



Project Proposal Application Funding Cycle 2008-2009

DETAILED PROJECT PROPOSAL OUTLINE

1. EXECUTIVE SUMMARY

The current mountain pine beetle epidemic is one of the greatest threats to Northern Caribou populations in British Columbia and Alberta. Northern Caribou in the Southern Mountains National Ecological Area (SMNEA) were recently designated as Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Before the project in this proposal was initiated in 2005/06, no information was available on the effects of the mountain pine beetle epidemic on caribou habitat use. This project investigates habitat use and movements of the Tweedsmuir-Entiako caribou population, the first Northern Caribou population to experience the mountain pine beetle epidemic, during the grey attack phase of the epidemic. The project biologist is Deborah Cichowski with the Bulkley Valley Centre for Natural Resources Research and Management. The Bulkley Valley Centre is a registered not-for-profit society based in Smithers, BC that has been conducting high quality interdisciplinary research on temperate, montane and boreal ecosystems since 2002.

The objectives of this project are: to improve the understanding of the effects of the current mountain pine beetle epidemic during the “grey-attack” phase on Northern Caribou migration, landscape level habitat use, stand level winter habitat use and winter forage site selection; to use information collected during this study to provide wildlife and forest managers with baseline information on the effects of epidemic mountain pine beetle numbers on Northern Caribou; and, to develop winter habitat management strategies for Northern Caribou populations experiencing mountain pine beetle outbreaks. The project is based on radio-collared caribou and will include monthly radio-telemetry flights, four sets of winter site investigations, calf survival surveys, and mortality investigations as required.

The Tweedsmuir-Entiako population is the first to experience the current mountain pine beetle outbreak; therefore, information collected will benefit all Northern Caribou populations where mountain pine beetle levels are currently increasing. The costs of not conducting this research will be the loss of the first opportunity to collect information on the response of caribou to a mountain pine beetle epidemic and to develop management strategies to deal with this issue.

The measures of success for the short-term objective (2008/09) for this project will focus on completing the proposed activities and the annual report. The measures of success for the long-term objectives for this project will include: a better understanding of caribou movements and habitat use during the grey phase of the mountain pine beetle epidemic in sub-boreal forests; a final report that contains a detailed analysis of data collected from 2005/06 to 2009/10 and compares it to data collected prior to mountain pine beetles attack, and includes recommendations for management strategies; a final project summary for wider distribution; final presentations to the Northern Caribou Technical Advisory Committee, the Morice Lakes IFPA, and the Bulkley Valley Centre seminar series; and, a presentation at the next scheduled North American Caribou Workshop.



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2. ISSUE

The Tweedsmuir-Entiako caribou population is the first Northern Caribou population to experience the recent mountain pine beetle (MPB) epidemic. During winter, caribou select mature lodgepole pine forests where terrestrial lichens are abundant, and forage primarily by cratering through the snow to obtain terrestrial lichens (Cichowski 1993). COSEWIC recently listed all caribou in the Southern Mountains National Ecological Area (SMNEA), which includes the Tweedsmuir-Entiako population, as Threatened. The Recovery Strategy for Northern Caribou in the SMNEA in BC identifies research on the effects of MPB on Northern Caribou as a priority (NCTAC 2005). Since this scale of MPB attack has been unprecedented on caribou ranges in recent history, there is no information available on the effects of MPB on caribou habitat use, making it difficult to develop management prescriptions that minimize impacts to caribou. This project assesses the impacts of the MPB epidemic on Northern Caribou habitat use and winter foraging habits during the grey attack phase of the epidemic, using radio-collared caribou and winter snow tracking. Although there is no hunting season for the Tweedsmuir-Entiako population, all Northern Caribou populations in BC and Alberta, including hunted populations in northern BC and in the Itcha-Ilgachuz area are at risk of experiencing the MPB epidemic due to climate change and a northerly expansion of MPB distribution. Not conducting this project will result in the loss of the first opportunity to collect information on the response of caribou to a MPB epidemic and to develop management strategies to deal with this issue.

3. PROJECT OBJECTIVES

The long-term objectives of this project are:

- to improve the understanding of the effects of the current mountain pine beetle epidemic during the “grey-attack” phase on Northern Caribou migration, landscape level habitat use, stand level winter habitat use and winter forage site selection using radio-collared caribou and snow tracking and comparing results to similar information collected prior to mountain pine beetle attack;
- to use information collected during this study to provide wildlife and forest managers with baseline information on the effects of epidemic mountain pine beetle numbers on Northern Caribou; and,
- to develop winter habitat management strategies for Northern Caribou populations experiencing mountain pine beetle outbreaks.

The short-term objective of this project for 2008/09 is:

- to assess the effects of the current mountain pine beetle epidemic during the grey-attack phase on Northern Caribou in the Tweedsmuir-Entiako caribou population by using radio-collared caribou and conducting:
 - monthly radio-telemetry flights;
 - 4 winter site investigations (snow tracking);
 - 3 calf survival surveys (June, October, March); and,
 - mortality investigations as required.



