Ornithological survey in Nunavik far north: search for Golden eagle nest and data collection for the northern component of the Québec Breeding Bird Atlas

Report, 2025

NUNAVIK MARINE REGION WILDLIFE BOARD

Votre gouvernement

Environnement et Changement climatique Canada
Service canadien de la faune

Environment and Climate Change Canada
Canadian Wildlife Service

Québec

Prepared by

Maude Fortier-Boisclair, biologist	Ministère de l'Environnement, de la Lutte aux Changements Climatiques, de la Faune et des Parcs – Direction de la gestion de la faune du Nord-du-Québec (MELCCFP-DGFa10)
Michel Robert, biologist, M. Sc.	Environment and Climate Change Canada, Canadian Wildlife Service – Québec region
Alexandre Paiement, wildlife technician	MELCCFP – Direction des espèces fauniques menacées ou vulnérable (DEFMV)

Review

Jérôme Lemaître, biologist, Ph. D.	MELCCFP – Direction générale des écosystèmes et des espèces menacées et vulnérables (DGEEMV) – DEFMV

In collaboration with

Nunavik Marine Region Wildlife Board
Canadian Wildlife Service, Environment and Climate Change Canada
Glencore Canada – Raglan Mine
Canadian Royalties Inc. – Nunavik Nickel Project

Contact information

Phone: 418 521-3830
1 800 561-1616 (toll-free)
Form: www.environnement.gouv.qc.ca/formulaires/renseignements.asp
Internet: www.environnement.gouv.qc.ca

Legal deposit – 2023
Bibliothèque et Archives nationales du Québec
ISBN 978-2-555-01812-9

Recommended citation:

Fortier-Boisclair, M., M. Robert et A. Paiement. 2025. *Ornithological survey in Nunavik far north: search for Golden eagle nest and data collection for the northern component of the Québec Breeding Bird Atlas*. Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs, Direction de la gestion de la faune du Nord-du-Québec, Québec, 22 p.

ᓀᓪᓚᑎᕐᓯᒪᑎᓪᓗᒍ

ᑖᒃᑯᐊ ᑐᓴᕐᑎᓯᐅᑏᑦ ᓄᐃᑦᓯᒍᑕᐅᔪᑦ ᖃᐅᔨᔭᐅᓯᒪᔪᓂᒃ ᑎᒻᒥᐊᓂᒃ ᖃᐅᔨᓴᕐᓂᑎᒍᑦ ᑲᔪᓯᑎᑕᐅᓯᒪᔪᓄᑦ ᔫᓂ 29-ᒥᑦ ᔪᓓ 10-ᒧᑦ, 2024-ᒥ, ᓄᓇᕕᐅᑉ ᑕᕐᕋᒪᓇᖓᓂ ᑲᑐᑦᔮᓇᔭᐅᔪᓄᑦ ᐱᓇᓱᑦᑎᖏᓐᓄᑦ ᐅᑯᐊ Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs (MELCCFP) ᐊᒻᒪᓗ ᑳᓇᑕᒥ ᐆᒪᔪᓄᑦ ᑭᒻᒪᑐᕐᕕᒧᑦ ᐊᕙᑎᓕᓇᕕᒻᒧᑦ ᐊᒻᒪᓗ ᓯᓚᐅᑉ ᐊᓯᑦᔨᐸᓪᓕᐊᓂᖓᓄᑦ ᑳᓇᑕᒥ ᐃᑉᐱᒍᓯᕝᕕᒧᑦ (CWS-Québec). ᑭᖑᓂᖓᔭᐅᔪᑦ ᐊᑦᔨᒋᓐᖓᓄᑦ ᐱᓇᓱᒐᐅᓯᒪᔪᒧᑦ ᑲᔪᓯᑎᑕᐅᓯᒪᑦᓱᓂ 2022-ᒥ ᑕᓯᐅᔭᕐᔪᐊᒥ ᐃᒣᑦ ᑕᓇᐅᕐᒧᑦ ᑰᕝᕕᖕᖏᓂ ᐃᒪᓴᓪᓚᕌᖅᕕᖕᖏᓐᓂᓗ (Fortier-Boisclair *et al.*, 2023).

