

An aerial photograph of a vibrant turquoise lake, likely in the Yukon region. The lake is characterized by large, light-colored sandy bars and peninsulas that protrude into the water. The surrounding landscape is a dense, dark green forest of coniferous trees. The water's color is a striking blue-green, and the overall scene is captured from a high angle, showing the intricate patterns of the lake's shoreline.

KASKA

Overview of Mapping, Projects,
Wildlife and Wetlands in
Dene K'éh Kusān

THANK YOU

Ducks Unlimited Canada and members of the National Boreal Program would like to thank Corrine Porter, *Executive Director, Dena Kayeh Institute*, for overseeing and supporting the success of this project. Tanya Ball, *Coordinator, Dane Nan Yé Dāh*, and the land guardians for taking us on the land and supporting our fieldwork. Lastly Norm MacLean, for supporting the creation of this project.

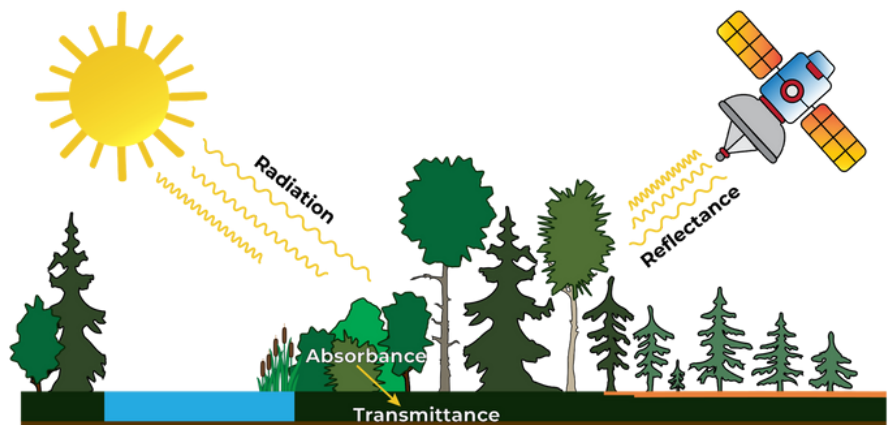
Special thank you to those who were a part of the field data collection: Robbie Porter, Lisa Shepherd, Daniel Koehl, Cash Johnny, Kyla Magun, and Tanya Ball, as well as community support from Daylu Dena Council, Dease River First Nation, and Kwadacha Nation.



MAPPING

Protecting and managing wetlands is essential. Around the world, wetlands are wildlife hotspots. They are also vital water cycling and filtration systems, storehouses for climate-altering carbon, and critical, - often sacred places for traditional cultures and communities.

Maps serve as key land-use planning tools, helping the public, Indigenous communities, governments, academics, developers, and industry to make informed decisions about the impacts their plans will have on a landscape.



How we map wetlands using remote sensing

Ducks Unlimited Canada's wetland maps knit together, evaluate, and verify a variety of what's known as "remote-sensing information" to create a large-scale and detailed picture of boreal fens, bogs, and other wetlands.

Remote sensing information is typically detected by technology above us; aboard planes, helicopters or satellites that capture light and other energy like radiation which is reflected from the earth's surface. The reflected energy tells a story.

The tools and techniques of remote sensing are becoming increasingly sophisticated, allowing information to be gathered quickly and in large quantities over large areas.

DENE K'ÉH KUSĀN (DKK) WHICH MEANS "ALWAYS WILL BE THERE" IN KASKA IS A PROPOSED INDIGENOUS PROTECTED AND CONSERVED AREA (IPCA) IN NORTHERN BRITISH COLUMBIA WHICH WILL PROTECT ANCESTRAL TERRITORY FROM BIODIVERSITY LOSS WHILE CREATING ECONOMIC OPPORTUNITY FOR KASKA DENA AND THE SURROUNDING COMMUNITIES.

Ducks Unlimited Canada's (DUC) National Boreal Program has partnered with the Dena Keyah Institute and Dane nan yé dāh Kaska Land Guardian Program to support their IPCA management plan, by providing wetland maps to complement their planning and decision-making processes.



