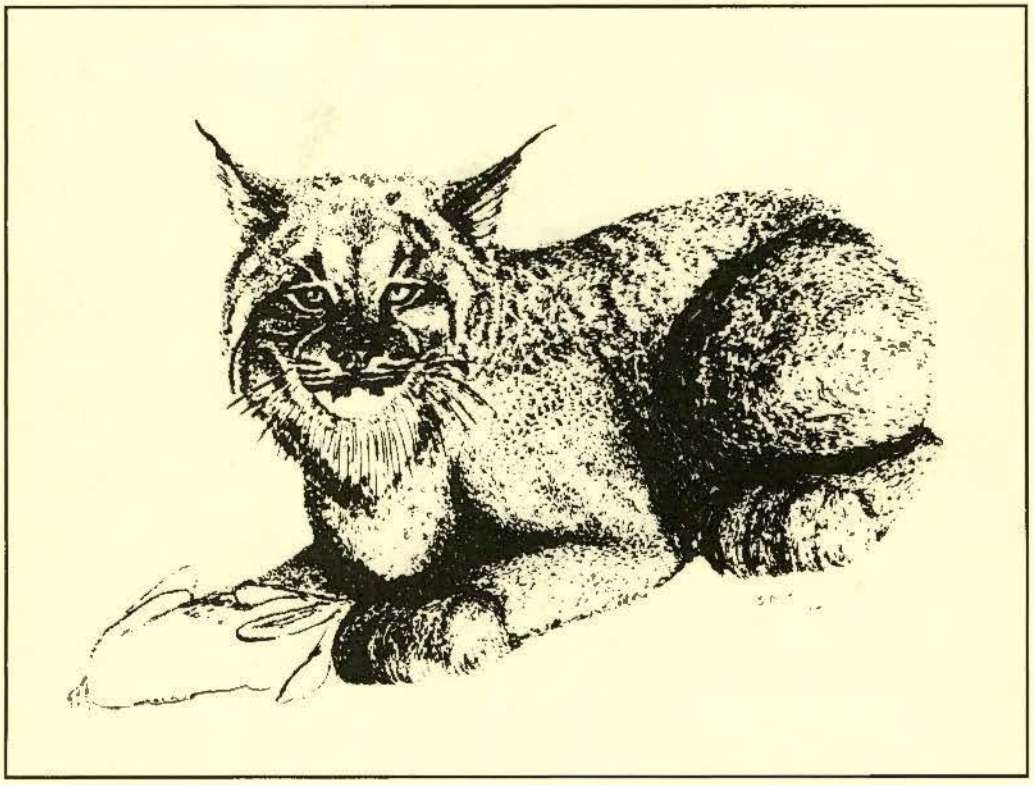
Alaska Department of Fish and Game
Division of Game
Federal Aid in Wildlife Restoration
Research Progress Report

DEVELOPMENT OF TECHNIQUES FOR EVALUATING LYNX POPULATION STATUS IN ALASKA



by
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Project W-22-6
Job 7.13
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PROGRESS REPORT (RESEARCH)

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SUMMARY

This report briefly describes progress made in developing a lynx (Felis lynx) population model, mapping traplines in interior Alaska, using lynx pelt measurements to monitor levels of kitten occurrence in trapped samples, and using track surveys to monitor lynx population status. The population model employs 8 population parameters with a range of values representing periods of snowshoe hare (Lepus americanus) scarcity and abundance derived from the literature for each parameter. The model is simple, easy to use, and useful in exploring lynx population dynamics and identifying areas where research is needed. A paper describing our progress in developing a lynx population model was presented at the Fourth Northern Furbearer Conference. Trapline mapping in Game Management Units (GMU) 12, 20, and 25 is nearing completion, and progress is being made in GMU's 19 and 21. Lynx pelt measurements appear to provide a useful means of tracking changes in the population cycle of lynx. Measurements recorded on sealing forms beginning in 1977 are being analyzed to illustrate changes in recruitment trends in various GMU's. The relationship between lynx population density and track occurrence continues to be evaluated in the Wood River study area.

Key Words: interior Alaska, lynx, models, track counts.

