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Summary

The sparse knowledge about Nunavik birdlife limits our ability to ensure the recovery of some species or their maintenance at viable population levels. Nunavik is home to the majority of breeding pairs of Golden Eagles (*Aquila chrysaetos*) in eastern North America. However, since 2011, with the exception of one population survey conducted in the Ungava Bay area, this vast territory has been the subject of very few eagle (and other raptor) surveys, even though it has many rock faces suitable for this species. This report presents the results of a 2022 Hudson Bay survey conducted 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). The survey highlighted the widespread use of this area by Golden Eagles, with a total of 163 nests located, of which 133 (81.5%) were new nesting sites for the species. The survey also provided new information on the nesting of other birds of prey: the Peregrine Falcon (*Falco peregrinus*), Rough-legged Hawk (*Buteo lagopus*), Gyrfalcon (*Falco rusticolus*), Merlin (*Falco columbarius*) and Osprey (*Pandion haliaetus*). The survey also aimed to collect data for the northern component of the *Atlas of the Breeding Birds of Québec*. The breeding evidence indices collected allowed us to extend the known breeding area of some species. This was the case for Tundra Swan (*Cygnus columbianus*), Long-tailed Duck (*Clangula hyemalis*), Red-throated Loon (*Gavia stellata*) and Rock Ptarmigan (*Lagopus muta*), which were found further south than their known breeding range in mainland Québec, as well as for American Wigeon (*Mareca americana*), Killdeer (*Charadrius vociferus*) and American Bittern (*Botaurus lentiginosus*), which, conversely, were found further north than their known range. Harlequin Duck (*Histrionicus histrionicus*) was particularly numerous, with 163 individuals counted, many of them on rivers not previously known to harbour this duck. Other species at risk were the Rusty Blackbird (*Euphagus carolinus*), Bank Swallow (*Riparia riparia*), Lesser Yellowlegs (*Tringa flavipes*), and Red-necked Phalarope (*Phalaropus lobatus*). The efforts made during this ornithological survey represent one of the most important multi-species knowledge acquisition projects ever conducted at these latitudes.

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Introduction

This project was made possible thanks to the financial contribution of the research fund of the Nunavik Marine Region Wildlife Board. It is the result of close cooperation 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 first objective of the project was to improve our knowledge of the breeding population of Golden Eagle (*Aquila chrysaetos*) in Nunavik. Improved knowledge of the distribution of Golden Eagles in the study area will enable the implementation of measures to protect the species in a perspective of economic development of Northern Québec. The Golden Eagle experienced a significant population decline in North America during the 20th century, primarily due to human disturbance (logging, trapping, and disturbance) and the presence of contaminants such as DDT, which interfered with the species' ability to reproduce (Katzner *et al.*, 2012). The status of the Golden Eagle was still precarious in the early 2000s and the species was designated as vulnerable in Québec in 2005 under the *Act respecting threatened or vulnerable species* (CQLR, c. e-12.01, "ARTVS"). The province is home to approximately two thirds of the Golden Eagle breeding population in eastern North America, making it a strategic area for maintaining a viable population. The Golden Eagle recovery plan has recently been renewed for ten years (2020–2030), as its Québec population was still showing uncertain demographic trends at the end of the first recovery plan (EROP, 2020).

Secondly, the project sought to collect data for the northern component of the *Atlas of the Breeding Bird of Québec*, i.e., breeding evidence indices for the greatest number of species in the greatest number of Atlas survey squares in the study area (see Robert *et al.*, 2019: 9). As of 2014, data collection for the *Second Atlas of the Breeding Birds of Southern Québec* has been completed. However, collection continues for Northern Québec, north of latitude 50°30' N. This region, which is difficult to access, has more than 11,000 Atlas survey squares and little data has been collected there since 2010. As a result, in many survey squares, no data on the birds breeding there have been collected. It is therefore essential that efforts be made in this northern region.

Finally, the project aimed at gathering as much information as possible on the nesting of other bird species at risk, meaning birds listed (or likely to be listed) under the ARTVS or the Canadian *Species at Risk Act* (S.C. 2002, c. 29, "SARA"), by verifying whether these species were present 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 Hudson Bay, between Point Louis-XIV to the south and Commodore Island Point to the north (Figure 1). We took the liberty of extending the study area slightly further east along the Great Whale River because of the high potential of this area for Golden Eagle and Harlequin Duck (*Histrionicus histrionicus*). In addition, the study area covered the western portion of Parc national Tursujuq near Umiujaq (Figure 2). The study area was selected because of its high concentration of rock faces with good breeding potential for several raptor species and because of the large number of rivers that flow into Hudson Bay.