Understanding moss with Robbie Porter

DUC worked directly with Dena Kayeh Institute and Corrine Porter to understand needs and concerns, as well as engaging directly with the emerging guardians program to provide training opportunities to assist with knowledge generation and sharing through field work, for example.



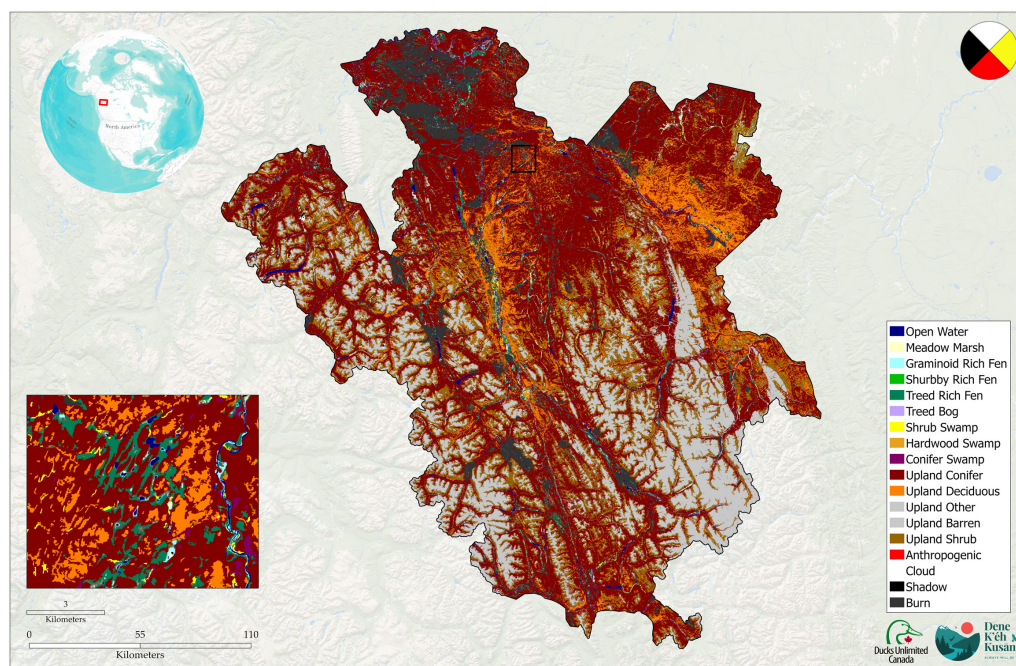
Fieldwork with Dane Nan Yé Dāh Land Guardians

THE PROJECT



THE PROJECT CONTINUED

DUC's wetland classifications use various multi-source Earth Observation datasets to create large-scale, detailed maps based on the five major classes of the Canadian Wetland Classification System (CWCS; open water, marsh, fen, bog, swamp) and then to the DUC's Enhanced Wetland Classification system (EWC; ~13 wetland classes in the Kaska region). The result is a collection of reliable and easy-to-read spatial data to support the on-going management of the Kaska region, a region we hope "always will be there."



Wetland Map of DKK

We use various types of data including helicopter-based vegetation surveys and high-resolution photo-interpreted sites to train and validate our machine learning models to understand the different wetland types across the landscape. The results of the detailed EWC product, which consisted of 18 classes (of which 9 were wetland classes), had an overall accuracy of 84%. At the more general Canadian Wetland Classification System level of detail including three major wetland classes (open water, fen, and swamp), the overall accuracy was 94%.

WETLANDS & WILDLIFE IN DENE K'ÉH KUSĀN

Open Water – Lakes, rivers, and shallow ponds.

Marsh – Marshes are the most iconic wetland class consisting of grasses, sedges, cattails and bulrushes. Many marshes in DKK have beaver activity. Beaver ponds were widely distributed in the valleys. These areas were a focal point for wildlife (moose, swans, waterfowl).

Fen – Fens are peatlands that can transport large volumes of water and nutrients across the landscape. Fens are the most abundant wetland type in DKK (4% of total area). These include many rich systems with plenty of beavers and moose, and many beautiful, braided fens

Bog – Bogs are stagnant to very slow-flowing peatlands that have low plant diversity due to the lack of available nutrients. Bogs are uncommon and rare across DKK. We encountered 3 treed bogs during our fieldwork.

