across years.

The second part of distance sampling is to estimate the density of seabirds, accounting for the lower detectability with greater distance. Predicted seabird densities varied across years, with 2024 being slightly less than the median for predicted seabird density (1.026 birds per km² in 2024) amongst all years (1.178 to 4.210 birds per km² and median value of 1.243; Table 3.3-6). The differences in estimated density reflect variability in the effort and number of birds detected between years.

TABLE 3.3-6 DETECTION AND DENSITY ESTIMATES BY YEAR (2019 TO 2024) DURING MOVING VESSEL SURVEYS

Year	Detection Estimate ^a	Detections 95% CIs ^b	Density (birds/km ²)	Density 95% CIs ^a
All Years	0.437	0.410–0.464	1.401	1.316–0.491
2019	0.322	0.256–0.388	1.866	0.991–3.513
2020	0.317	0.239–0.395	1.178	0.663–2.093
2021	0.432	0.391–0.473	1.243	0.527–2.928
2022	0.497	0.441–0.553	1.181	1.055–1.323
2023	0.441	0.358–0.524	4.210	3.486–5.086
2024	0.424	0.336–0.512	1.026	0.833–1.264

% = percent; CI = Confidence Interval; km² = square kilometre

^a The detection estimate represents the average probability of detection. A higher detection estimate indicates that there is a greater probability of detecting an object at a given distance.

^b Values indicate the range in which 95% of the samples fall.

Variability in the number of birds detected is driven by several elements, including random occurrence of large flocks (e.g., 100 to 200 birds), observer experience, local habitat variation near islands or channels, and time of day. These are differences in the number of birds encountered/recorded, rather than true differences in regional bird abundance. Therefore, the density estimate for all years of data together is considered the most accurate (Table 3.3-6).

3.3.3 STATIONARY VESSEL SEABIRD OBSERVATIONS 2019 TO 2024

Analyses of stationary survey data included only on-effort sightings and did not use re-sightings of the same birds. Table 3.3-7 summarizes sample sizes for stationary vessel surveys (points), detections (groups), and individuals (total number of birds). Stationary vessel survey sample sizes include only those with recorded temporal effort.

The number of seabird detections during stationary vessel surveys in 2024 was lower than previous years (n = 35 in 2024; Table 3.3-7). The number of seabird detections per survey in 2024 was 0.26, and this value has been declining since 2022 (2.17 detections per survey in 2022; 0.87 in 2023). In 2024, the average number of individuals per detection was 4.34, compared to 5.32 in 2023, representing a decrease of 23% (Table 3.3-7). The average number of individuals

per detection has decreased since a high of 8.94 in 2021 (Table 3.3-7). This indicates that seabirds have been recorded in smaller group sizes since 2021 and that both fewer seabirds and smaller groups of birds are being observed during stationary surveys. This may, in part, be due to decreases in detections of gregarious species such as herring gulls and snow geese (Table 3.3-8). The observed decrease in the average detection also aligns with when the survey methods changed to six 5-minute interval surveys, which suggests that this survey method may result in lower detection rates.

TABLE 3.3-7 SEABIRD SURVEY SAMPLE SIZES AND DETECTION AVERAGES DURING STATIONARY SURVEYS, 2018 TO 2024

Year	Stationary Vessel Surveys				
	Points	Detections	Individuals	Average Individual/ Detection	Average Detection/ Point
2018	5	0 ^a	0 ^a	-	-
2019	14	17	19	1.12	1.21
2020	90	81	318	3.93	0.90
2021	111	141	1,261	8.94	1.27
2022	29	63	263	4.17	2.17
2023	122	106	564	5.32	0.87
2024	136	35	152	4.34	0.26

Note:

Dashes (-) indicate none observed.

^a Locations were not given for 2018 stationary vessel data. Therefore, these observations were not used in analysis.

TABLE 3.3-8 BIRD SPECIES RECORDED DURING STATIONARY SEABIRD SURVEYS, 2019 TO 2024

Species	Scientific Name	2019	2020	2021	2022	2023	2024	Total
American crow	<i>Corvus brachyrhynchos</i>	0	1	0	0	3	0	4
Arctic tern	<i>Sterna paradisaea</i>	0	1	0	0	0	0	1
Black-legged kittiwake	<i>Rissa tridactyla</i>	0	8	0	0	0	0	8
Black guillemot	<i>Cephus grylle</i>	1	4	17	48	0	4	74
Black scoter	<i>Melanitta Americana</i>	2	0	9	8	0	0	19
Cackling/Canada goose	<i>Branta hutchinsii/canadensis</i>	0	25	447	90	181	17	760
Common eider	<i>Somateria mollissima</i>	0	8	3	11	0	0	22
Common loon	<i>Gavia immer</i>	0	0	2	2	0	1	5

