



Research Connections: Cumulative Effects

Using science and Indigenous knowledge to predict changes in caribou habitat and develop sustainable practices to ensure resiliency

Note 17

Lead Researchers: Christian Hébert and Solange Nadeau (LFC) **Project Type:** Caribou **Project Status:** Active (2021–2022)



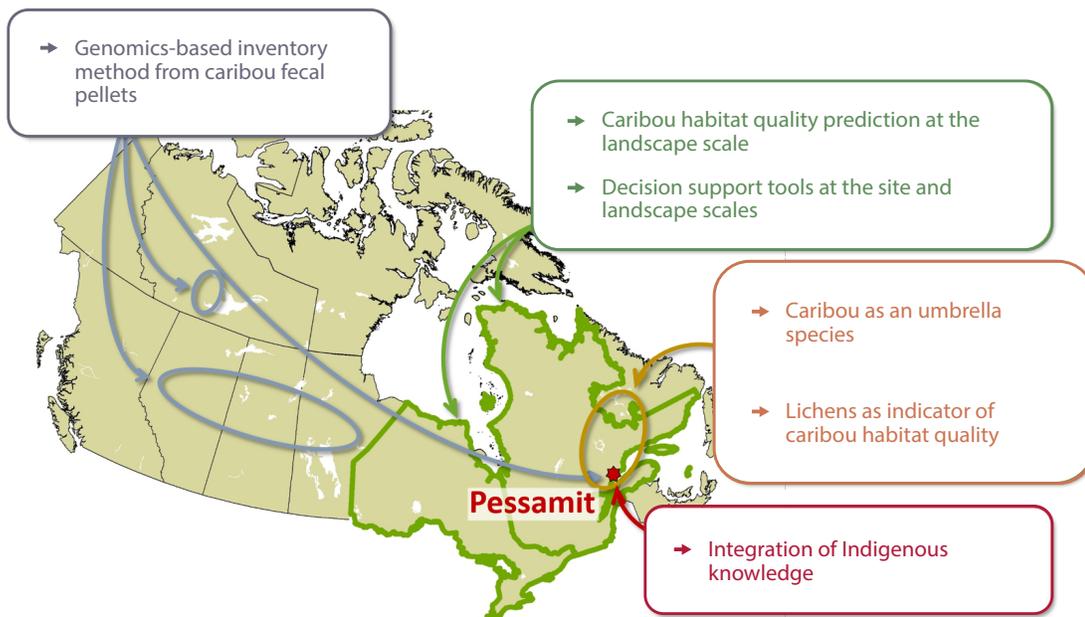
Need/Drivers

In 2003, the boreal woodland caribou was listed as threatened under the *Species at Risk Act* (SARA). Managing caribou habitat is complex and requires the integration of knowledge from different sources into new tools. Knowledge integration assists decision makers in improving ongoing recovery plans or developing new ones.

Objectives

The goals of this research include:

- improving the understanding of the impacts of climate change, natural disturbances (e.g., wildfire and spruce budworm (SBW)) and forest management on caribou habitat
- incorporating scientific and Indigenous knowledge on caribou habitat of the Pessamit's Nitassinan
- exploring opportunities for expansion of this approach to other Indigenous territories



Study area of the different components of the Caribou project.

Approach

CFS researchers use their wide range of expertise to collaborate with the Première Nation des Innus de Pessamit in our main study area in Québec. This provides a strong Indigenous perspective on caribou and encourages the development of a co-creative project.

- Non-invasive genomics-based method will be used to characterize caribou diets and microbiome to identify population health indicators. This will be done using DNA from caribou fecal pellets collected across Canada.
- The quality of caribou habitat in different forest types will be assessed using lichens and understory vegetation. In addition, the potential of caribou as an umbrella species for maintaining ecological integrity and ecosystem services will be tested using insect and lichen communities measured in forests affected by different levels of disturbance.
- Models will be developed in a climate change context to predict forest succession after natural disturbances or logging. Using data collected in the previous project, a model will be developed to predict caribou habitat quality. Decision support tools will integrate all models, as well as other values, to assist decision makers in selecting/improving caribou recovery plans.
- The close collaboration with the Pessamit's Innu underpins the research done on the Côte-Nord region in Quebec. Constant efforts are made to combine Indigenous and scientific knowledge to inform the caribou recovery strategies for the area. Similar efforts to develop collaboration with Indigenous communities are emerging in other locations.

