Nova Scotia Species at Risk Fund - Year 1/3 Final Report
Rebecca Jeppesen, May 2008

Adaptive Habitat Model for the Cape Breton American Marten
(*Martes americana*) Augmentation Project

Goals and Objectives

To develop an accurate quantitative and G.I.S. based adaptive habitat model for use by the Department of Natural Resources (DNR) and the Nova Scotia Marten Recovery Team (NSMRT) in order to identify suitable marten habitat in Cape Breton Island, thereby improving the chances of achieving a long-term viable marten population through augmentation efforts.

Background

The Nova Scotia Department of Natural Resources (DNR) Wildlife Division, Parks Canada, and numerous other partners of the Nova Scotia Marten Recovery Team (NSMRT) recently began efforts to augment the population through translocation of wild and captive bred individuals (Austin-Smith & O'Brien, personal communication). Central to the success of this endeavor is the identification of optimal and suboptimal habitat in CBI.

DNR Forestry Division (2007) has compiled an on-line geographic information systems (GIS) database which includes data on stand age, canopy height, crown closure, maturity, cover type, and land use classification - all of which have been identified as playing crucial roles to the distribution of marten throughout its range (Banfield 1974, Bateman 1986, Clarke *et al.* 1987, Hodson 2003, Potvin *at al.* 2000). Additional characteristics also play significant roles in determining whether an area constitutes suitable marten habitat, namely presence, abundance, and structure of coarse woody debris (CWD) (Bateman 1986, Berlo 2006, Clarke *et al.* 1987, Hodson 2003, Potvin *et al.* 2000, Slough 1994).

Data concerning CWD is not currently available for the study area, and relationships between CWD and other forest stand characteristics are lacking in the literature; as such the primary focus of my research in the first year was to predict the quantity and structure of CWD throughout the CBI study area (>60,00 stands) to assist in determining habitat suitability and contiguity in CBI.

Study Area

The study area for my research was defined in such a way as to include potential marten release sites identified by DNR for augmentation efforts (Austin-Smith 2006), the Cape Breton Highlands National Park, 7 Provincial Wilderness Areas, the Marten Habitat Management Zone, various reserves (steep slope, lynx habitat, connectivity management, and old growth) (Austin-Smith 2006) and a large block of provincially owned land in the centre of the region. The total study area is approximately 5500 km^2, and ranges from St. Ann's Harbour, west to

Lake Ainslie, and North to the Pollets Cove -Aspy Fault Wilderness Area. The study area was chosen following consultation with members of the NSMRT and DNR Wildlife Division (O'Brien and Austin-Smith, personal communication); the large amount of crown land in the region will facilitate the implementation of any land management scenarios that may be recommended to enhance marten habitat in the future.

Outline of Work Completed and Preliminary Results
In the first field season (summer 2007) data were collected for 75 plots. Beginning in January 2008, 58 of these (randomly selected) were used in CWD prediction models for development and parameterization while the remaining 17 will be used to test and validate the models. Regression models to predict the total volume of CWD were developed with promising preliminary results for live natural and managed forested land. The first stages of predicting the structure (standing, fallen, measure of diameter and length / height) of CWD by discriminant function analysis also look promising. In addition, a large amount of literature has been reviewed and summarized for use in determining the suitability of the habitat for marten.

Assessment of Achievements to Date
The results to date indicate that the project objectives are attainable within the slated time line. The GIS based model is expected to be completed in early fall 2008; the augmentation of the marten population is on-going through efforts of the NSMRT.

Years 2 and 3 - The Future of the Project
The remaining portion of the 125 plots will be sampled in the 2008 field season; a number of these stands are classified as depleted or dead by NSDNR Forestry (2007) which will hopefully provide the data required to obtain accurate prediction concerning the quantity and structure of CWD in such stands. Following completion of the coming field season, equations derived through regression and discriminant analysis will be input to the GIS model to obtain quantitative measures of CWD throughout the study area. The suitability of stands will then be determined; the result will be a digital map that can be easily modified to reflect updates in the Forestry database (DNR Forestry 2007).

The scope of the project has expanded to include the design and implementation of an individual based model (IBM) with the objective of determining the best augmentation strategy to ensure the long term survival of a self sustaining marten population in Cape Breton. The GIS habitat model will serve as the virtual ecosystem in the IBM.

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Rebecca Jeppesen

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