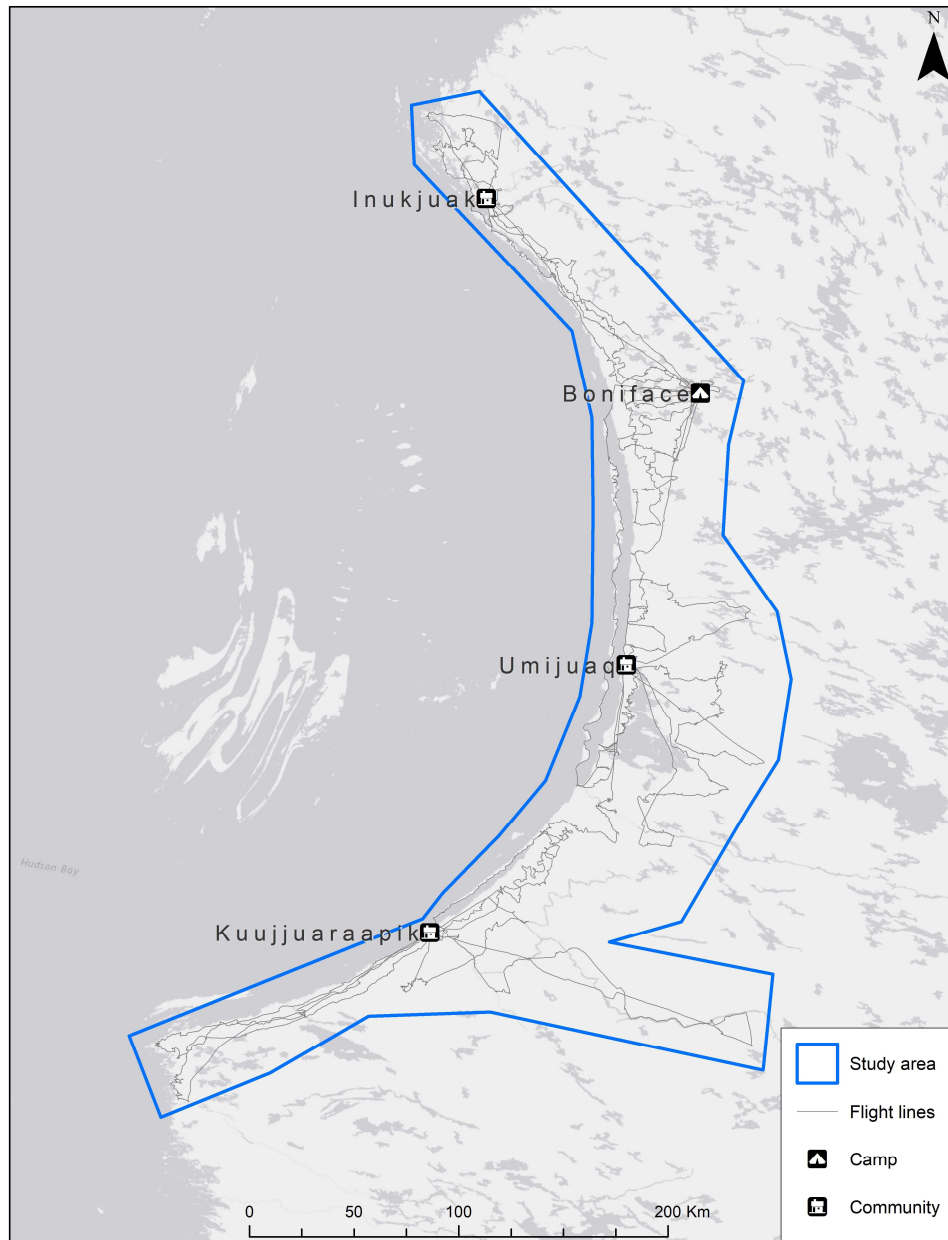


Figure 1 Study area and route flown by helicopter, June 16–27, 2022.