ᑖᑦᓯᒪ ᐱᓇᓱᒐᐅᑉ ᑐᕌᓪᓚᓪᓚᓇᖕᖓ ᖁᓖᒻᒥᔫᓕᒃᑯᑦ ᖃᐅᔨᓴᕐᓂᖅᑲᕐᓂᖅ ᓇᑦᑐᕋᓕᓐᓂᒃ (*Aquila chrysaetos*) ᓄᓇᕕᐅᑉ ᓯᑦᔭᖏᓐᓂ ᐊᒥᓱᐃᓂ ᖃᕐᖁᑦ ᐃᓐᓈᕈᖏᓐᓂ, ᐅᒣᑦᑐᓂᒃ ᖃᐅᔨᓴᕐᕕᐅᓚᓇᓚᐅᕐᓯᒪᖕᖏᑐᓂ. ᖃᐅᔨᓴᕐᕕᐅᓚᓇᑦᓯᒪᔪᑦ ᓯᑦᔭᓃᑦᑐᑦ ᐃᒣᓪᓗᐊᓚᒃᑳᑦᑐᓂᒃ ᓯᕕᑐᓂᓪᓕᒫᑦᑐᑦ 75 km, ᖃᓂᑕᖓᓂ ᓄᕘᑉ ᑕᓇᐅᖓᑕ, ᑎᑭᐅᑎᓯᒪᑦᓱᓂ ᐊᓇᐅᓕᕐᕕᐅᑉ ᑕᓯᐅᔭᖓᓂᑦ ᓂᐱᕝᕕᐊᓂ ᑎᑭᑦᓱᓂ 70 km ᓯᕿᓂᖓᓂ ᐅᐃᓐᓂᕚᓯᖓᓂ ᑲᖏᕐᓱᔪᐊᑉ ᓄᐃᕕᐊᓂ ᓂᓪᒋᒥ. ᖃᐅᔨᓴᕐᓂᑎᓂ ᓇᓗᓀᕐᓯᒪᔪᑦ 173-ᓂᒃ ᓇᑦᑐᕋᓖᑦ ᐅᓪᓗᖏᓐᓂᒃ, 30-ᖏᑦ ᓇᑦᑐᕋᓕᑦᑕᖃᓚᐅᔩᑦ ᐊᑐᕐᑕᐅᓯᑎᒃ 2024-ᒥ. 80%-ᖏᑦᑕ ᐅᖓᑖᓅᕐᑐᑦ ᓇᑦᑐᕋᓖᑦ ᐅᓪᓗᖏᑦ ᑕᑯᔭᐅᓯᒪᔪᑦ ᑭᖑᓂᕐᒥ ᑭᑎᑕᐅᓂᖃᓚᐅᕐᓯᒪᖕᖏᑐᑦ. ᖃᐅᔨᓴᕐᓂᑎᓂ ᓇᓗᓀᕐᓯᓚᐅᔪᒻᒥᔪᑦ ᐊᑐᕐᑕᐅᔪᓂᒃ ᐱᑕᓕᖓᓂᒃ ᑭᒻᒪᕖᑦ (*Buteo lagopus*) ᐅᓪᓗᖏᓐᓂᒃ, 75 ᐊᑐᕐᑕᐅᔪᓂᒃ ᐱᑕᓕᖓᓂᒃ ᑭᒻᒪᕕᕐᔪᐊᑦ (*Falco peregrinus*) ᐅᓪᓗᖏᓐᓂᒃ, 3 ᐊᑐᕐᑕᐅᔪᓂᒃ ᐱᑕᓕᖓᓂᒃ ᕿᓐᓄᐊᔪᐊᑦ ᒥᑭᓂᕐᓴᑦ (*Falco rusticolus*) ᐅᓪᓗᖏᓐᓂᒃ ᐊᒻᒪᓗ 2 ᐅᑉᐱᐊᓘᒃ ᐊᑐᕐᑕᐅᔪᓂᒃ ᐱᑕᓕᖓᓂᒃ ᐅᓪᓗᖏᓐᓂᒃ (*Bubo scandiacus*). ᐱᓇᓱᐊᕐᓂᕗᑦ ᑐᕌᓚᒃᑲᓚᐅᔫᖅ ᐳᑯᓐᓂᓂᒃ ᑐᑭᓯᐅᑎᑦᓴᓂᒃ ᑕᕐᕋᒦᓰᑦ ᓇᓂᓯᐅᑎᐅᒍᓐᓇᓂᐊᕐᑐᓂᒃ ᑯᐯᒥ ᐱᐊᕐᕿᐅᓰᑦ ᑎᒻᒥᐊᑦ. ᐳᑯᓚᐅᔪᔪᑦ ᐱᐊᕐᕿᐅᓰᒍᓂᖏᑦᑕ ᓇᓗᓀᕐᑕᐅᓚᓇᐅᑎᖏᓐᓂᒃ 47 ᑎᒻᒥᐊᑦ ᐊᑦᔨᒌᖕᖏᑐᑦ, ᐃᓚᐅᑎᓗᒋᑦ ᑕᑯᑦᓴᐅᓯᐊᓚᐅᕐᓯᒪᖕᖏᑐᑦ, ᐆᑦᑑᑎᒋᑦᓯᒋᑦ ᖃᓴᐅᑦ ᐁᑉᐸᖏᑦ (*Gavia pacifica*), ᒥᑏᑦ ᕿᖕᓚᓖᑦ (*Somateria spectabilis*) ᐊᒻᒪᓗ ᑐᐊᓪᓚᔫᖅ (*Calidris alpina*), ᐊᓯᖏᑦ "ᑯᑦᓴᓇᕐᑐᒦᑦᑐᑦ", ᐆᑦᑑᑎᒋᑦᓯᒋᑦ ᓴᐅᒃᑮᖅ (*Phalaropus lobatus*), ᐅᐱᒃ (*Asio flammeus*) ᐊᒻᒪᓗ ᐃᕕᒐᖅ (*Histrionicus histrionicus*). ᑕᑯᓚᐅᔪᒻᒥᔪᑦ ᐅᓪᓗᖏᓐᓂᒃ ᐃᓱᖕᖓᖅᓘᑉ (*Stercorarius pomarinus*), ᓯᕗᓪᓕᐋᒥ ᐅᓪᓗᖏᑦ ᑕᑯᔭᐅᓯᓇᐅᕐᑯᓚᐅᔩᑦ ᐅᒣᑦᑐᐃᑦ ᑯᐯᒥ 1930-ᒥᓂᑦ.

ᓇᑯᕐᒪᑕ ᐱᓇᓱᐊᕐᓯᒪᔪᑦ 2022-ᒥ (Fortier-Boisclair *et al.*, 2023), ᐊᒻᒪᓗ UL 2024-ᒥ (ᑖᓐᓇ ᖃᐅᔨᓴᕐᓂᖅ), ᓄᓇᕕᐅᑉ ᓯᑦᔭᖏᑦ ᐅᓄᕐᓂᓴᒻᒪᕇᑦ ᖃᐅᔨᓴᕐᕕᐅᓯᒪᓕᕐᑐᑦ ᖁᓖᒻᒥᔫᓕᒃᑯᑦ ᓇᑦᑐᕋᓕᓐᓄᑦ. ᐊᓕᐊᑉᐳᒧᑦ ᐊᓕᐊᓕᕐᑐᒧᑦ ᑐᓴᕐᑎᓯᒥᐊᒥᒃ ᐱᓇᓱᐊᕐᑕᕗᓄᑦ ᐱᓚᕿᓯᒪᓕᕋᑦᑕ ᐅᓄᕐᑐᒪᓇᓐᓂᒃ ᓄᑖᓂᒃ ᑐᑭᓯᐅᑎᑦᓴᓂᒃ ᓇᑦᑐᕋᓖᑦ ᐅᓪᓗᖃᕐᕕᒋᔫᖏᓐᓂᒃ, ᑯᐯᒥ ᓇᓗᓀᕐᑕᐅᒪᓕᕐᑑᑉ ᐃᑉᐱᒋᔭᐅᑦᓯᐊᓇᐊᖃᓕᕐᓂᖓ ᐊᑖᒍᑦ *ᐱᖁᔭᐅᑉ ᐱᑦᔪᑎᓕᐅᑉ ᐊᓯᐅᖏᓐᓇᓂᐅᔭᓕᕐᑐᓄᑦ ᐅᕝᕙᓘᓐᓃᑦ ᓄᖑᖏᓐᓇᓂᐅᔭᓕᕐᑐᓄᑦ ᐆᒪᔪᓄᑦ*. ᑐᑭᓯᓇᕐᓂᓴᐅᓕᕐᑐᖅ ᐅᓄᕐᓂᓴᒻᒪᕆᖏᑦ ᓇᑦᑐᕋᓖᑦ ᐱᐊᕐᕿᐅᓰᑦ ᐊᒥᐊᓲᑲᐅᑉ ᑕᕐᕋᖓᑕ ᓂᓪᒋᖓᓂ ᐅᒣᑦᒍᒋᐊᖏᓐᓂᑕᐅᖅ ᓄᓇᕕᒻᒥ. ᖃᐅᔨᒪᓂᕐᑖᕆᓯᒪᓕᕐᑕᕗᑦ 2022-ᒥᓂᑦ ᑐᓂᕿᓯᒍᑕᐅᓚᖓᔪᑦ ᐃᖏᕐᕋᓯᑎᑕᐅᓂᖏᓐᓄᑦ ᒪᓕᒐᑦᓴᑦ ᐅᖑᒪᔭᐅᒋᐊᖃᕐᓂᖏᓐᓄᑦ ᐊᒻᒪᓗ ᖃᓄᐃᓪᓗᐊᓯᒪᓂᕆᓯᒪᔭᒥᓄᑦ ᐅᑎᕐᑎᑕᐅᒋᐊᕐᓂᖏᓐᓄᑦ ᑖᒃᑯᐊ ᐆᒪᔪᐃᑦ.

