



# Caribou Update



December 2012

---

## Cumulative Effects Project Overview

### Introduction

The Porcupine Caribou Management Board (PCMB) is mandated to co-operatively manage, as a herd, the Porcupine Caribou (PCH) and its habitat within Canada so as to ensure the conservation of the Herd. The PCMB regularly makes recommendations on land use planning and land management related to specific projects, plans or activities throughout the Canadian range which may affect caribou movements, behaviour, habitat, reduce caribou productivity, or affect interactions between native users and Porcupine Caribou. The long-term health and productivity of the PCH is affected by many natural and human factors interacting in complex and dynamic ways. We want to be able to assess impacts, not only from human activity, but from climate change, on the health of the PCH. We want to develop the tools needed to comment on a development proposal while considering other sources of change in the herd including other development or climate change.

### What are cumulative effects?

Natural factors that affect the herd include climate (weather events, snow condition, and green-up), habitat quality and composition, wildfire activity, predation and insects. Human factors include harvest, other land use activities, and land management policy (e.g. protected areas). Determining the relative contribution, or 'effect', of each of these different factors in caribou health, productivity, and ultimately population status, is challenging.

Cumulative effects have been defined as changes to the biophysical, social, economic and cultural environments caused by the combination of past, present and reasonably foreseeable future actions. Impacts (changes) can be caused by natural events such as forest fires, or by human activities such as a mining project. When we want to assess the impacts of all these sources of change we can focus on an area or on a wildlife species.

### Why should we care about cumulative effects within the range of the Porcupine Caribou Herd?

Activities such as oil and gas development, fishing, mining, hunting, recreation and human settlement can all contribute to cumulative effects along with broader influences such as climate change. While the range of the PCH is considered relatively pristine, increased activity along the Dempster Highway, increasing impacts of climate change and the continued prospect of development in the calving ground areas are just some of the existing and potential impacts that we need to consider and manage. Project-by-project impact assessment and mitigation is not efficient or effective when making management decisions about the herd and its habitat. Potential future effects on the herd must be assessed in concert with all current and past activities within the range.

Understanding current and foreseeable activities and their potential impacts within the range of the PCH will allow us to better predict and manage these impacts to ensure that they do not reach a level that begins to negatively affect the Herd.

## **What is the Porcupine Caribou Management Board doing to better understand cumulative effects?**

Preliminary work on a cumulative effects project for the PCH was initiated in 2000-01. Gary Kofinas and other researchers from the Sustainable Arctic Communities project developed preliminary criteria for the PCMB to discuss possible land-use scenarios. Since no single agency or organization has taken responsibility for assessing and managing cumulative effects in the herd's range, the Board initiated a project in 2009 to begin developing a number of tools for assessing current and potential cumulative effects on the PCH. Once the North Yukon Land Use Plan was done, the lead on that program, Shawn Francis, was hired by the PCMB to use the database developed through the land-use planning process to incorporate into a cumulative effects project on the herd. That exercise produced a new vegetation map and a human footprint map of roads, seismic lines, etc. for the range of the herd, and a study plan of how modelling might be used to link habitat, development, and changing climate to the population cycles of the herd.

To implement the study plan, the PCMB has recently hired Don Russell. Don has had considerable experience in both conducting research on the PCH and developing tools to help assess cumulative impacts on large migratory caribou herds. The approach Don has taken is to use our knowledge of the ecology of caribou and build upon three models that have been developed over the years.

### **What is the study plan?**

The objective of the project is to relate caribou habitat features to the productivity of the herd. We will estimate how a habitat feature affects an individual caribou, extrapolate that effect from an individual to the herd, and estimate the effect on herd growth.

The energy-protein model was developed years ago to model the growth and fattening of an individual cow caribou throughout the year. The condition of caribou has a significant influence on whether or not the

cow produces a calf in any particular year. By knowing what the caribou eats, we can predict whether or not she will become pregnant.

A vegetation map will be used to build a map of caribou food. That map will be overlaid with the human footprint map to make a caribou habitat map. The many years of radio collar location data will be used to determine what habitat features, natural or man-made, caribou use or avoid the most. This is called a Resource Selection Function (RSF). The RSF analysis tells us how strong the avoidance is near features (such as how the density of caribou changes as we move away from the Dempster Highway).

The energy-protein model will then tell us the effect of avoiding certain areas on pregnancy. We can then make some assumptions on what proportion of the herd may be impacted by the features and the herd pregnancy information can be used in the population model to estimate herd productivity.

By knowing how different habitats affect herd growth, we can test how removing or changing a certain area in the model might change the productivity and growth rate of the herd. In this way, we can better assess the impacts of developments in different areas on the herd.

### **What is the status of the project and what's next?**

Shawn Francis developed the vegetation map and human footprint map. Don's work so far has produced two more products: First, using climate data assembled by the CircumArctic Rangifer Monitoring and Assessment (CARMA) Network, the historical climate (1979-2011) was summarized and analyzed for the different periods of population trends in the herd (increase periods 1979-1989, and 2001-2011 and decrease period from 1990-2000). This data will allow us to run the model for realistic weather conditions and determine which indicators (such as insect harassment levels or winter snow depth) has the greatest impact on the growth and fattening of the PCH.

The second product was an analysis of habitat use (RSF) in the winter. This analysis looked at the impact of the Dempster Highway, communities and seismic lines on winter distribution of the herd. From this work we will be able to learn how such infrastructure and activity has impacted the herd. Future newsletters will describe these products in more detail.

Work in the near future will include simplifying the model so that we can run the model ourselves, and drawing up a list of potential habitat disturbances we want to test.

The Board is cognizant of its limited resources and scope of responsibility in this type of initiative and is assessing its continued role in cumulative effects management and the role of potential partners.

For more information, please visit PCMB's Web site at [www.taiga.net/pcmb](http://www.taiga.net/pcmb) or contact Deana Lemke at (867) 633-4780, fax 393-3904 or e-mail [pcmb@taiga.net](mailto:pcmb@taiga.net)



*Porcupine Caribou photos: © Peter Mather 2010, all rights reserved*