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4. ACTIVITIES/METHODOLOGY

Long-term and short-term objectives will be achieved through a 3-year field study of radio-collared caribou. This project was initiated in 2005/06 (Year 1) with data collection starting in 2006/07 (Year 2). Year 4 (2008/09) will be the final year of data collection and Year 5 (2009/10) will focus on the final data analysis and report. Information collected for the short-term objective for 2008/09 (as described below) will be combined with information collected during 2006/07 and 2007/08 to fulfil the three long-term objectives.

To assess the effects of the mountain pine beetle epidemic on caribou habitat use at the landscape level, ideally, caribou seasonal movements and habitat use would be studied prior to, during and following mountain pine beetle attack. The Ministry of Environment has been tracking radio-collared caribou in the Tweedsmuir-Entiako area for 20 years. All data collected during the 20 year period has been analyzed and summarized in Cichowski and MacLean (2005). Currently, 5 GPS collars and 14 VHF collars are active in the study area. An additional 5 GPS collars and 5 VHF collars will be placed on caribou in December 2007. No further capture work is planned for 2008/09. In Year 4 (2008/09), all radio-collared caribou will be located by fixed-wing aircraft during 12 monthly flights conducted from April to March. During flights, the following information will be collected for each radio-collared caribou found: GPS location, habitat description, tree status (i.e. red attack, green, grey attack, etc.), group size and presence of calf (if the caribou and group were seen), and other relevant information. GPS data for GPS collars will be downloaded when the collar is retrieved. All data will be entered into a database following telemetry flights and checked for errors. Initial analysis at the end of March will include an overview of data collected during the fixed-wing flights and GPS data collected from GPS collars. Habitat selection by caribou during the grey attack phase of the mountain pine beetle epidemic will be assessed using radio-collared caribou locations and will be compared to habitat selection prior to the epidemic.

Stand and site level responses of caribou winter habitat use to mountain pine beetle attack will be investigated by snowtracking. Following 4 radio-telemetry flights conducted from December 2007 to March 2008, radio-collared caribou locations will be used to locate caribou using areas in or adjacent to mountain pine beetle attack. A helicopter will be used to access sites. Fresh tracks will be followed or backtracked and feeding site type (terrestrial vs. arboreal lichen feeding), general habitat class (pine, pine/spruce, spruce, etc.), disturbance class (none, forest harvesting, mountain pine beetle attack), snow depth, canopy closure and % vegetation cover in feeding craters will be recorded at each feeding site. In addition, snow will be excavated every 100 steps where caribou are traveling and not cratering and the same measurements will be recorded at those sites. These data will be compared to similar data collected from the 1985 to 1988 intensive winter habitat field study.

To address annual range use in context of a declining population, basic information on population parameters will be collected with a focus on adult mortality, calf survival and recruitment, and population growth. Population parameters will be compared to those from the previous 20 year study to assess population growth. Adult mortality will be based on annual adult mortality rates. All mortality signals from adult radio-collared caribou will be investigated to determine the fate of the collared caribou (mortality, slipped collar, etc.), to determine the cause of mortality when possible, and to retrieve the collar. Where feasible, a fixed-wing aircraft or boat will be used to access mortality sites; all other sites will be accessed by helicopter. Adult survival rates will be calculated using two methods; the first based on the proportion of radio-collared caribou that were still alive at the end of the year, and the second using the Kaplan-Meier estimator, which calculates survival with associated confidence limits based on monthly survival for the radio-collared caribou sample.



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Calf survival and recruitment will be assessed by tracking the status of calves associated with radio-collared adult female caribou. A helicopter will be used to locate each radio-collared caribou to see whether she has a calf. Calf survival surveys will be conducted 3 times during the year: in June to determine neonatal calf survival; in October to determine summer calf survival; and in March to determine winter calf survival and overall calf recruitment. Population growth rate will be calculated based on adult radio-collared caribou survival and calf recruitment. All population data will be compared to population data from 1983 to 2003. Data will also be added to a Population Viability Analysis that was recently developed for the population (Cichowski and MacLean 2005).

The combination of snowtracking and using radio-collared animals provides a multi-scale approach to assessing habitat use (Cichowski 1993, Johnson 2000) and has been successfully used in the study area in the past (Cichowski 1993). The activities proposed for this project provide a feasible approach to addressing project objectives.

All activities will be conducted by the project biologist, Deborah Cichowski, including project management, fieldwork, data management and analysis, and report writing. Habitat analyses will be conducted by Norm MacLean. Field assistance will be provided by Ministry of Environment staff.

5. BENEFITS/RISK

Because the response of caribou to mountain pine beetle attack is unknown and the Tweedsmuir-Entiako caribou population is the first caribou population to experience a significant mountain pine beetle outbreak, investigation of impacts on the Tweedsmuir-Entiako caribou population will aid in developing caribou management strategies for all Northern Caribou populations in BC, including hunted populations such as the Itch-Ilgachuz population and populations in northern BC. Information obtained from this study will include stand conditions that caribou select following epidemic mountain pine beetle levels and forage selection. This will aid in identifying forest stands on other caribou winter ranges that will be important caribou winter range following epidemic mountain pine beetle levels, and therefore will aid in directing mountain pine beetle management and salvage efforts to minimize impacts to all Northern Caribou populations in BC. Although management strategies for managing caribou winter ranges following mountain pine beetle attack will be developed as part of the final report (Year 5 – 2009/10), information collected during the study to date is already being used to guide management.

