WINTER HABITAT SELECTION BY ELK IN A BOREAL MIXEDWOOD ECOSYSTEM, WEST-CENTRAL ALBERTA: ANNUAL PROGRESS REPORT 1994 - 1995

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Abstract

This study deals with winter habitat selection by elk in a boreal mixedwood ecosystem in West-Central Alberta. The objectives of the project are to determine habitat selection by elk at a landscape, stand, and site scale. The project also assesses diet quality, through analysis of fecal samples, and tests a winter habitat suitability index model for elk. Twelve elk have been fitted with radio collars, after being captured in a collapsible clover trap. Intensive monitoring of these elk began December 01, 1994 and continued until March 21, 1995. Analysis of this years data will commence this summer, if time permits, or in the fall of 1995, after all vegetation data has been collected.

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TABLE OF CONTENTS

LIST OF TABLES

INTRODUCTION

Management of crown land for multiple-use has become a major concern of the general public in the 1980's. This resulted in the creation of the Model Forest network, whose goal is to integrate the needs of wildlife, recreation, and reforestation with those of timber management. One member of the national Model Forest Network is the Foothills Forest located in Hinton, Alberta.

The Foothills Forest is located on 1.2 million hectares of Crown and private land, and includes the Forest Management Agreement area (FMA) of Weldwood of Canada; Hinton Division. The goal of the Foothills Forest is to develop a computerized Decision Support System (DDS), which incorporates the needs of wildlife, timber production, and other wildlife values. To incorporate the wildlife requirements, 35 indicator species were selected, and a habitat suitability index model (HSI) developed.

Elk (Cervus elaphus) was one of the indicator species chosen for the development of an HSI model . An initial expert based model was developed by the Integrated Resource Management Steering Committee of Weldwood (Bonar et al., 1990), and then revised by the staff of Foothills Forest (Todd et al., 1993). The model consists of twelve variables associated with two basic life requirements of elk. The first part of the model deals with the food requirements and consists of five variables. The second part of the model is further subdivided into two components. The first is thermal cover and consists of five variables, with the second being hiding cover, consisting of two variables (Jones., 1994). The model ranks each of the variables from 0 to 1, with a ranking of 1 being optimal, and then combines them into a single index value. The model can be applied on a large scale, usig a GIS system, to determine habitat availability and quality for elk. Incorporating the elk model into the DSS model will allow managers to test different scenarios (ie clear cutting versus partial cutting) on the long term consequences to elk habitat. As stated previously the model that exists to date is based on expert opinion and previous literature. Before the model can be incorporated into the DSS it should be field tested to ensure the selected variables and their respective rankings are correct. One of the goals of this project to empirically test/validate the model.

To empirically test the model, radio telemetry of collared elk will be used to determine habitat selection. Habitat selection at a landscape, stand, and site scale, and diet quality will be addressed. The site scale analysis will serve as the test of the HSI model. This paper is a summary of the accomplishments from April 1994 to March 1995, and is subdivided into two main sections. The first section deals with the achievements during the spring and summer months. The second section focuses on the achievements of the winter months.

(1) Spring and summer achievements

There were four major goals accomplished during the spring and summer months of 1994. These ranged from trapping and collaring elk, to the completion of my research proposal. These four accomplishments are summarized below.

Trapping Effort

Radio telemetry is a common method used in habitat selection studies. Before telemetry can be used animals have to be fitted with radio collars. Collapsible clover traps have been used in previous studies to capture elk so that they can be fitted with a radio collar (Thompson et al., 1989). Eight collapsible clover traps were distributed throughout the study area in areas of confirmed elk use. An average of 5 traps were open on any given night. Traps were checked remotely twice a day. Traps were opened on May 4 and remained open until the 27 of August, with a one month closure starting on the 20 of May. This closure was to allow cows to calve. This summer's trapping effort resulted in the capture of 11 elk, 20 deer (both white-tail and mule deer), 5 bears and 19 horses (8.45 trap nights/capture or 42.3 trap nights/elk). Of the 11 elk captured, 7 were fitted with Lotek radio collars (LMRT-4) and ear tags. This brings the total number of collared elk on the study area to 12. Jasper National Park wardens borrowed a radio collar and have placed it on a cow elk within the parks' boundaries. Sometime last fall (October or November) this cow and possibly others were to be relocated to the study area. Due to a conflict in policy, Jasper National Park wardens decided not to relocate this elk, and have agreed to replace the collar. Currently the eight clover traps are being used by Jay Gedir and Tim Quinn to capture and collar white-tailed and mule deer.

Weekly locations of collared animals

Once a week (May 01, 1994 to August 31, 1994) subject to field logistics, each collared elk was located using telemetry. Elk were relocated to confirm they were still alive and to become aquainted with their movements. By August 31, 1994, 179 locations (includes this summers' locations and all previous locations) had been taken and mapped. Of these, only 102 were deemed accurate enough to positively say the collared animal was in a particular area. The locations will not be used in any analysis because they are not accurate enough for habitat selection studies.