Species	Scientific Name	2019	2020	2021	2022	2023	2024	Total
Common murre	<i>Uria aalge</i>	0	0	20	2	0	5	27
Common raven	<i>Corvus corax</i>	0	0	0	0	0	14	14
Dovekie	<i>Alle alle</i>	0	0	0	17	0	0	17
Glaucous gull	<i>Larus hyperboreus</i>	4	18	6	16	0	0	44
Great cormorant	<i>Phalacrocorax carbo</i>	0	0	1	0	0	0	1
Great skua	<i>Stercorarius skua</i>	0	0	2	0	0	0	2
Greater scaup	<i>Aythya marila</i>	0	0	0	0	2	1	3
Herring gull	<i>Larus argentatus</i>	6	64	41	64	406	290	871
Iceland gull	<i>Larus glaucoides</i>	0	0	2	19	1	0	22
Leach's storm-petrel	<i>Oceanodroma leucorhoa</i>	0	1	1	0	0	0	2
Long-tailed duck	<i>Clangula hyemalis</i>	0	0	0	2	0	0	2
Northern fulmar	<i>Fulmarus glacialis</i>	2	170	147	45	48	7	419
Parasitic jaeger	<i>Stercorarius parasiticus</i>	0	0	0	1	0	0	1
Peregrine falcon	<i>Falco peregrinus</i>	3	5	0	0	0	0	8
Pomarine jaeger	<i>Stercorarius pomarinus</i>	1	4	5	1	0	0	11
Razorbill	<i>Alca torda</i>	0	3	0	7	2	58	70
Red-breasted merganser	<i>Mergus serrator</i>	0	0	1	1	0	0	2
Sandhill crane	<i>Grus canadensis</i>	0	1	0	0	0	0	1
Snow goose	<i>Chen caerulescens</i>	0	176	419	182	117	0	894
Snowy owl	<i>Bubo scandiacus</i>	0	1	0	0	0	0	1
Thick-billed murre	<i>Uria lomvia</i>	0	17	0	3	0	0	20
White-winged scoter	<i>Melanitta deglandi</i>	0	2	0	0	0	0	2
Wilson's storm-petrel	<i>Oceanites oceanicus</i>	0	0	2	0	0	1	3
Unknown bird	NA	1	0	35	0	2	9	47
Unknown duck	NA	0	0	48	23	160	75	306
Unknown falcon	NA	0	2	0	0	0	0	2
Unknown goose	NA	0	0	0	7	25	0	32
Unknown gull	NA	4	17	59	206	16	27	329
Unknown hawk	NA	0	0	1	0	0	0	1
Unknown jaeger	NA	0	0	0	0	12	5	17
Unknown murre	NA	0	6	0	9	35	0	50

Species	Scientific Name	2019	2020	2021	2022	2023	2024	Total
Unknown ptarmigan	NA	0	0	0	0	0	16	16
Unknown sandpiper	NA	0	2	0	0	0	0	2
Total		24	536	1,268	764	1,010	530	4,132

Note:

NA = not applicable

3.3.3.1 SEABIRD SPECIES OBSERVED

A total of 4,132 individuals from 31 known species and 10 unknown species have been recorded during stationary vessel surveys between 2019 and 2024 (Table 3.3-8, Figure 3.3-4). Nearly 31% of records were from 2021 alone ($n = 1,268$ individuals), while 2023 made up an additional 24% of observations ($n = 1,010$). In 2024, 530 individuals were recorded. Among the 530 individuals in 2024, 10 species were identified, and 5 were unknown species. The most common species recorded in 2024 during stationary surveys were herring gull (*Larus argentatus*; $n = 290$), unknown duck ($n = 75$), and razorbill ($n = 58$). Similarly to the moving vessel observations, records of razorbill increased in 2024 ($n = 58$). Conversely, there were no observations of snow geese (*Chen caerulescens*) in 2024, which contrasts with previous years when more than 100 snow geese had been recorded yearly since 2021 (Table 3.3-8).

3.3.3.2 DISTANCE ANALYSIS: SEABIRD DETECTION ESTIMATE

Detection estimates indicate the relative likelihood that a seabird will be detected within the survey area (i.e., within 300 m from the observer) if it is there, taking into account the lower detectability when birds are farther away from the observer. A higher detection estimate indicates that seabirds are more likely to be seen and recorded, even if they are a greater distance away from the ship/observer. Density estimates could not be calculated for stationary surveys, as stationary effort requires repeated surveys at the same locations. While several of the stationary vessel surveys were conducted at anchor, the sample size is currently too small for modelling.

Stationary vessel surveys have limited model fitting capabilities due to lower sample size, compared to moving vessel surveys. Distance models were run for individual years from 2020 to 2024 and for all years combined (2019 through 2024), although very little data were collected in 2019.

The three key model selections were fit to estimate how quickly detectability changes with distance from the observer. Of the three model selection functions, hazard-rate models performed the best by AIC rating for all years of data combined (Table 3.3-9). However, the detection estimates for the top three AIC-rated models were low (Table 3.3-9), with relatively high standard errors, making the detection estimates unpredictable and indicating poor model fit. Therefore, the half-normal model was selected as the most representative model because it indicated a reasonable detection estimate and a low standard error (Table 3.3-9). The half-normal model estimates that detection decreases gradually with greater distance from the observer. Although the model fitting was less consistent for the stationary vessel data, compared to the moving vessel surveys, detection estimates for stationary vessel surveys were consistent between years (Table 3.3-10).

FIGURE 3.3-4 SEABIRD DETECTIONS DURING STATIONARY VESSEL SURVEYS, 2019 TO 2024

