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Carleton University  
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Ottawa, ON K1S 5B6

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NWB Manager of Licensing  
Nunavut Water Board  
P.O. Box 119  
Gjoa Haven, NU X0B 1J0

Dear Manager:

Please find attached an application for water use without a license, as well as project descriptions in both English and Inuktitut for research conducted at Kingait, Nunavut. This work was previously covered under Nunavut Water Board License 8WLC-ASR2526.

Please note the approval can be made out to Dr. Grant Gilchrist, however, any questions you have regarding this application can be directed to myself, Holly Hennin ([holly.hennin@ec.gc.ca](mailto:holly.hennin@ec.gc.ca)).

Thank you very much for your consideration of this application, and please do not hesitate to contact us with any questions or concerns you may have.

Sincerely,

Holly Hennin  
Wildlife Technician  
Environment and Climate Change Canada

## **Coastal surveys to assess the distribution and abundance of common eider ducks nesting in Hudson Strait**

### **Project Description**

Common eider ducks are an important resource in Nunavut for their eggs, meat, and down. The eider ducks nesting along coastlines of Hudson Strait are under several pressures including shipping in the region, increased predation from polar bears, mortality from fisheries by-catch and harvest on their wintering grounds, and changes in climate (changes in local ice dynamics, food availability, and warming temperatures). Eiders are known to be sensitive while nesting, and can be impacted by outbreaks of avian disease, human disturbance, or cascading impacts of climate change including higher rates of polar bear nest predation. The objective of this project is to resurvey the breeding colonies of common eider ducks nesting in Hudson Strait along the Southern coast of Baffin Island in direct collaboration with the community of Kinngait. The results of these new surveys (2024-2028; not conducted in the last 10 years) will be compared to historical information collected on the same islands since the 1950s. This will provide updated information on the distribution and number of common eiders in the region, as well as the impact of bear predation and avian cholera if they are detected. We will compare information from these new surveys to our historical data to assess the impact of shipping, polar bear predation, climate change, and winter mortality on the common eider breeding population on Southern Baffin Island. Importantly, the results of this study will be shared with the community of Kinngait. The information will also be relevant to the Nunavut Wildlife Management Board who in turn, will be better positioned to advise ongoing harvest regulations in both Greenland and Newfoundland/Labrador.

Our surveys are conducted in July, which is when eider females incubate nests. In advance of the field season we select islands ranging in size from 0.1 to 5.0 km<sup>2</sup> for survey. These islands are supplemented with additional locations recommended by our guides to ensure that a range of colonies with different habitat characteristics and eider abundance are visited. The islands are accessed by boat and circled upon arrival to determine whether bears are present. After landing, a search is made on foot by 3-6 people walking 10-25 m apart in successive linear sweeps until the entire island is investigated. Nests are easily found because there is little vegetation and current year breeding attempts can be reliably distinguished from previous years' attempts by the presence of fresh down, which eiders pluck to line their nest bowls. When a nest is found, we record its status as active—a nest containing an incubating hen, eggs or newly hatched ducklings, or empty—a nest in which fresh down was present but a hen, eggs, or ducklings were not present. We also note signs of potential nest predators, including polar bears, foxes, and gulls. For polar bears, the principal signs are seeing animals, finding feces, and encountering large numbers of nests that had been destroyed in which feather down is strewn widely around the nest bowl and eggs have been broken open by large crushing bites or blows. We will opportunistically collect samples of polar bear feces found on the surveyed islands to assess polar bear diet composition. Any carcass or part of a bird that is found will be opportunistically collected for disease analysis.

In collaboration with another study examining the current levels of oil-related contaminants exposure in marine species, and the potential effects, we will also aim to collect eggs from common eiders, herring gulls and black guillemots (10 eggs from each species). In other regions of Canada, Black Guillemot and Common Eider eggs have been shown to be sensitive to environmental levels of oil-related contaminants. This project aims to expand efforts started in other regions that aim to examine oil-related contaminants in eggs along a gradient of vessel and shipping traffic.

In collaboration with an additional study, we would like to collect some soil samples from islands with eider nesting colonies. There are two sets of samples that we aim to collect: pond sediment samples and common eider nest cup samples. The pond sediment samples give an indication of historical population dynamics of eiders on that island (up to thousands of years), and would allow the comparison of lake sediment and peat archives for reconstructing population trends in common eider nesting populations, examine the stability of populations over millennia, and determine whether population changes across islands were synchronous or whether certain islands have provided more desirable nesting habitat during different climatic periods. We will collect the peat core from within a few meters of the main pond on a nesting island (up to 8 samples collected each year) with the aim of reaching the bedrock to get a full profile for the nesting island (up to 40 cm). A 10 cm by 10 cm square hole is cut into the ground and the soil is removed in 20-25cm increments until the bedrock is reached. The hole will be backfilled with available surrounding soils and moss.



Figure 1. Left: photo showing surface peat being extracted with a bread knife (before the hole was widened). Right: Photo showing two consecutive peat cuts made with a bread knife; first from 0-25 cm and second from 25-40 cm. They were wrapped together in plastic wrap and then tin foil for transport back to the lab.

Nest cup sediment samples indicate the use of the nest cup through time (eider-specific population dynamics within 300-400 years). Sediment sampled near nest cups are not near active nests (i.e., nest cups with eggs) to prevent disturbance to nesting females. To collect common eider nest cup sediment samples, we will cut away  $\sim 10 \times 10$  cm square of peat from the ring surrounding the center of nest or the nest bowl and usually we can cut to bedrock with one cut of the bread knife (i.e. the peat depth is shorter than the breadknife,  $\sim 20$  cm). Eider nest vegetation depths range from  $\sim 8$  cm to 20 cm. After removal of the nest vegetation cube, the hole is infilled with local vegetation/peat from the surrounding area, but not a nest. We aim to collect 10 of these samples in each year.



Figure 2. Nest bowls and sampling of peripheral cups. We measure the depth from the top of the cup to bedrock, note if down was present in the nest, and whether the cup filled with water after sampling (e.g. left cup).



During portions of the surveys we will be camping on islands to facilitate sampling of areas far from town. We will camp at established campsites recommended by our local guides to reduce our impacts on the land. There will be between 6-7 Inuit guides and 3 others camping at each site. We will only be camping at each site for two weeks cumulatively (roughly one week, two times) before moving on. We will be using canvas tents provided by the guides for sleeping and cooking. We will have a small amount of white gas and fuel for the boats at each campsite. We have a spill response plan and will have a spill kit with us at all times.

Water is used for drinking and washing purposes only and will either be brought from town or obtained from small streams according to our guides. Human waste will be buried in a sump away from all water sources and backfilled before leaving camp. All other waste will be transported back to Kinngait and disposed of properly.