Summary

This report presents the results of ornithological surveys conducted from June 29 to July 10, 2024, in the far north of Nunavik by a joint team from the Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs (MELCCFP) and the Canadian Wildlife Service of Environment and Climate Change Canada (CWS–Québec). It follows a similar project carried out in 2022 in the Hudson Bay watershed (Fortier-Boisclair *et al*., 2023).

The main objective of this project was to conduct helicopter surveys for Golden eagle (*Aquila chrysaetos*) in a coastal area of Nunavik with many rock faces, but which had never been extensively covered by such surveys. The main study area was a coastal strip approximately 75 km wide, adjacent to the Hudson Strait, extending from Wolstenholme Bay in the west to 70 km southeast of Kangiqsujuaq in the east. Our surveys led to the identification of 173 eagle nests, 30 of which were active in 2024. More than 80% of the eagle nests discovered had never been inventoried before. Our surveys also identified 175 active Rough-legged hawks (*Buteo lagopus*) nests, 75 active Peregrine falcon (*Falco peregrinus*) nests, 3 active Gyrfalcon (Falco rusticolus) nests, and 2 active Snowy owl (*Bubo scandiacus*) nests. Our work also aimed to collect data for the northern component of the *Atlas of Breeding Birds of Québec*. We collected breeding evidence for 47 bird species, including some rare ones, such as the Pacific loon (*Gavia pacifica*), the King eider (*Somateria spectabilis*), and the Dunlin (*Calidris alpina*), as well as others considered "at risk", such as the Red-necked phalarope (*Phalaropus lobatus*), the Short-eared owl (*Asio flammeus*), and the Harlequin duck (*Histrionicus histrionicus*). We also found a Pomarine jaeger (*Stercorarius pomarinus*) nest, which would be the first nest of this species discovered in Québec since 1930.

Thanks to the work we conducted in 2022 (Fortier-Boisclair *et al*., 2023), then in 2024 (this study), the vast majority of Nunavik's coasts have now been surveyed by helicopter for Golden eagles. We are pleased to note that our work has led to the acquisition of an impressive quantity of new data on the nesting of this bird, designated as vulnerable in Québec under the *Act respecting threatened or vulnerable species*. It is clearer than ever that a large proportion of the Golden eagle that breed in eastern North America do so in Nunavik. The knowledge we have acquired since 2022 should contribute to the implementation of measures to protect and recover the species.

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Acknowledgements

We would like to thank the MELCCFP wildlife technician and the CWS–Québec biologists who took part in the inventory work or contributed to the drafting of this report: Alexandre Paiement, Michel Robert and Hilde Marie Johansen. We also thank the biologists and technicians who reviewed and commented on this document. We are grateful to the Nunavik Marine Region Wildlife Board for its financial contribution to the project. Lastly, we thank Raglan Mine–Glencore and Canadian Royalties Inc. for their in-kind contributions, as well as pilot Nicolas Canard from Passport Hélico.

Introduction

This project, which follows the one we conducted in 2022 in the Hudson Bay watershed (Fortier-Boisclair *et al.,* 2023), had as its main objective the continued acquisition of knowledge about the breeding population of the Golden eagle (*Aquila chrysaetos*) in Nunavik, this time focusing on the Hudson Strait area. It was made possible through financial support from the research fund of the Nunavik Marine Region Wildlife Board. The project is the result of close collaboration between the Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs (MELCCFP) and the Canadian Wildlife Service of Environment and Climate Change Canada (CWS–Québec).

The Golden eagle experienced a significant decline in North America over the course of the 20th century, mainly due to human persecution (shooting, trapping, and disturbance) and contamination by pollutants such as DDT, which severely compromised its reproductive success (Katzner *et al.*, 2012). The species' status remained precarious in the early 2000s, leading to its designation as vulnerable in 2005 under Québec's *Act respecting threatened or vulnerable species* (CQLR, c. E-12.01, LEMVQ). Furthermore, its recovery plan in Québec has been extended through 2030 (EROP, 2020).

Québec is home to approximately two-thirds of the Golden eagles that breed in eastern North America, making this region critical for maintaining a viable population. Moreover, a very large proportion of Québec's breeding Golden eagles are found in Nunavik (Robert *et al*., 2019; Morneau *et al*., 2015). As such, detailed knowledge of the species' distribution within this vast territory is essential to support the development of conservation and recovery measures.

Secondly, the project sought to collect data for the northern component of the *Atlas of Breeding Birds of Québec*, i.e., gathering breeding evidence for as many species as possible in as many atlas squares as possible north of latitude 50°30′ N (see Robert *et al*., 2019). This hard access region contains over 11,000 atlas squares, yet relatively few data have been collected there since 2010—particularly in the far north of Nunavik. Given the numerous breeding records gathered in the watershed of the Hudson Bay in 2022 (Fortier-Boisclair *et al.,* 2023), it was considered highly appropriate to build on the golden eagle survey efforts to expand the search for breeding evidence to the Hudson Strait area.

Finally, the project aimed at gathering as much information as possible on the nesting of other bird species at risk (besides the Golden eagle), meaning bird listed—or likely to be listed—under the ARTVS or the Canadian *Species at Risk Act* (S.C. 2002, c. 29, SARA), by verifying their presence at previously known nesting sites or by searching for new ones.

Study area and fieldwork

The study area covered a coastal strip approximately 75 km wide adjacent to the Hudson Strait, extending from east of Wolstenholme Bay in the west to 70 km southeast of Kangiqsujuaq in the east (Figure 1). This area was selected due to its high concentration of rock faces offering good nesting potential for several species of raptors. Furthermore, the Hudson Strait region remained one of the last major Golden eagle nesting areas in Nunavik that had not yet been thoroughly surveyed. In some places, the study area extended farther inland to include other zones with high potential for Golden eagle nesting. It also included a 30 km radius zone centered around a wind turbine project by Raglan Mine. This area was surveyed under an agreement between Glencore and MELCCFP, with the aim of minimizing air traffic and disturbance to local wildlife, including the migratory caribou[1].