CONTENTS

BACKGROUND

The background for this and other lynx (Felis lynx) studies has been outlined previously (Stephenson 1986). Briefly, the combination of increased human population, high pelt value, and improved mobility of trappers has increased the trapping of lynx during the past 2 decades in Alaska and large areas in Canada. Concern that intensive trapping may slow or prevent the normal growth of lynx populations when snowshoe hares (Lepus americanus) are abundant, as has been observed in some areas, has led to increased effort to evaluate the effects of trapping on lynx.

The present study was designed to (1) use available data to estimate the effects of various mortality rates on lynx populations (using population modeling), (2) assess the potential spatial distribution of lynx harvests and existence of refugia (based on trapline distribution), (3) develop a method to monitor patterns in lynx recruitment (using pelt measurements), and (4) develop field techniques to evaluate lynx population status (using track surveys).

OBJECTIVES

To use simulation modeling to maximize the interpretive value of available information on lynx population dynamics and, in particular, to provide a framework for the analysis and interpretation of harvest data and density indices.

To map trapline distribution in interior Alaska so that trapping intensity and the extent of trapped and untrapped lynx habitat can be described.

To refine pelt measurement criteria that can be used to separate kitten and adult lynx and to apply these criteria to the pelt sealing data obtained since 1977-78.

To develop a technique for estimating relative and/or absolute lynx numbers in large areas where access is limited and more intensive census methods are impractical.

STUDY AREA

The study area includes most of the Tanana and Yukon River drainages in interior Alaska. In addition, pelt measurement analyses (Objective 3) are being accomplished for all GMU's where lynx are harvested. Field work relative to Objective 4 is being conducted annually in the Wood River area 64 km (40 mi) south of Fairbanks. This area is described in a previous report (Stephenson 1986).

METHODS

The lynx model (Objective 1) was developed and refined in the spring of 1987. A description of the model and the preliminary findings were presented at the Fourth Northern Furbearer Conference held in Juneau on 3 and 4 April 1987. The abstract from this paper is provided in Appendix A. A complete description and discussion of the model will be included in the final report.

The distribution of traplines is being delineated using a variety of sources, including records maintained in the voluntary trapline registration program by the Alaska Trapper's Association and by the Natural Resource Office at Fort Wainwright. In addition, numerous individual trappers, as well as Department area biologists in Tok, Fort Yukon, and Galena, are contributing information. Reports by the Alaska Department of Fish and Game Subsistence Division staff are being used to determine trapline distribution in some rural areas. Traplines are being recorded on USGS 1:250,000 maps.

Pelt measurements, including length (tip of nose to base of tail) and width (across widest portion of pelt in pelvic region), have been recorded on sealing forms since 1977, when mandatory sealing began. It is generally accepted that little size overlap exists between lynx kittens and adults. Quinn and Gardner (1984) studied the relationship between age, sex, and pelt size in Ontario lynx. With 41 of 43 kitten pelts measuring less than 31.8 in, they showed that kittens can be reliably identified with pelt measurements. Two kitten pelts that were 31.8 to 35.8 in long overlapped in size with older lynx, particularly yearling and adult females.

In Alaska, trappers and furbuyers reported that the largest kitten pelts (after stretching) seldom exceeded a length of

35 in and that most were less than 32 in long and 7 in wide. However, kitten pelts in Alaska commonly measure from 32 to 34 in, and because width measurements taken by various fur-sealing agents may include the length of the hair, widths of 8 in or more may be recorded. In a preliminary analysis, the following measurements were used to separate kittens and adults: 34 in long and less than 8 in wide. Additional work will be done during the next year to separate kittens from adults using known-age lynx.

The methods used to evaluate the relationship between track frequency and population density of lynx are similar to those described by Stephenson (1986). Field work was conducted in the Wood River study area from 9 to 28 March 1986 and from 27 February to 25 March 1987. Track accumulation was measured on the 25-mi trail used in previous years, and lynx numbers were estimated based on observations of tracks and the known movements of radio-marked lynx.

RESULTS AND DISCUSSION

Maps of traplines in northern GMU's 12, 20, and 25 have been completed. Additional information is needed for a few areas, notably the Yukon River area above Circle, but for most areas the mapping is complete. With the help of area biologists T. Osborne (Galena), and R. Pegau and J. Whitman (McGrath), as well as various reports on trapping activity around rural communities prepared by members of the ADF&G Subsistence Division, considerable progress has been made in mapping traplines in GMU's 19, 21, and 24.