Error determination

Determining the error associated with taking a bearing is a means of determining how accurate your locations are. In order to determine habiatat selection one needs accurate locations. To determine the error when taking a bearing,12 test collars were fixed to wooden stakes and placed in different locations within the study area (primarily the west end) (Garrott et al., 1986). A total of 275 bearings were taken on these collars, from 23 different bearing stations. The loudest signal (bearing taken at point of loudest signal (n=138)) and null-point (the center bearing calculated from bearings taken at the point were signal stops to the left and to the right (n=137)) methods were used to obtain these bearings. Before determining the bias and precision of each method, any bearing out plus or minus ten degrees (attributed to bounce), were removed from the data set (Garrott et al., 1986). Bias is a measure of the difference between the true bearing and the actual bearing, while precision is a measurement of the variation of estimated bearings (Garrott et al., 1986).

Table 1.0: Proportion of signals associated with bounce, precision. and bias using two different telemetry techniques

Method	Null point method	Loudest point method
n*	50	52
% Bounce (n)	87	86
Bias ($\bar{x}$) (degrees)	1.060	0.865
Precision (SD) (degrees)	5.441	6.049

* - # of bearings after -10^0<bearing>10^0 removed

Both methods produced equivalent results in terms of proportion of signals attributed to bounce, bias, and precision (see Table 1.0). For this study the null point method will be used . The large proportion of signals associated with bounce is a direct result of the topography and observer inexperience. To over come these factors all bearings will be mapped on 1:15000 airphotos and the resulting polygon visited(within 5 days) to confirm use by elk. Confirmation of use will consist of either seeing the collared elk or other elk at the site or finding recent sign in the snow (ie tracks, beds, feeding sites or pellet groups). This will also serve to determine activity at the site.

Research proposal

My research proposal was completed in August for review and will serve as the guideline for this coming year. To summarize the proposal, there are three aspects I am focusing on: (1) winter habitat selection by elk at a landscape, a stand, and a site scale, (2) a general data base on elk ecology (including home range size, distribution and diet quality), and (3) the testing of the Habitat Suitability index model revised by Foothills Forest staff.

Table 2.0: Number of locations per animal.*

I.D. #	1805	1814	1823	1834	1844	1885	1904	1914	1935	1945	1955	1975
Num.	14	22	29	28	22	24	26	25	4	27	0	18

* as of March 21 , 1995

(2) Winter achievements

The focus of the winter months was on data collection, in order to address the questions asked in the research proposal. The first selection deals with data collection to address the objective of habitat selection and to test the HSI model (objectives 1 and 3, respectively), while the last two sections deal with data collection to gather general ecological data on elk (objective 2)

Winter data collection

Determination of winter habitat selection by elk began on December 1, 1994 and continued until March 21, 1995. The twelve collared animals were randomly subdivided into three groups of four, with each group being located every third day baring field logistics. 342 locations have been obtained to date, of which 239 (84% of which were confirmed) were on the 12 collared animals (see Table 2.0). A total of 65 bedding sites and 112 feeding sites were found (includes locations on collared animals and non-collared animals). Intensive monitoring of elk stopped on March 21, 1995 due to a lack of snow and the dispersal of collared animals, indicating a shift to spring/summer ranges. Analysis of data will commence this summer if time permits, or this fall after all vegetation data for the feeding and bedding sites has been collected .

Fecal sample collection

To date a total of 69 fecal samples were collected throughout the winter months (see Table 3.0). These samples represent three or four sub-populations. Samples will be sent to the University of Alberta for analysis of fecal nitrogen content. Samples will be collected, baring field restraints, until all subpopulation's fecal samples have changed from pellet form to patty form, indicating the animals diet change to spring green up vegetation.

Flight surveys

As stated in my research proposal a number of aerial flight surveys were to be flown this winter. Due to the difficulty in visualizing animals in dense cover and budget restraints, no surveys were flown .

Table 3.0: Number of pellet samples collected per month and per group.*

Group	December	January	February	March	Total
Ranch	9	5	6	14	34
1805	0	3	3	6	12
1885	0	3	1	3	7
1914/1935	4	4	1	3	12

* as of March 29, 1995

Literature Cited

Bonar, R., R. Quinlan, T. Sikora, D. Walker, and J. Beck. 1990. Integrated resource management of timber and wildlife resources on the Weldwood Hinton Forest Management Agreement Area. Unpubulished report.

Jones, P. F. 1994. 1994/95 Detailed activity workplan: elk study. Unpublished report.

Garrott, R., G. White, R. Bartmann, and D. Weybright. 1986. Reflected signal bias in biotelemetry triangulation systems. J. Wild. Manage. 50(4):747-752.

Thompson, M. J., R. E. Henderson, T. O. Lemke, and B. A. Sterling. 1989. Evaluation of a collapsible clover trap for elk. Wildl. Soc. Bull. 17:287-290.

Todd, M. 1993. 1993/94 Detailed activity workplan: elk study. Unpublished report.