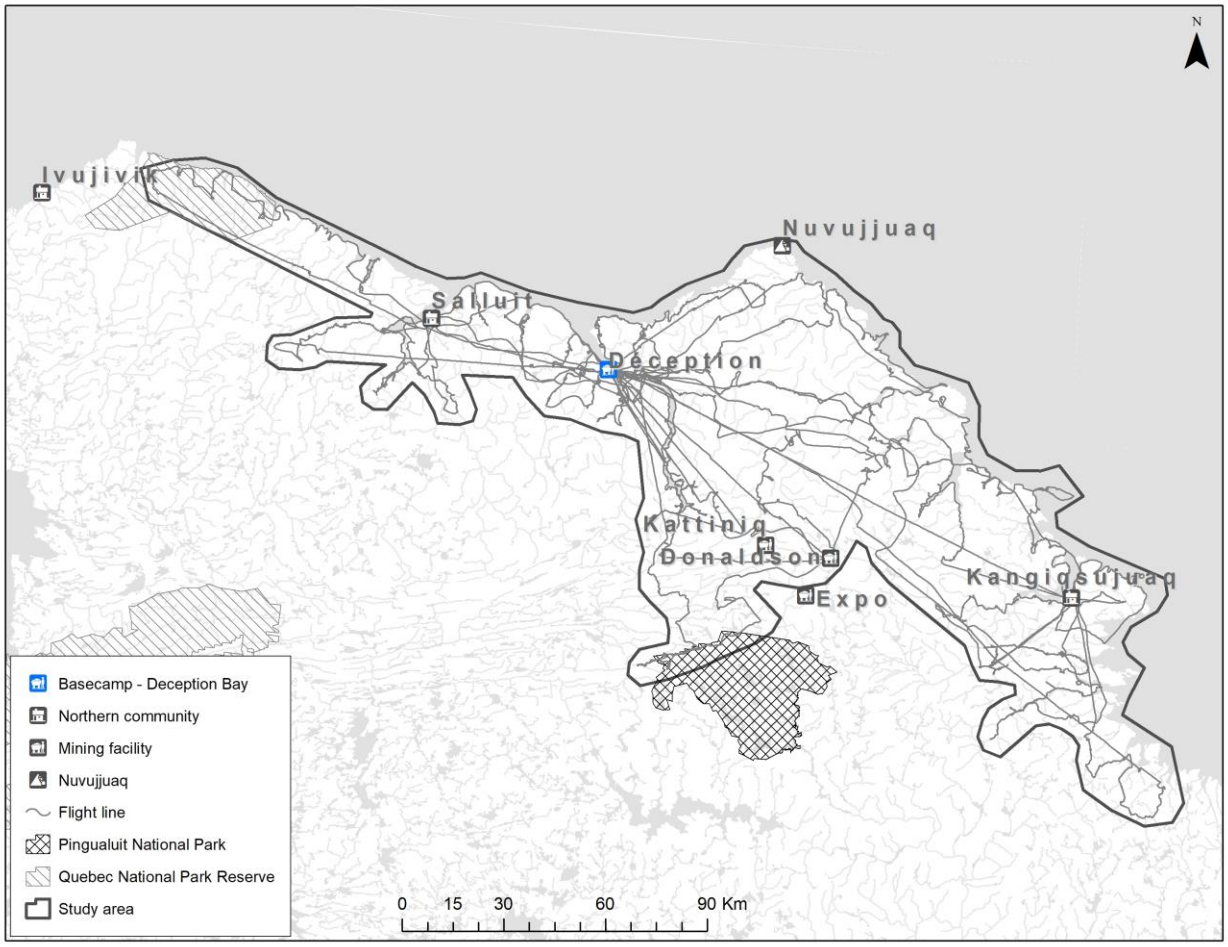

Figure 1. Study area and helicopter flight path from June 29 to July 10, 2024.

[1] Glencore had already planned to carry out an aerial ornithological inventory in the same area and during the same period as this project. MELCCFP therefore reached an agreement with Glencore to ensure that only one of the two surveys would be carried out, thereby reducing disturbance to local wildlife.

We met with the coordinators of the Anguvigaqs in Kangiqsujuaq, Salluit and Ivujivik at their offices on May 28, 29 and 31, 2024, respectively, for logistic purposes. During the meetings in Salluit and Ivujivik, some members of these Anguvigaqs also attended the project presentation, which gave us the opportunity to collect their concerns and comments on the project.

The fieldwork ran from June 29 to July 10, 2024, during which time the crew flew 57 hours and covered 7,441 kilometres aboard an Eurocopter AS350 B2 helicopter (Figure 1). The team was housed at the Bombardier camp facilities at Deception Bay. The positioning of the aircraft was handled from Bombardier camp.

Data entry

All data collected during the project were added to the *Atlas of Breeding Birds of Québec* database via NatureCounts and, where relevant, to the SOS-POP database, to be integrated into the Centre de données sur le patrimoine naturel du Québec (CDPNQ). The data were also transferred to the eBird database, taking care not to release the exact locations of at-risk species, except[2] in specific cases.

Birds of prey and Common raven[3]

Our work led to the discovery of nests belonging to five species of birds of prey: Golden eagle, Peregrine falcon (*Falco peregrinus*; a species likely to be designated threatened or vulnerable under the ARTVS), Rough-legged hawk (*Buteo lagopus*), Gyrfalcon (*Falco rusticolus*), and Snowy owl (*Bubo scandiacus*), as well as nests of Common raven (*Corvus corax*). Our work also led to the observation of several Short-eared owls (*Asio flammeus*; a threatened species listed in Schedule 1 of SARA and a species likely to be designated threatened or vulnerable under the ARTVS), and one Bald eagle (*Haliaeetus leucocephalus*; a species designated as vulnerable under the ARTVS) (Figure 2).

[2] We provided the exact locations of some observations of at-risk species—specifically those for which disclosure posed no risk to the species concerned.

[3] The Common raven is included in this section simply because it builds nesting structures similar to those of birds of prey.