Swamp – Swamps are often transition areas between upland forest and other wetlands and contain hummocky ground and pools of water. Shrub swamps were the most abundant swamp type in DKK with many tall conifer swamps along meandering streams and rivers.

Uplands – Conifer trees are the dominant upland type in DKK. We encountered Caribou, Goats and Sheep in the mountains as well as Elk in forested stands.



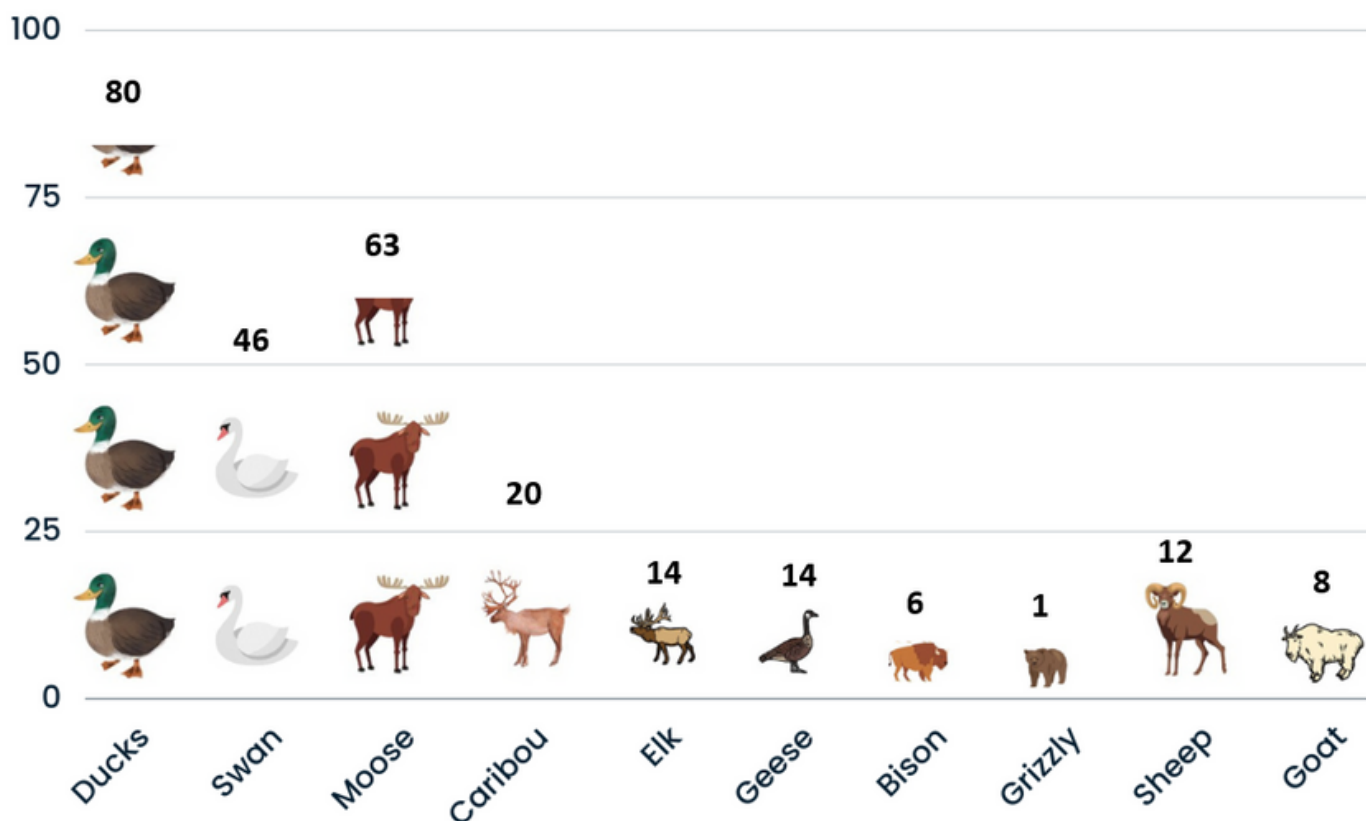
Wetland Complex in DKK

WETLANDS & WILDLIFE IN DENE K'ÉH KUSĀN CONTINUED

Dene K'éh Kusān is 6% Wetlands and 94% Upland and "Other." While Dene K'éh Kusān has a small area of wetlands, these wetlands are **rich in biodiversity**.