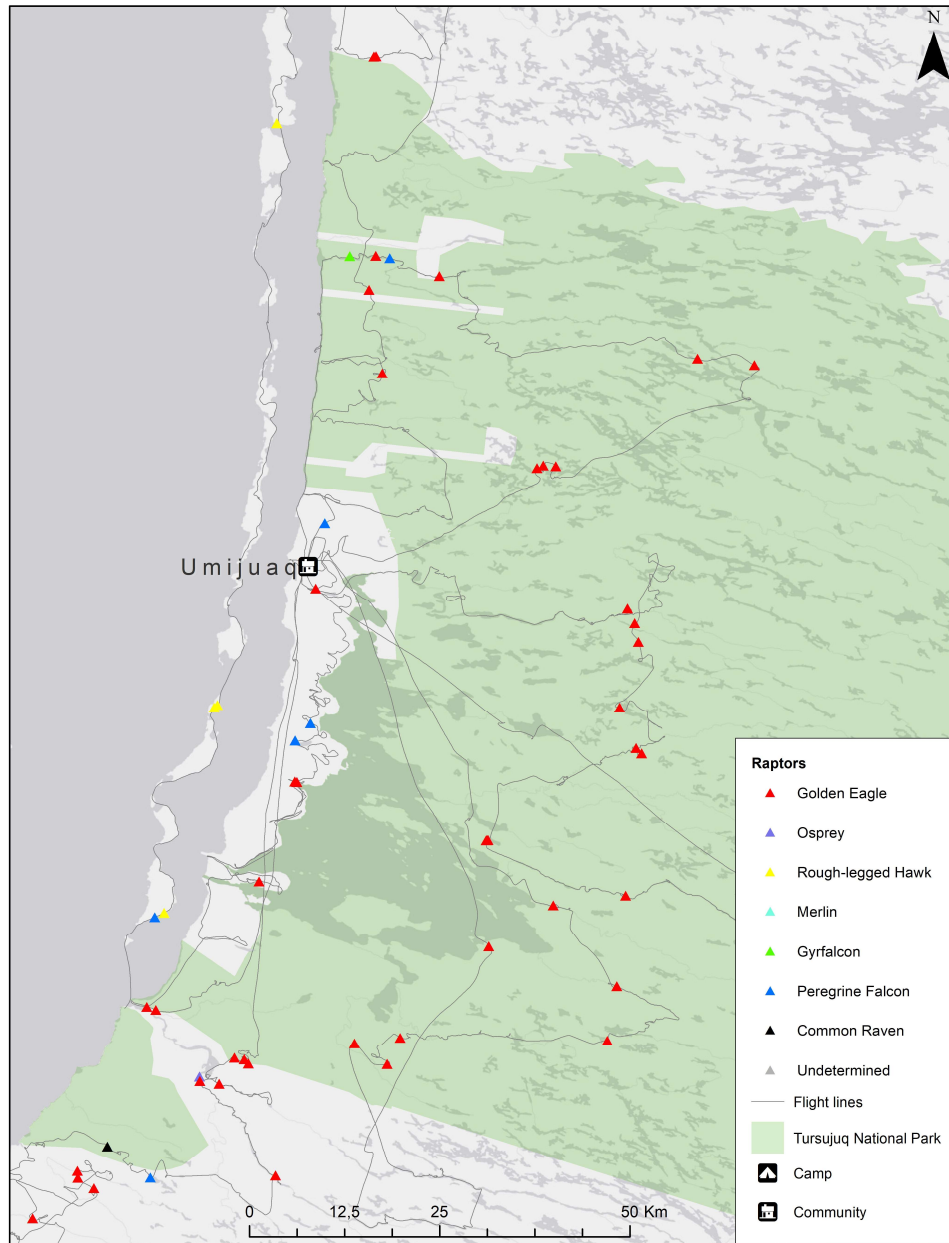


Figure 2 Sightings of raptors and nesting sites within the boundaries of Parc national Tursujuq, June 20–22, 2022.

The fieldwork ran from June 16 to 27, 2022, during which time the crew flew 67.5 hours (8,786 litres of fuel consumed) in a Eurocopter AS350 B2 helicopter. More than 5,650 kilometers in the study area was covered during the survey. The field crew was housed at the Centre d'études nordiques facility in Kuujuarapik from June 16 to 19, at the Umiujaq facility from June 20 to 22, and at Camp Boniface from June 23 to 26. The positioning of the aircraft was handled from Chibougamau.

Data entry

All data collected during the project were added to the *Atlas of the Breeding Bird of Québec* database via [NatureCounts](#) and, when relevant, to the [SOS-POP](#) database, to be integrated into the [Centre de données sur le patrimoine naturel du Québec](#) (CDPNQ). We also transferred the data to the [eBird](#) database, taking care not to release the information, with a few exceptions¹, the exact positions of species at risk.

Birds of prey and Common Raven²

The project led to the discovery of nests of six species of birds of prey: Golden Eagle (designated as vulnerable under the ARTVS), Peregrine Falcon (*Falco peregrinus*) (likely to be designated as threatened or vulnerable under the ARTVS) Rough-legged Hawk (*Buteo lagopus*), Gyrfalcon (*Falco rusticolus*), Merlin (*Falco columbarius*) and Osprey (*Pandion haliaetus*), and nests of Common Raven (*Corvus corax*) (Figure 3). Overall, 245 nest sites of these species were identified, of which 79 were considered active for 2022 (Figure 4). A site was considered active when it had at least one egg or chick at the time of the survey (Morneau *et al.*, 2015). Sites that were destroyed or in poor condition were not counted in this project, but were used to update the SOS-POP database.

¹ We have provided the exact location of some of our observations of species at risk where disclosure would not be harmful.

² The Common Raven is included in this section simply because it builds nesting structures similar to those of birds of prey.