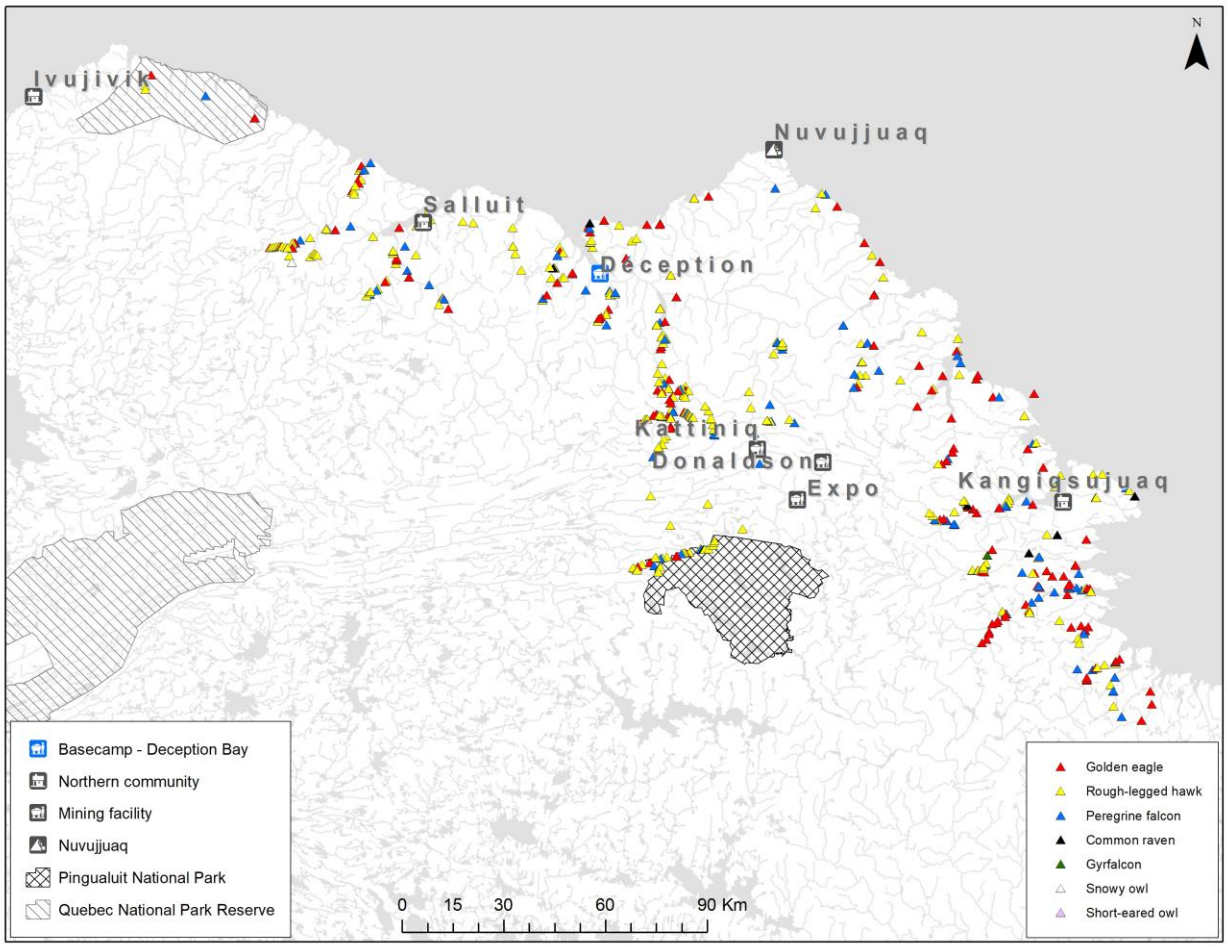

Figure 2. Raptor and common raven observed during the current project.

For all these species combined, 565 nesting sites were identified, of which 295 were considered active in 2024 (Table 1). A nesting site was considered active when at least one egg or chick was present at the time of the survey (Morneau *et al.,* 2015). Sites that were destroyed or in poor condition were not counted for the purposes of this project, although they were used to update the SOS-POP database.

Table 1: Number of nesting sites for each bird of prey species and for the Common raven

Species	Number of nesting sites	
	Active	Inactive
Golden eagle	30	143
Rough-legged hawk	175	86
Peregrine falcon	75	41
Common raven	13	5
Snowy owl	2	-
Short-eared owl	1	-
Gyrfalcon	3	2
Unknown	-	4

An area[4] of 5,825 km² was covered to search for Golden eagle nests during this project. This effort led to the identification of 173 nests, of which 142 (82%) were previously unrecorded. Of the 30 active nests found in 2024, 26 (86.7%) were newly documented nest sites for this species (Figure 2). It should be noted that nests discovered in 2007, 2016 and 2018 were still being used by the species at the time of this survey.

Several Snowy owls were observed during this project, including a few active nests. Furthermore, unlike the results obtained in 2022 in the Hudson Bay area, we found a large number of active Rough-legged hawk nests in 2024 (n = 175), clearly indicating that this was a productive year for small mammals in this region of Nunavik. It is well known that the density of Rough-legged hawk breeding pairs varies from year to year and depends on the density of lemmings and voles, its preferred prey. (Bechard *et al.,* 2020; Anctil *et al.,* 2019). The same is true for the Snowy owl (Holt *et al.,* 2024), which explains the high number of individuals observed during this project.

Atlas of the Bredding Birds of Québec (northern component)

In total, we collected 1,177 breeding evidence for 56 bird species across 154 atlas squares. Breeding was confirmed for 30 of these species based on observed behaviours, while the best breeding evidence obtained was classified as "probable" or "possible" only for 14 and 3 species, respectively. The remaining 9 species were observed in unsuitable nesting habitat and were therefore assigned code X (species observed only).

The figure 3 shows the 154 atlas squares from which our observations originated. The table 2 lists some of the species identified during this project and indicates, for each one, the number of atlas squares and the total observations, as well as the best level of breeding evidence for each species within the study area[5]. To be noted, the Thick-billed murre (*Uria lomvia*) is assigned code X in this table solely because it does not breed in the only square where it was observed during this project. In fact, we deliberately avoided approaching the cliffs in the Wolstenholme area, where this murre breeds in very large numbers, in order to avoid disturbance and in respect of the concerns expressed by Ivujivik community members.

[4] As a general estimate, we calculated the area covered by assuming a detection zone extending 500 metres on either side of the helicopter, recognizing that the ability to detect raptor nests can vary greatly depending on topography and weather conditions.

[5] The full list of species identified appears in Appendix 1.