We counted 112 wildlife sightings, and within these sightings we saw:

WILDLIFE IN DKK



APPLICATIONS



DUC's wetland maps are unique in forming the basis of other spatial tools for mapping, managing and conserving key features of boreal nature:

Biodiversity: To begin understanding boreal wetland biodiversity, DUC focused on the Alberta boreal region as a starting point to assess biodiversity within each of the wetland classes. Through research, we developed our biodiversity tool in Alberta to rank wetlands by primary and secondary habitat use, the number of species utilizing a wetland type and the rarity of species. This tool allows for mapping of the biodiversity potential of all mammals, birds, amphibians and reptiles. Based on wetland type we have also been able to identify potential habitat preferences for caribou using provided caribou telemetry data in northeast British Columbia and boreal Alberta, as well as bison habitat suitability in the same regions.

Waterfowl Density: The western boreal forest contains the greatest number of wetlands and lakes in the world and supports about 10 million ducks each spring. Waterfowl distribution maps are useful to assess the relative potential contribution of areas to overall population size. These products are based off of data in the boreal plains; however, opportunities exist related to waterfowl corridors and connectivity in the other regions.

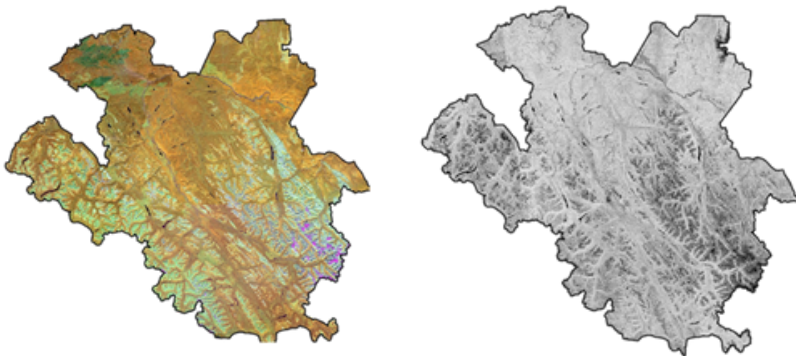
Boreal Carbon Storage: The predominant boreal wetland types are peatlands (bogs and fens), which develop thick layers of moss that can be metres deep. Peat depth data has been extracted from published literature and along with our own collected samples, can be combined with our wetland mapping products to map the estimated subsurface carbon storage values at various locations.

Land Use Planning: DUC facilitates the use of data sources and spatial tools to assist in understanding some of the spatial complexities. Spatial decision support tools such as Marxan or Zonation give us the ability to understand the landscape in a unique way. DUC is involved in assisting with, and providing advice to, land use planning processes across the boreal region. We run models of various scenarios to provide conservation options for interested parties.

LIMITATIONS OF THE WETLAND MAP

The following points should be considered while using and interpreting the DKK wetland inventory presented in this guide:

- The ability to map wetlands is limited by the spatial resolution of the satellite imagery. In the case of the DKK wetland inventory, wetlands smaller than 10 m by 10 m in size are not visible in the imagery, and thus not able to be mapped. The amount of data available reflects how reliable an inventory can be.
- Wetlands occur along a gradient of conditions, and may vary in wetland type and form (i.e., open, shrubby, treed) without distinct boundaries. Due to the methodology employed in the DKK wetland inventory, this product should not be used to derive specific wetland boundaries.



Satellite Imagery in Dene K'éh Kusān

- This inventory does not replace the need for additional detailed wetland mapping at the local scale, such as for mine site assessment, urban development, or transportation corridors.
- The purpose of this inventory was to identify wetlands on the landscape. While this inventory maps broad upland classes, they were not the focus of this product.



National
Boreal
Program