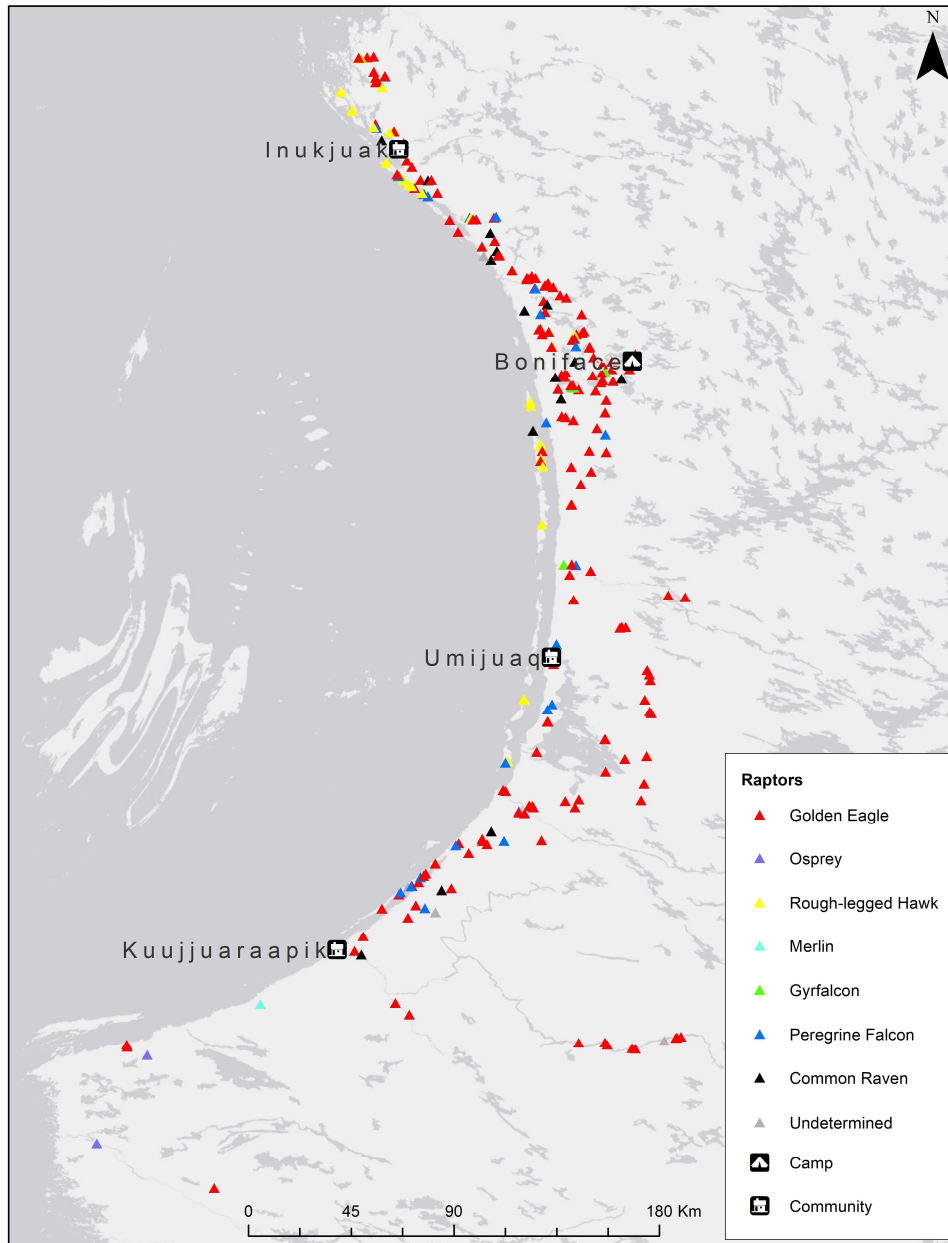


Figure 3 Raptor and Common Raven nests observed during the project.

An area³ of approximately 4,650 km² was covered to search for Golden Eagle nests in the study area, resulting in the identification of 163 nests, of which 133 (81.5%) were previously unrecorded. Of the 34 active nests found in 2022, 26 (76.5%) were newly documented nest sites for this species. Six of the

³ We estimated the area covered by simply considering a 500-meter zone on each side of the helicopter, as the ability to detect raptor nests can vary greatly, depending on topography and weather conditions.

34 active nests in 2022 had first been identified in the 1990s. A 14.7-hour flight effort was made in Parc national Tursujuq and 43 Golden Eagle nests were observed, of which 22 (51%) were new sites (Figure 1).

Several Rough-legged Hawk nests were found, but no breeding pairs were observed during the survey, suggesting that 2022 was a very unproductive year for small mammals. The density of nesting pairs for the Rough-legged Hawk is highly variable from year to year and depends on the availability of lemmings and voles, its preferred prey (Bechard *et al.*, 2020; Anctil *et al.*, 2019).