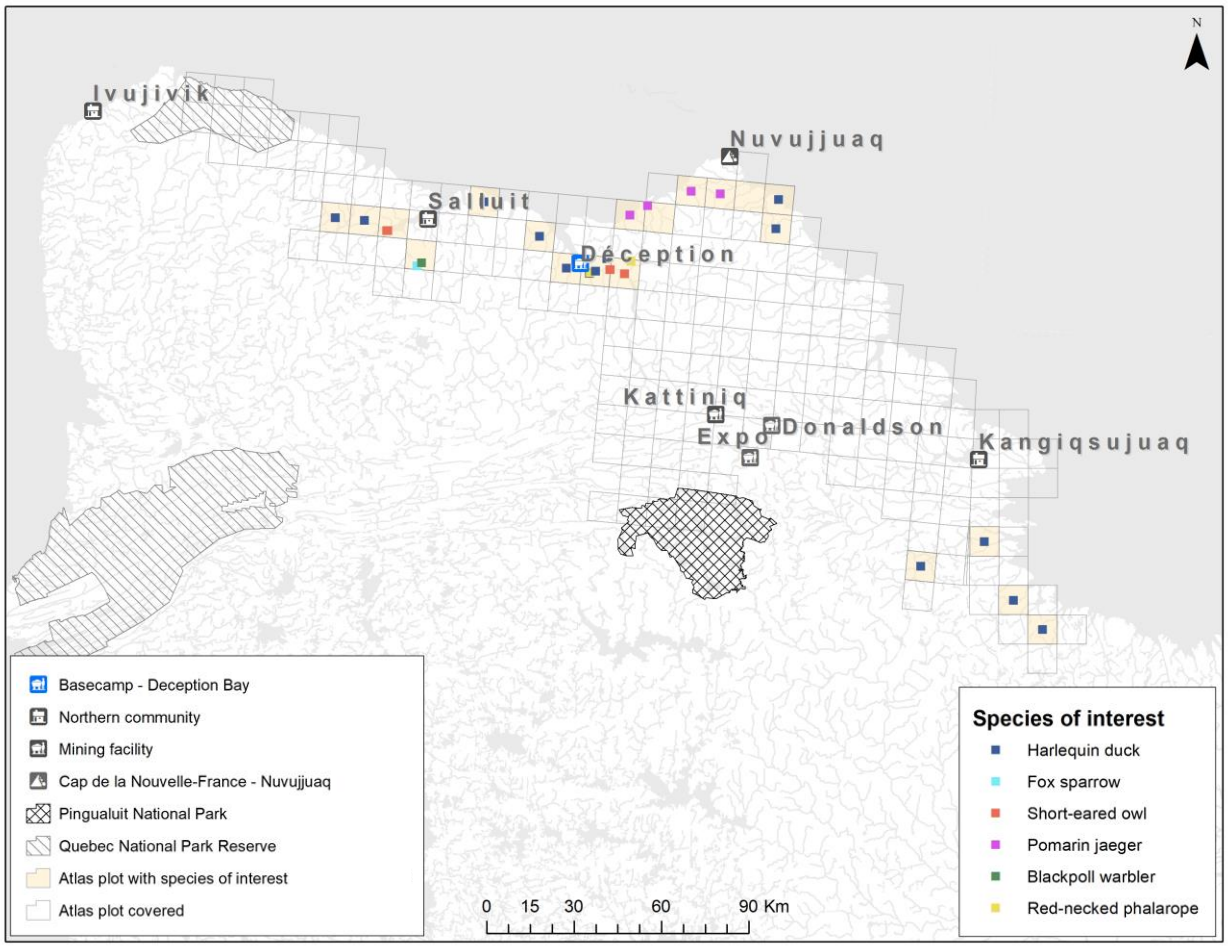

Figure 3. Atlas survey squares overflown during this project. Coloured squares are those where the field tam conducted ground surveys.

A large portion of our flight time was spent scanning rock faces, it is not surprising that the species most frequently observed were raptors (Rough-legged hawk, Peregrine falcon, and Golden eagle) or other birds that typically nest on such structures, such as the Common raven, Snow bunting, and Canada goose. Furthermore, the species that rank quite high in Table 2 include birds that are rather easy to detect from a helicopter, either because of their large size or their white plumage. (e.g., Canada goose, Rock ptarmigan, Herring gull, Snowy owl).

Table 2: Partial list of species observed during the current project

Species	Atlas squares		Observations	Breeding evidence
	N	%	N	Level of certainty
Rough-legged hawk	96	62,3	114	Confirmed
Snow bunting	93	60,4	117	Confirmed
Canada goose	82	53,2	115	Confirmed
Peregrine falcon	68	44,2	80	Confirmed
Golden eagle	58	37,7	62	Confirmed
Rock ptarmigan	47	30,5	58	Confirmed
Herring gull	32	20,8	52	Confirmed
Snowy owl	21	13,6	26	Confirmed
Harlequin duck	13	8,4	20	Probable
Pacific loon	5	3,2	8	Confirmed
King eider	4	2,6	6	Confirmed
Short-eared owl	4	2,6	6	Probable
Gyrfalcon	4	2,6	4	Confirmed
Pomarine jaeger	4	2,6	4	Confirmed
Red-necked phalarope	3	1,9	5	Probable
Bald eagle	2	1,3	5	Observed only (X)
Dunlin	1	0,6	2	Probable
Fox sparrow	1	0,6	1	Probable
Red-winged blackbird	1	0,6	1	Observed only (X)
Thick-billed murre	1	0,6	1	Observed only (X)
Hooded merganser	1	0,6	1	Observed only (X)
Ross's goose	1	0,6	1	Observed only (X)
Greater white-fronted goose	1	0,6	1	Possible
Blackpoll warbler	1	0,6	1	Probable

Aside from the presence of species at risk (addressed below), some of our observations are particularly noteworthy, especially the observation of the Pomarine jaeger (*Stercorarius pomarinus*) in four atlas squares (Figure 3) along the Hudson Strait, between Deception Bay (Salluit Tullio) and Cape of Nouvelle-France (Nuvujjuaq). On the morning of July 2nd, after spotting two jaegers from the helicopter, we landed and thoroughly searched the surrounding Arctic peatland. We then found a nest containing two eggs (https://ebird.org/checklist/S185324834). This nest appears to be the first discovered in Québec in nearly a century, as the only previously recorded Pomarine jaeger nests in the province were documented by W. E. Clyde Todd in 1930: on June 21st near Inukjuak, and on July 17 near Puvirnituq (Todd, 1963). It is also worth noting that no breeding evidence had yet been recorded for the Pomarine jaeger in the second atlas. Our observations of this species during the project are therefore remarkable.

We also collected breeding evidence for the Blackpoll warbler (*Setophaga striata*) and Fox sparrow *(Passerella iliaca*) in the valley of Foucault River, near Salluit (Figure 3). This valley currently represents the northernmost location in Québec where these two passerine species are known to breed.

On June 27, about ten kilometres from Deception Bay along the road, we observed two Greater white-fronted geese (*Anser albifrons*), a species whose breeding in Québec has never been documented. While our observation corresponds only to a "possible breeding", it adds to a handful of other sightings (including two in 2024) of the species in Nunavik during the breeding season. This suggests that conclusive evidence of breeding on Québec soil could soon be found.

On July 9, a bit east of Kangiqsujuaq, we were also fortunate to observe a molting Ross's goose (*Anser rossii*) accompanied by Canada geese (https://ebird.org/checklist/S186239425). While this observation cannot be linked to any breeding evidence, it is worth noting that a group of nine Ross's geese accompanied by Canada geese had been observed on June 15, 2024 (prior to our arrival in the study area), along the Canadian Royalties mining road between the Méquillon and Ivakkak mines (https://ebird.org/checklist/S181959020). It is also relevant to mention that the Ross's goose population nesting on Southampton Island, Nunavut, has increased tenfold since the 1970s (Abraham *et al.*, 2020), making it entirely plausible that the species may already be breeding in Québec—or will be soon.