Another benefit is that all activities conducted in Years 1 (2005/06) and 2 (2006/07) and the majority of activities in Year 3 (2007/08) have been funded by other sources (over \$260,000 contributed to date) and additional external funding is also being sought for the remainder of the project. Therefore, the HCTF contribution to the project will result in a much larger dataset than would be collected by the HCTF contribution alone. Other benefits are that this project will complement the project already underway on the response of terrestrial lichens to the mountain pine beetle epidemic, and will support a project recently initiated on modeling the impacts of mountain pine beetles on Northern Caribou.

The primary risk associated with the project is potential injury to animals during capture. However, no capture work is planned for 2008/09. During the first 3 years of the project (2005/06 to 2007/08) caribou were captured using net guns fired from helicopters, physically restrained while a radio-collar was placed around their neck and a blood sample taken, and then released, resulting in relatively low risk of injury.

There are no risks anticipated to non-target species and no liability concerns since the project focuses on monitoring radio-collared caribou and occasional snowtracking.



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6. EVALUATION/MEASURES OF SUCCESS

The measures of success for the short-term objective (2008/09) for this project will focus on proposed activities and the annual report. Year 4 (2008/09) will include the following measures of success:

- 12 radio-telemetry flights (April 2008 to March 2009);
- 4 winter site investigations (December 2008, January 2009, February 2009, March 2009);
- 3 calf survival surveys (June 2008, October 2008, March 2009);
- mortality investigations as needed;
- 1 Annual Report that summarizes activities conducted and data collected in 2008/09; and,
- annual updates to the Northern Caribou Technical Advisory Committee and the Morice Lakes IFPA, depending on timing of those meetings.

The measures of success for the long-term objectives for this project will be addressed during the final year of the project. Year 5 (2009/10) will focus on data analysis and completion of a final report and will include the following measures of success:

- a better understanding of caribou movements and habitat use during the grey phase of the mountain pine beetle epidemic in sub-boreal forests;
- a completed final report that contains a detailed analysis of data collected from 2005/06 to 2009/10 and compares it to data collected prior to mountain pine beetles attack, and includes recommendations for management strategies;
- a final project summary for wider distribution;
- final presentations to the Northern Caribou Technical Advisory Committee, the Morice Lakes IFPA, and the Bulkley Valley Centre seminar series;
- a presentation at the next scheduled North American Caribou Workshop.

7. COMMUNICATION/OUTREACH

Communications will be in the form of Annual Reports for Year 4 (2008/09) and a Final Report to be completed in Year 5. The focus of Year 5 will be data analysis and completion of the Final Report. Target audiences for reports will include the Northern Caribou Technical Advisory Committee and associated Recovery Implementation Groups, and, wildlife and forest managers where Northern Caribou ranges are affected by mountain pine beetles. For Year 4 (2008/09), an update will be presented to the Northern Caribou Technical Advisory Committee at their annual meeting and to the Morice Lakes IFPA Information Session. Results from the study will also be presented at the next North American Caribou Workshop following completion of the final report. In addition, a final project summary will be completed in Year 5 that will be used for wider distribution. Annual reports and the final report will also be available through the Bulkley Valley Centre for Natural Resources Research and Management's website.

In addition, Quarterly Summaries, which will summarize activities conducted during each quarter including a brief overview of results, will be provided to all project supporters. Powerpoint presentations will also be presented to project supporters and wildlife and forest managers as required.

HCTF support will be acknowledged on the cover page and acknowledgements section of the annual report for 2008/09 and the final report, and on the funding sources slide in any powerpoint presentation.



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8. LITERATURE CITED

- Cichowski, D.B. 1993. Seasonal movements, habitat use, and winter feeding ecology of woodland caribou in west-central British Columbia. B.C. Min. For., Victoria, B.C., Land Manage. Handb. No. 79. 54p. (www.for.gov.bc.ca/hfd/pubs/docs/mr/lmr079.htm)
- Cichowski, D. and N. MacLean. 2005. Tweedsmuir-Entiako Caribou Population Technical Background Information Summary. Prepared for Ministry of Environment, Smithers, B.C. 199p. (Source: Rick Marshall, Ministry of Environment, Rick.W.Marshall@gov.bc.ca)
- Johnson, C.J. 2000. A multi-scale behavioural approach to understanding the movements of woodland caribou. PhD Thesis. University of Northern British Columbia, Prince George, B.C. 210p. (Source: Chris Johnson, UNBC, johnsoch@unbc.ca)
- Northern Caribou Technical Advisory Committee. 2005. A Strategy for the Recovery of Northern Caribou (*Rangifer tarandus caribou*) in the Southern Mountains National Ecological Area in British Columbia – Version 1.0. Ministry of Environment, Victoria, B.C. (Source: Ian Hatter, Ministry of Environment, Ian.Hatter@gov.bc.ca)