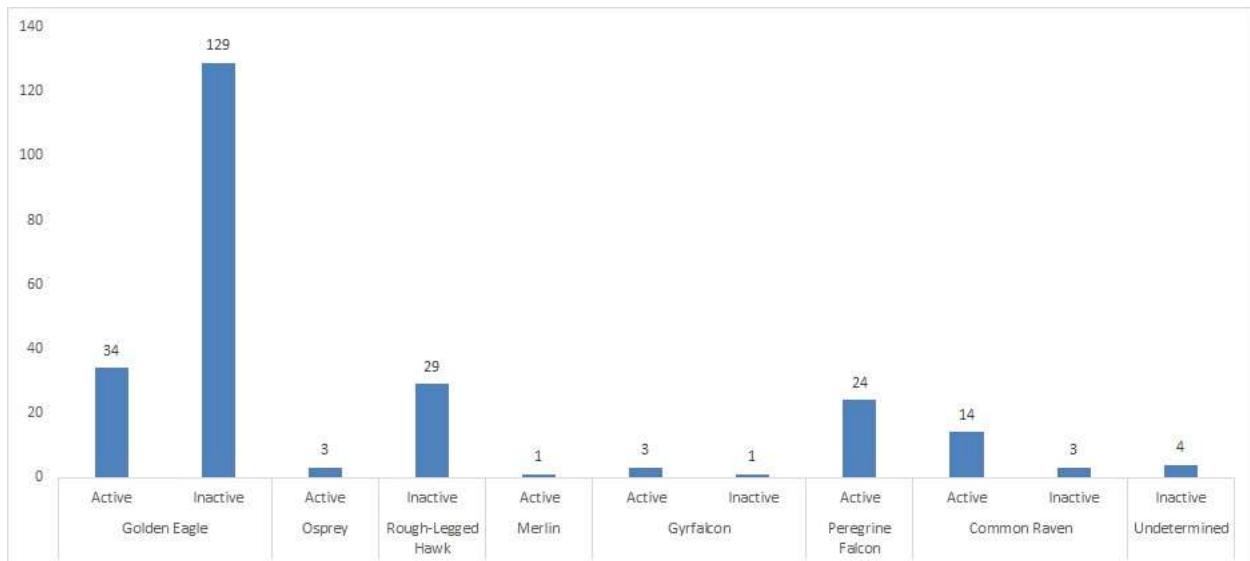


Figure 4 Number of raptor and Common Raven nests (active and inactive) found during the project. Indeterminate nests are those for which it was impossible to identify the species that built them.

Atlas of the Breeding Birds of Québec (northern component)

We collected 1,465 breeding evidence indices for 99 bird species during the surveys. This includes the few indices that we collected during our round-trip travels between Chibougamau and the study area. Overall, we collected breeding evidence indices from 243 Atlas survey squares. Of this number, 16 squares were surveyed on the ground to collect breeding evidence indices (Figure 5).

The breeding indices collected extended the known breeding range of some species. For example, we found Tundra Swan (*Cygnus columbianus*), Long-tailed Duck (*Clangula hyemalis*) and Red-throated Loon (*Gavia stellata*) in one or more of the survey squares in the Pointe Louis-XIV area, which is further south than their known breeding range in continental Québec. The same is true for Rock Ptarmigan (*Lagopus muta*), which we observed as far south as on some peaks near Umiujaq.

Conversely, we found some species further north than their known breeding range, notably American Wigeon (*Mareca americana*), Killdeer (*Charadrius vociferus*) and American Bittern (*Botaurus lentiginosus*) in the Pointe Louis-XIV area, as well as Red-eyed Vireo (*Vireo olivaceus*) in Kuujuarapik.