Current and Anticipated Impacts

So far, the project has yielded a strong collaboration between researchers and Indigenous collaborators. This has resulted in the development of an innovative co-creative approach to develop new knowledge for the betterment of caribou recovery plans. Fieldwork will refine our understanding of the biodiversity on this territory. For example, Dr. Arsenault recently observed the presence of a rare lichen in northern Quebec and Labrador. This is a new record outside of Atlantic Canada for this lichen, which is listed under SARA and as critically endangered on IUCN's Red list. In addition to this high profile species, Dr. Arsenault observed

several new lichen species in northern Quebec and Labrador, as well as extensions of geographical range for many other species. These findings highlight the ecological value of the Pessamit's Nitassinan. Critical habitats for caribou will be identified and models to forecast them will be developed. A decision support tool will improve land-use decision making by taking into account caribou and other values such as biodiversity (e.g., insects, lichens and vegetation) in the context of climate change. Finally, the genomic tools will enable long-term, non-invasive monitoring of a number of population parameters that are key to managers. These outcomes will directly contribute to efforts put into the development of caribou recovery plans at the national, provincial and local levels.



Photo: S. Bourassa

Integration of Indigenous knowledge and western science through field discussions between members of the Innu community of Pessamit and CFS biologists on the importance of lichens in caribou habitat. From left to right, Jean-Luc Kanapé from Pessamit, David Gervais and Jean-Michel Béland from CFS and Éric Riverin from Pessamit.

Research team

- CFS: Christian Hébert (LFC), Solange Nadeau (LFC), André Arsenault (AFC), Yan Boulanger (LFC), Guy Larocque (LFC), Louis De Grandpré (LFC), Christine Martineau (LFC), Dominique Boucher (LFC), Jean-Michel Béland (LFC), David Correa (LFC), Stéphane Bourassa (LFC), David Gervais (LFC), Mathieu Gauvin (LFC), Marie-Josée Bergeron (LFC).
- Indigenous collaborators: Première Nation des Innus de Pessamit for multiple project components, Première Nation Abitibiwinni and Miawpukek First Nation for some components.
- Other collaborators: Wenjun Chen (NRCan), Daniel Fortin (ULaval), Mathieu Leblond and Micheline Manseau (ECCC), Wayne Bell and Angus Carr (OMNRF).

Knowledge transfer

Liming He, Wenjun Chen, Sylvain G. Leblanc, Julie Lovitt, André Arsenault, Isabelle Schmelzer, Robert H. Frase, Rasim Latifovic, Lixin Sun, Christian Prévost, H. Peter White, Darren Pouliot. "[Integration of multi-scale remote sensing data for reindeer lichen fractional cover mapping in Eastern Canada.](#)" *Remote Sensing of Environment* 267 (2021): 112731.

S. Nadeau, C. Hébert, A. Arsenault, Y. Boulanger, G.R. Larocque, C. Martineau, L. De Grandpré, P. Baines, F. Grenon, P. Bellefleur, D. Boucher, D. Gervais, D. Correa, J.-M. Béland, G. Pelletier, M.-H. Rousseau, A. Côté, J.-L. Canapé, É. Canapé, S. Picard, A. Rodgers, M. Leblond, F.W. Bell, M. Sharma, J.-M. Lussier, D. Fortin, A. Terrigeol, M.-H. St-Laurent, M. Manseau. (2021) Science and Indigenous Knowledge to predict changes in caribou habitat: An integrative and collective approach. [Poster presented at the 2021 North American Caribou Workshop.](#) May 3rd–6th 2021.