In another surprising finding, we observed a Red-winged blackbird (Agelaius phoeniceus)—a species never before reported in Nunavik—on July 9, along the shoreline about 45 km northwest of Kangiqsujuaq (https://ebird.org/checklist/S186207635). This individual was clearly lost! We also encountered an immature Bald eagle (likely the same individual each time) near our camp at Deception Bay, the northernmost location where the species has been reported in Québec to date. Additionally, we observed a Hooded merganser (*Lophodytes cucullatus*) near Cape of Nouvelle-France (Nuvujjuaq), much farther north than the very few previous sightings of this species in Nunavik, all of which were near Kuujjuaq.

As for species at risk, we observed the Short-eared owl (a **threatened** species listed in Schedule 1 of SARA and likely to be designated as **threatened** or **vulnerable** under the ARTVS) in four atlas squares, the northernmost in Québec where the species has been reported to date. These squares were all located in valleys near Salluit or Deception Bay (Figure 3). The same applies to the Red-necked phalarope (*Phalaropus lobatus*; a species of **special concern** listed in Schedule 1 of SARA), which we observed in three squares (Figure 3). Both species are likely more widespread in the study area than what our results suggest.

Lastly, as was the case in 2022 (Fortier-Boisclair *et al.,* 2023), our 2024 results concerning the Harlequin Duck (*Histrionicus histrionicus*; a species of **special concern** listed in Schedule 1 of SARA and vulnerable under the ARTVS) are particularly interesting. In total, we recorded 42 individuals across 13 atlas squares, all of which were located north of the range previously documented in the second atlas. Our surveys also extended the known breeding range of the species farther north in Québec. It is worth noting that this small duck likely nests in every square where we observed it, even though we were unable to confirm breeding during this project. In fact, our surveys were simply conducted a little too early in the season to observe harlequin ducklings.

Discussion

The Golden eagle nesting effort undertaken during this project has clearly proven to be a relevant addition to the one we deployed in the Hudson Bay area in 2022 (Fortier-Boisclair *et al.*, 2023). It paid off, given the high number of active nests found and the fact that the majority had never been recorded before (Figure 2).

The last Golden eagle survey conducted in the northern portion of Nunavik dated back to 2018 and covered only the eastern coastal portion of the Hudson Strait, from north of Kangiqsujuaq to Kuujjuaq (Anctil *et al.*, 2019). The present inventory added 142 Golden eagle nests to those documented in 2018, representing an 82% increase (142/173) in the Hudson Strait region. Of the 173 nests recorded in 2024, 17% (n = 30) were active. In comparison, 81% (133/164) of the nests found in 2022 in the Hudson Bay watershed had never been previously documented, and 21% were active at the time of the survey (Fortier-Boisclair *et al.*, 2023). As such, our 2022 and 2024 findings for the Golden eagle are similar. In our view, these results suggest that both the Hudson Bay and the Hudson Strait areas could be selected for a new long-term monitoring program for the Golden eagle productivity in Nunavik. The many nests found in these regions, including many unoccupied ones, indicate that the areas could support a larger population, assuming there is enough feeding ground (Morneau *et al.*, 2012).

Our results also show that the Rough-legged Hawk commonly breeds in Nunavik during years when lemmings are abundant. Of the 259 Rough-legged Hawk nests we identified in 2024, 175 (68%) were active. It is likely that many of the 29 (all inactive) nests we found in 2022 in the Hudson Bay watershed would have been occupied had we surveyed them during a year of high lemming abundance. That said, the far north of Nunavik likely hosts many more breeding Rough-legged Hawks than the Hudson Bay sector. The same holds true for the Snowy Owl, which we also found in significant numbers in 2024—again due to the high lemming population that year.

In the context of northern Québec's economic development, it is increasingly important to consider the significance of the Hudson Strait area for the breeding of Golden eagles and other raptors. The discovery of several new nests in 2024 in areas such as Watts Lake and its tributaries, Puvirnituq River, Guichaud River, and Wakeham River indicates that the far north of Nunavik is extensively used by these species. As some of the areas where we found eagle nests are close to mining project sites, it is to be expected that actions may have to be taken to minimize the impact of these activities on Golden eagle nesting.

As for the northern component of the *Atlas of Breeding Birds of Québec*, our 2024 results are, overall, satisfactory. It is important to note that most of the fieldwork this year focused on locating raptor nests from a helicopter, which meant we were unable to spend much time exploring, on foot, various habitats of special interest (e.g., coastal arctic peatlands, tall shrub areas in south-facing valleys). Despite this, we gathered breeding evidence for 47 species, including some particularly rare ones (e.g., Pomarine jaeger, Pacific loon, King eider, Gyrfalcon, Dunlin). Furthermore, our results suggest that some bird species for which there is currently no confirmed breeding in Québec (Greater white-fronted goose, Ross's goose) may indeed breed in the far north of Nunavik. As expected, we also pushed the known breeding range northward for several species, including three species at risk (other than the Golden eagle): the Short-eared owl, the Red-necked phalarope, and the Harlequin duck. We found the owl and the phalarope in several large wetlands located in valleys near Salluit and Deception Bay, though it is likely that they also breed elsewhere in the study area. As for the Harlequin duck, we found it along several rivers flowing into the Hudson Strait, and we are convinced that we would have observed it on several other rivers if we had been able to devote more flying hours to its search.

Conclusion

Thanks to the work we carried out in 2022 (Fortier-Boisclair *et al.,* 2023) and again in 2024 (this study), the vast majority of Nunavik's coastline has now been surveyed by helicopter for Golden eagle nests (Figure 4). We are pleased to report that our efforts have led to the collection of an impressive amount of new data on Golden eagle nesting in Nunavik, as well as on the nesting of many other bird species.