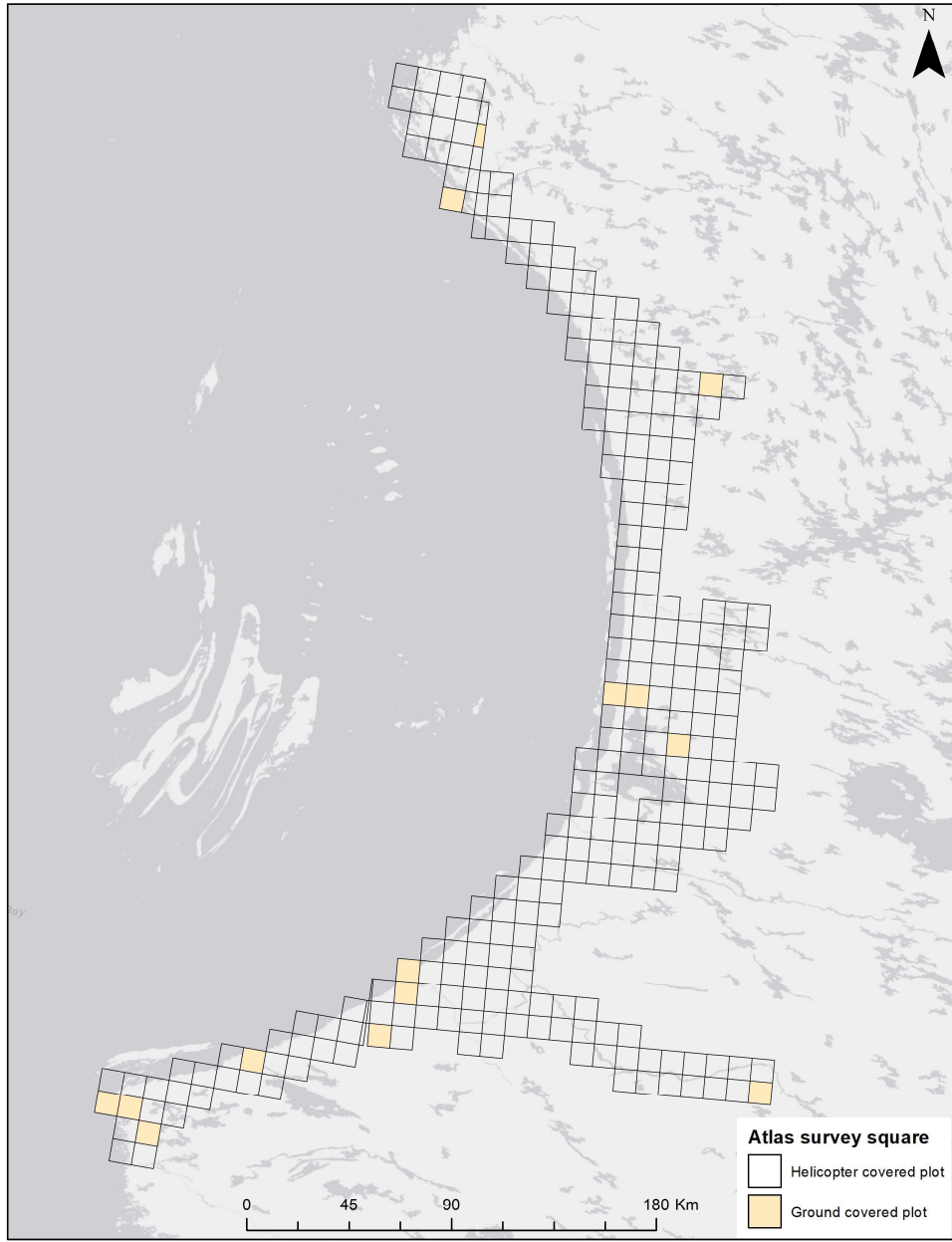


Figure 5 *Atlas* survey squares overflowed during the project. Coloured squares are those where the field team conducted ground surveys.

Other birds at risk

The discovery of numerous Harlequin Ducks (a SARA Schedule 1 species **of special concern** and a **vulnerable species** under the ARTVS) represents one of the most interesting results from the northern component of the Atlas (Figure 6). In all, we counted 163 individuals in 35 survey squares and with two exceptions, each of these survey squares represents a net addition to the Atlas results.

Many of the rivers where we observed Harlequin Ducks were not known to harbour this species at risk during nesting season and yet some show particularly high Harlequin Duck densities. On June 18, we surveyed a female from a rock face on the edge of a small tributary of the Denys River (plot 18UUG60), which suggests that a nest may have been present; harlequins are known to nest on cliff ledges (Brodeur *et al.*, 2008). Unfortunately, we were unable to land due to lack of sufficient space.

We obtained breeding evidence indices for Rusty Blackbirds (*Euphagus carolinus*; a SARA Schedule 1 species **of special concern** and **likely to be designated threatened or vulnerable** under the ARTVS) in 13 Atlas survey squares during the project (Figure 6). The species is likely more common than our results indicate considering it can be easily missed during high-speed helicopter overflights. In fact, this bird likely breeds in a large portion of the study area wetlands.

We found Bank Swallow (*Riparia riparia*; SARA Schedule 1 **threatened** species) nesting cavities in three Atlas survey squares: at two locations along the Great Whale River and near Inukjuak. However, we did not observe (by helicopter) any swallows at these locations (Figure 6). The only colony where an individual was observed was located near the mouth of the Great Whale River in Kuujjuarapik.

We collected breeding evidence indices for Lesser Yellowlegs (*Tringa flavipes*; a **threatened** species under review for listing on SARA Schedule 1) in four Atlas survey squares, three of which are in the Pointe Louis-XIV area (Figure 6). This species is difficult to distinguish from the Greater Yellowlegs (*Tringa melanoleuca*) from the air, and it is likely that we could have found the Lesser Yellowlegs in more survey squares if we could have spent more time on the ground.

Finally, we found the Red-Necked Phalarope (*Phalaropus lobatus*; SARA Schedule 1 species **of special concern**) in a plot in the Pointe Louis-XIV area (Figure 6).

