Adaptive Management Research Project

Forest Management Districts 10, 11, 12 and 13 (Zone 5)

Department of Environment and Conservation | Department of Natural Resources

Newfoundland Labrador

INTRODUCTION

Caribou on the island of Newfoundland are of the forest-dwelling ecotype, classified as a unique subspecies (*Rangifer tarandus terraenovae*; Thomas and Gray 2002; COSEWIC 2011 unpublished), and one of few endemic mammals in the Province. They are an essential element of the Provinces' culture and biodiversity, and the subject of significant study, most recently a major 5- year initiative called the Caribou Strategy. This study was designed to examine causes of a decline that began in many of the Island's caribou populations during the late 1990s. To date, considerable information on the distribution, movements and occurrence of caribou has been collected, comprising key baseline data. Subsequent analysis of this information includes the delineation of core areas, or areas with intensive and repeated use by caribou and their location throughout Newfoundland. However, while the location of important caribou areas can now be confidently described, less certain are the environmental attributes of areas most intensively used, (or conversely, avoided) by caribou. That is, while the location and importance of a given core area may be known, the attributes that make it attractive to caribou are not known, and hence management of the landscape for the suite of characteristics which make it high value habitat is also not possible.

Range recession and decline of caribou populations has frequently been attributed to anthropogenic landscape change (Schaefer 2003; Vors et al 2006). For woodland caribou, forest and caribou management values often overlap. These competing values require knowledge of the space-use patterns of caribou

across the landscape and the extent to which proposed harvesting operations will influence these. Timber harvesting has been associated with numerous adverse effects in caribou populations. These include disturbance during road building, displacement thorough removal of forest as well as indirect effects such as avoidance of areas adjacent to disturbance and increased access to caribou by hunters on the roads that remain after forest harvesting as been completed. Recent studies in Quebec suggest that both proximity of forest harvesting as well as fragmentation of core areas themselves result in displacement of caribou from previously used areas. Courtois et al (2008) investigated caribou response to forest harvesting for forest management plans which included preservation of large forest blocks connected by corridors and found that caribou avoided cut areas and selected protected blocks. A companion study found that caribou changed their use of areas in relation to the extent of forest disturbance (Courtois et al 2007). In Newfoundland, Schaefer and Mahoney (2007) assessed the impacts of clear-cut logging on the summer range of the Middle Ridge caribou herd and found that female caribou avoided cut-overs by an average of 9 km while males continued to occur in proximity to cuts. Sex-specific reponse by caribou in Newfoundland was also documented by Chubbs et al (1993) who found that female caribou with calves were displaced by forest harvesting due to their avoidance of cut areas. Further, McCarthy et al. found a negative relationship between the total anthropogenic/forestry footprint and recruitment in Newfoundland. While each of these studies indicate that caribou are negatively impacted by forest harvesting, all recommend that aggregating disturbances and

maintaining undisturbed interconnected blocks (100 to 250 km^2) within the landscape will allow caribou to persist.

Proceeding with forest harvesting in core areas, without knowledge of the potential ramifications with respect to displacement of caribou to less suitable areas, reoccupation of previously disturbed areas and corresponding changes in survival and recruitment, may negatively impact the caribou populations. From a management perspective, this knowledge gap impedes effective management of caribou populations, constrains assessment of forest management plans, and hinders biologically sound mitigation measures.

In order to determine the best management practices and mitigate anthropomorphic forestry impacts on caribou, Newfoundland and Labrador's Environment and Conservation - Wildlife Division and the Department of Natural Resources - Forestry Services Branch, Centre for Forest Science and Innovation (hereafter Wildlife and Forestry) committed to a Memorandum of Understanding to undertake research activities that would inform forestry and wildlife management through an adaptive approach. The research proposed is a necessary step in the development of landscape-oriented management efforts that incorporate planning for high-value caribou habitats over space and time. In summary, by first determining environmental characteristics of core areas then planning and maintaining a mosaic of areas that mimic current core areas (and managing areas to attain these characteristics) we inevitably increase the potential of maximizing forest harvest and caribou persistence over time.

Here we propose the following three tier research plan where each tier of the research is intended to build upon the results of the previous tier: 1) characterize the ecological conditions associated with core areas (areas of high caribou use) , relative to those areas used less intensively; 2) extrapolates the field program to a larger region by evaluating the applicability of the previously defined ecological conditions to core areas throughout the broader range of Newfoundland caribou (e.g. Northern Peninsula); 3) integrates information from the first two tiers and links caribou demography to landscape change and availability of preferred habitats.

The following section outlines specific objectives for each research tier. Work plans outlining projects described in Tier 2-3, including data requirements, divisional responsibilities, financial and human resources will be completed as the project develops:

Tier 1: (Currently ongoing, Concordia University; Appendix A)

- Characterize land cover associated with caribou core use areas and those areas used at lower intensities or not at all.
- Determine if the proportion of suitable habitats and cutovers vary between regions used less or more intensively by caribou.

Tier 2:

- Evaluate the applicability of the previously defined ecological conditions by expanding the field program to core areas throughout the broader range of Newfoundland caribou (e.g. Northern Peninsula).
- Validate community descriptions and map these throughout the study area/s by integrating field data with remotely sensed, other map layers depicting digital environmental information.
- Assess potential differences in preferred habitat use by caribou in different regions of the Province.
- Evaluate changes in caribou distribution (core areas) relative to forest harvesting using a retrospective analysis of known caribou locations (2005-2012).

Tier 3:

- Determine the accumulated anthropomorphic disturbance ranges for caribou.
- Assess the relationship between caribou population demographics (survival, recruitment) and the anthropogenic footprints within caribou ranges.

Outcomes:

- Identification of high value habitats throughout the Island
- The ability to do long-term landscape-level planning
- Inform wildlife and forest management, including appropriate mitigation

Study Area and Methods

Tier 1: Ongoing, Zone 5 - Forest Management District, South-central Newfoundland; see Appendix A.

Tier 2:

- Study area to be located within the Northern Peninsula, Newfoundland and Labrador.
- Field sampling for vegetative data (see Tier 1).
- Compile required spatial datasets:
    - satellite data/aerial photograph
    - cutblocks
    - forest resource roads
    - FRI
- Develop classification protocol depicting preferred habitats and extrapolate via mapping to the Northern Peninsula study area. This map will depict suitable caribou areas.
- Retrospectively map forest harvesting activity on an annual level relative to caribou distribution in order to determine the timing of reoccupation of harvested areas relative to time since cut and stand age.
    - Classify forest harvest cuts by time since cut

Tier 3:

- Map cumulative disturbances within caribou ranges at the herd level.

- Conduct analyses on population dynamics using Program MARK, Pradel models.

Literature Cited

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