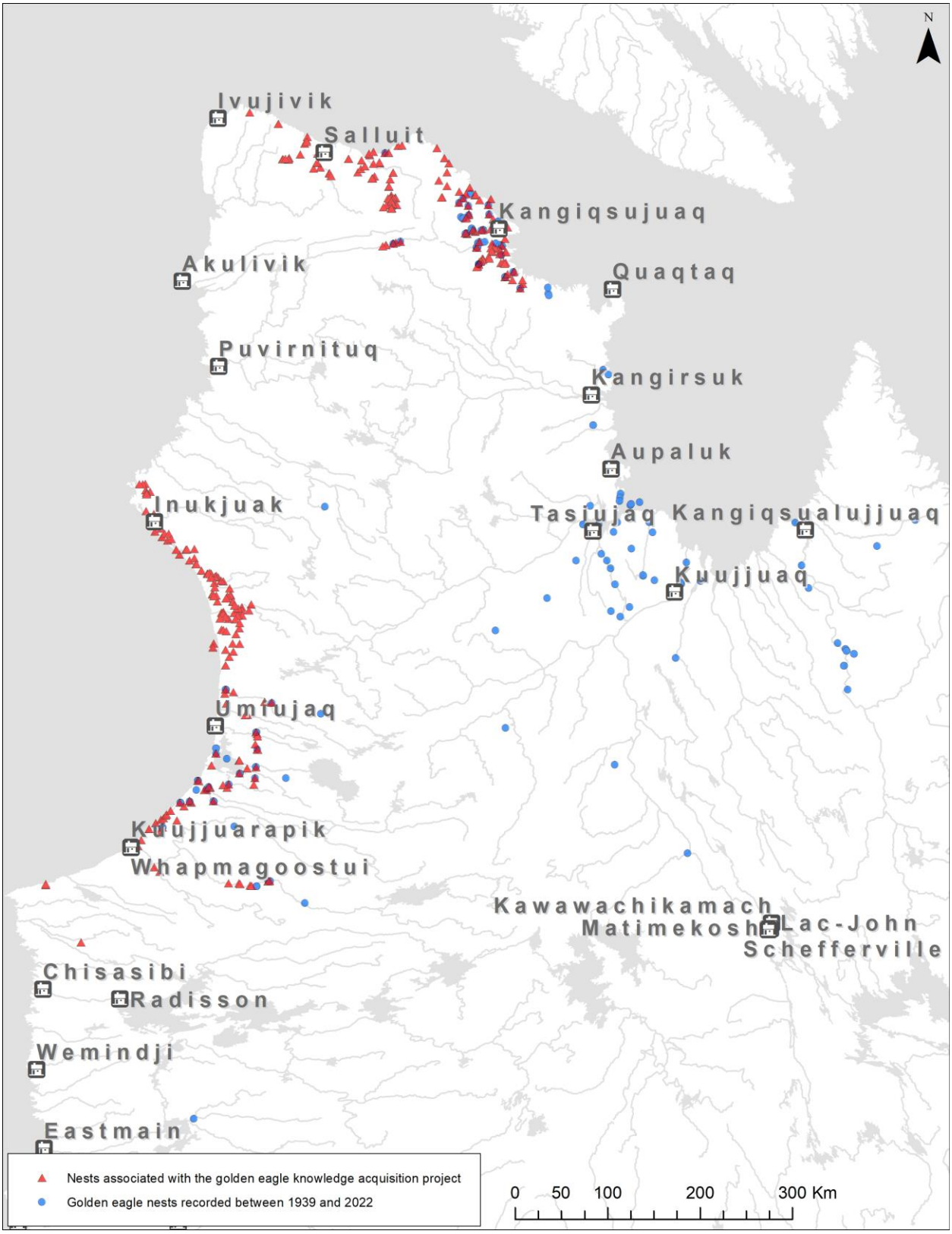

Figure 4. Overall survey effort for identifying Golden eagle nesting sites in Nunavik.

These data will improve our ability to predict how Golden eagles use the various habitats available in Nunavik and enhance our understanding of how the species occupies this vast territory. As a result, appropriate conservation measures can be implemented to protect nests, knowing that the species often reuses the same sites year after year.

Furthermore, our work has helped meet several objectives of the *Golden Eagle Recovering Plan* (ÉROP, 2020), including the identification of key nesting areas in Northern Québec, the potential to establish long-term monitoring of productivity in regions other than Kuujjuaq, and the ability to implement protection measures better suited to the threats specific to the Nunavik. The data collected in 2022 and 2024 will also support more accurate assessments of the impacts of future mining and wind energy projects. Finally, the use of these data will enable us to obtain, in the medium and long term, a more accurate estimate of the size of the eagle population in Quebec.

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Appendice 1

Complete list of species observed during the current project

	Atlas squares		Observations	Breeding evidence
	N	%	N	Level of certainty
Rough-legged hawk	96	62,3	114	Confirmed
Snow bunting	93	60,4	117	Confirmed
Canada goose	82	53,2	115	Confirmed
Peregrine falcon	68	44,2	80	Confirmed
Golden eagle	58	37,7	62	Confirmed
Rock ptarmigan	47	30,5	58	Confirmed
Common raven	41	26,6	49	Confirmed
Herring gull	32	20,8	52	Confirmed
Common eider	22	14,3	28	Confirmed
Snowy owl	21	13,6	26	Confirmed
Common merganser	19	12,3	24	Probable
American pipit	15	9,7	42	Confirmed
Long-tailed duck	14	9,1	21	Probable
Hooded merganser	14	9,1	14	Probable
Red-throated loon	13	8,4	21	Confirmed
Harlequin duck	13	8,4	20	Probable
American robin	12	7,8	17	Confirmed
Glaucous gull	12	7,8	14	Confirmed
Northern pintail	11	7,1	22	Probable
Tundra swan	11	7,1	13	Confirmed
Lapland longspur	9	5,8	27	Confirmed
White-crowned sparrow	9	5,8	26	Confirmed
Savannah sparrow	9	5,8	23	Confirmed
Horned lark	8	5,2	23	Probable
Common redpoll	8	5,2	23	Confirmed
Semipalmated plover	8	5,2	18	Confirmed
Snow goose	8	5,2	8	Confirmed
Semipalmated sandpiper	7	4,5	15	Confirmed
Least sandpiper	6	3,9	12	Confirmed
Green-winged teal	6	3,9	11	Probable
Common loon	6	3,9	7	Possible
Pacific loon	5	3,2	8	Confirmed
King eider	4	2,6	6	Confirmed
Short-eared owl	4	2,6	6	Probable
Gyrfalcon	4	2,6	4	Confirmed
Iceland gull	4	2,6	4	Confirmed
Pomarine jaeger	4	2,6	4	Confirmed
Nelson’s sparrow	3	1,9	5	Confirmed
Red-necked phalarope	3	1,9	5	Probable
Wilson’s snipe	3	1,9	4	Possible
Great black-backed gull	3	1,9	4	Probable

Black guillemot	3	1,9	3	Confirmed
Bald eagle	2	1,3	5	Observed only (X)
Mallard	2	1,3	2	Observed only (X)
American black duck	2	1,3	2	Observed only (X)
Hoary redpoll	2	1,3	2	Probable
Dunlin	1	0,6	2	Probable
Fox sparrow	1	0,6	1	Probable
Red-winged blackbird	1	0,6	1	Observed only (X)
Common goldeneye	1	0,6	1	Observed only (X)
Lesser black-backed gull	1	0,6	1	Observed only (X)
Thick-billed murre	1	0,6	1	Observed only (X)
Harlequin duck	1	0,6	1	Observed only (X)
Ross's goose	1	0,6	1	Observed only (X)
Greater white-fronted goose	1	0,6	1	Possible
Blackpoll warbler	1	0,6	1	Probable

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