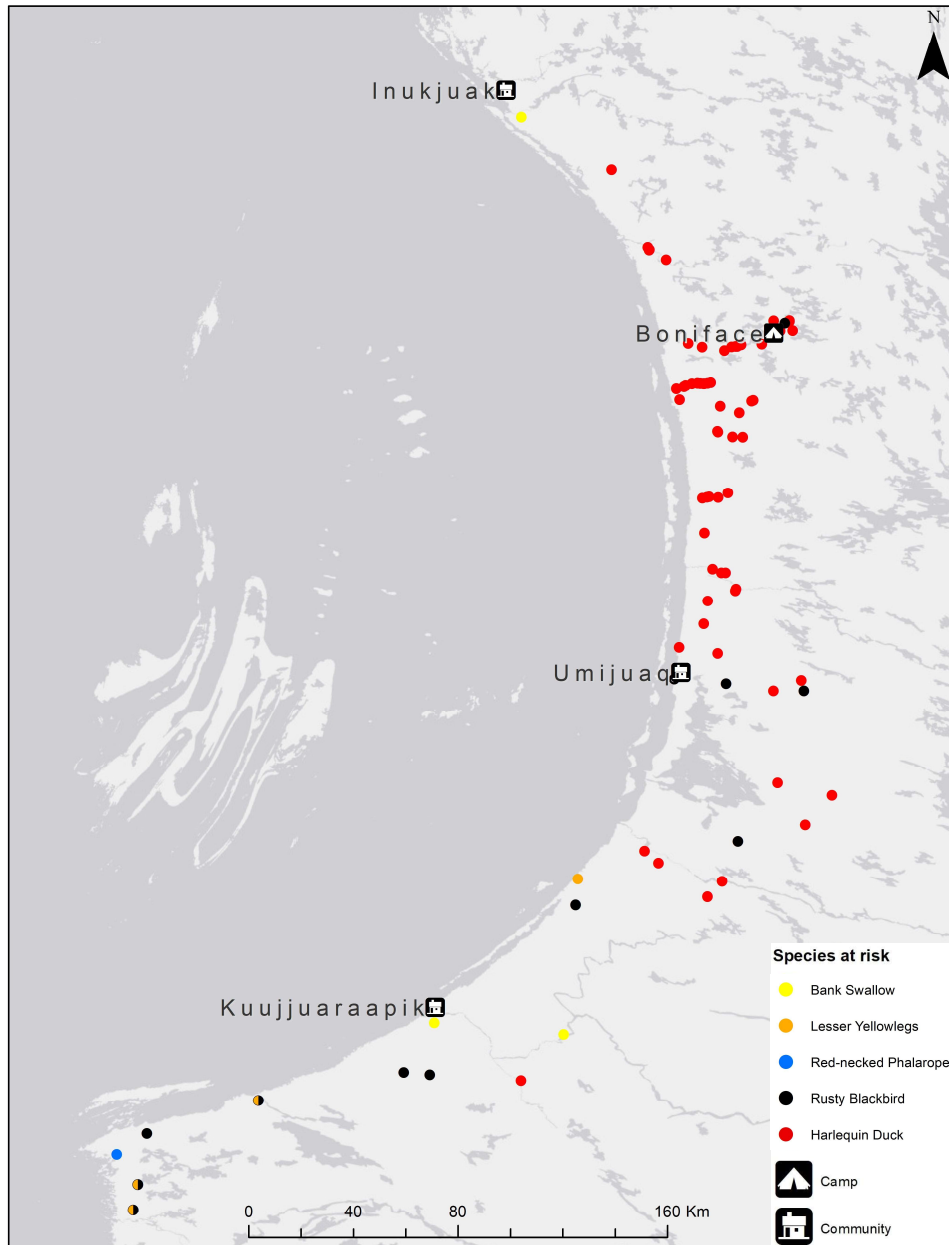


Figure 6 *Observation sites for species at risk, other than birds of prey, found during the project.*

Discussion

The research undertaken during this project represents one of the most important efforts ever attempted in Québec to document the nesting of Golden Eagle. The effort was successful given the large number of active nests found and the fact that the majority of these nests represent a net addition to provincial databases. In addition, the abundance of old nests indicates, unsurprisingly, that Golden Eagles have been using the study area for a long time (Morneau *et al.*, 1994). Initial surveys conducted between 1990 and 1993 indicated that the Hudson Bay watershed had a high potential for Golden Eagle nesting (Morneau *et al.*, 1994), and our comprehensive 2022 survey clearly confirmed this. Our survey identified 163 Golden Eagle nests, 133 (81.5%) of which were new, all of which were limited to the coastal zone, some islands near the Hudson Bay coast, and Great Whale River. In comparison, in a 2018 survey conducted in the Ungava Bay area (well known for Golden Eagle nesting), 67.9% (106/156) of the nests surveyed were new (Anctil *et al.*, 2019). That survey covered the coastal zone between Kuujjuaq and Kangiqsujuaq (Anctil *et al.*, 2019), which is equivalent to the area explored at Hudson Bay during the current study.

Our 2022 survey adds 22 new nests to the 36 that were found in 2019 in Parc national Tursujuq. This park apparently provides exceptional habitats for cliff-nesting raptors (Johansen and Anctil 2019).

In a context of economic development in Northern Québec, it seems increasingly important to consider the importance of the Hudson Bay area for Golden Eagle nesting. The discovery of several new nests in 2022, combined with the fact that there are still large areas of high potential that have never been explored, suggests that the Hudson Bay watershed harbours a very important part of the Golden Eagle population in eastern North America (Anctil *et al.*, 2019; Johansen and Anctil, 2019).

This project allowed us to collect many data for the northern component of the *Atlas of the Breeding Birds of Québec*, even if the weather conditions were sometimes unfavourable for conducting ground surveys. The Pointe Louis-XIV area would merit additional surveys as it is the southernmost place in Québec where vast expanses of tundra with erect shrubs are found. We found species that do not nest anywhere else in Québec at such low latitudes (e.g., Tundra Swan, Long-tailed Duck) and it is likely that the area supports others (e.g., Pacific Loon [*Gavia pacifica*], Dunlin [*Calidris alpina*]).