Considerable progress has also been made in using pelt measurements on sealing forms (recorded for most lynx caught since 1977) to determine the occurrence of kittens in harvested samples. Before analysis of these data could be accomplished, sealing records for GMU's 12, 20, 21, 24, and 25 had to be checked to determine whether harvested animals had been assigned to the correct subunit and year, and numerous errors were corrected. A major task involved recoding many sealing forms in GMU's 12, 20, and 25 to reflect recent changes in unit boundaries. Lynx-sealing data from 1977 to the present are now based on current unit boundaries.

Once data files had been checked and corrected, a computer analysis was used to determine the occurrence of kittens; i.e., the $\leq$34-in-length and $\leq$8-in-width criteria described earlier. Preliminary graphs for GMU's 12, 20, 21, 24, and 25 show similar patterns in lynx recruitment; the increases and decreases in kitten occurrence generally reflect similar changes in snowshoe hare abundance during the same periods.

Using these criteria, the percentage of kittens in the annual harvests ranged from about 1% to 5% during lows to 12% to 30% during the increasing and high phases of the snowshoe hare cycle. In most units the highest percentage of kittens occurred from 2 to 4 years before peak harvests.

Because lynx kittens are generally underrepresented in trapped samples (Brand and Keith 1979), analysis of pelt measurements cannot be used to determine the actual proportion of kittens in the population; however, it does appear to show great promise in tracking the lynx-hare population cycle. Additional analyses of this type will be performed for other GMU's in the future.

Field work in the Wood River area has provided 4 years of data on lynx population density and track frequency and has also added to our knowledge of lynx movements, habitat preferences, and behavior. The track frequencies obtained during 1986 and 1987 are being analyzed and compared with similar data obtained during 1984 and 1985. This analysis will further our understanding of the relationship between lynx population density and track frequency.

ACKNOWLEDGMENTS

Many people have contributed to the progress made in the lynx program during the past year. Robin (O'Connor) Beasley took the initiative in developing the lynx population model, while Paul Karczmarczyk and Dan Reed were largely responsible for the progress made in organizing sealing records and analyzing pelt measurements. Paul also provided valuable field assistance in the Wood River study area. Jim Smith has continued to cooperate in providing an area for field studies, and Clay Hogan has likewise continued to allow the use of his cabin as a field facility. Numerous trappers and area biologists aided in developing trapline maps and size criteria for kitten and adult pelts. Wayne Regelin provided advice and support in developing this study and reviewed this progress report.

LITERATURE CITED

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Appendix A. Abstract of a paper presented at the Fourth Northern Furbearer Conference, Juneau, Alaska, April 1987.

LYNX POPULATION DYNAMICS AND HARVEST - INSIGHT FROM A COMPUTER MODEL

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Pelt prices of lynx (Felis lynx) have skyrocketed in the past 15 years, causing concern about the potential for overharvesting this easily trapped furbearer. The magnitude of the lynx harvest and its effects on population growth are difficult to assess because of problems in adequately understanding the population dynamics of a cyclic, generally solitary, secretive furbearer. To maximize the interpretive value of our harvest data, we developed a computer model of lynx population dynamics. Based on a literature review, ranges of values for 8 population parameters were established for periods of snowshoe hare (Lepus americanus) abundance and scarcity; these ranges were incorporated into the model. Several aspects of lynx population dynamics reflected in the model are as follows: (1) lynx populations have a tremendous potential to increase when conditions are favorable; (2) during periods of hare abundance, small changes in sex ratios appear to have substantial effects on population growth (probably because of the high reproductive potential of females); and (3) in some situations, a lynx population harvested at 2 different rates may yield the same 3-year harvest; however, the number of lynx remaining after that 3-year harvest may be much higher with the lower harvest rate. We believe the model will be an extremely useful tool for examining several aspects of lynx population dynamics and identifying aspects needing more research. Advantages of this model include its celerity, low cost, flexibility, and easy use. The future direction of this ongoing project will be discussed.

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