This project also yielded a wealth of data on bird species at risk in the study area and, it should be noted, almost all of these data represent additions to our knowledge. Furthermore, the discovery of a surprising quantity of Harlequin Ducks highlights the importance of some rivers in the Hudson Bay watershed for this species at risk. In addition, at the scale of the study area of this project, the SOS-POP database contained no mention of Harlequin Ducks north of the Nastapoka River, which is where we found most of them. Some of the rivers in this portion of the study area (e.g., Biscarat, Boniface, Brot, and Longland Rivers) have high densities of harlequins.

Interest in a second phase of this project

Based on the 2022 results, it would be desirable to repeat bird surveys in 2023, this time in the coastal sector of Hudson Strait, between Ivujivik and Kangiqsujaq. This is a vast area that has been the subject of very few bird surveys to date, and it is likely that Golden Eagles nest in several (as yet unknown) locations there. Furthermore, considering the collaboration between the MELCCFP and CWS-Québec was successful in 2022, it seems appropriate to renew it and include again an “Atlas component” in the 2023 surveys. It is important to recognize that pooling our governments’ resources and expertise has greatly facilitated the acquisition of new ornithological knowledge in a region of Nunavik where avifauna remains very little studied.

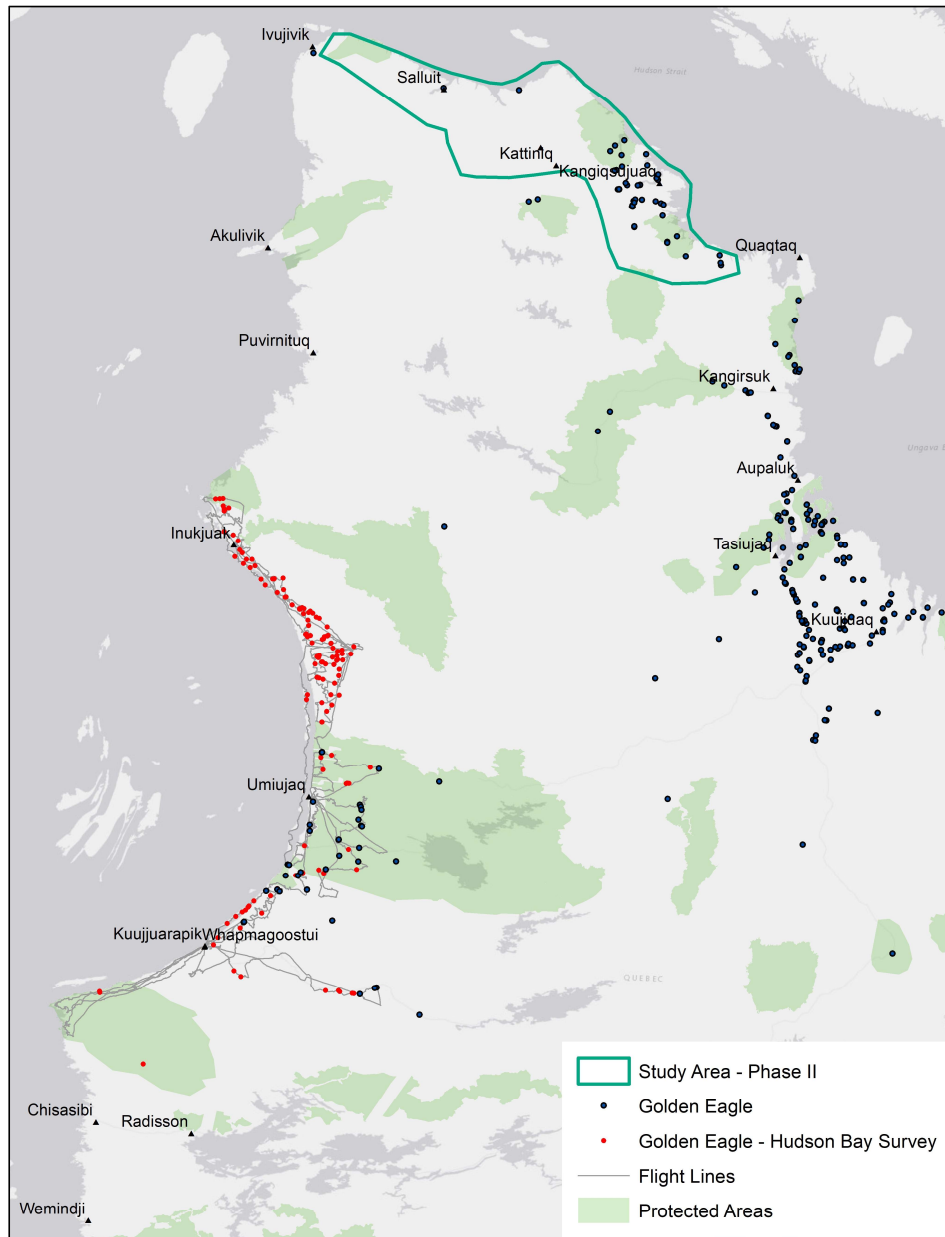


Figure 7 Projected study area, in the Hudson Strait region, for Phase II of the search for Golden Eagle nests.

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