FEDERAL AID
FINAL RESEARCH REPORT

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 25526
Juneau, AK 99802-5526

PROJECT TITLE: Landscape ecology and population dynamics of moose in Game Management Unit 13

PRINCIPAL INVESTIGATOR: Grant V. Hilderbrand and Bruce W. Dale

COOPERATORS: on Spalinger (University of Alaska Anchorage) and Phil Townsend (University of Maryland)

FEDERAL AID GRANT PROGRAM: Wildlife Restoration

GRANT AND SEGMENT NR: Initiated under W-27-5, completed under W-33-3

PROJECT NR: 1.55

WORK LOCATION: Nelchina Basin, Game Management Unit 13

STATE: Alaska

PERIOD: 1 July 2004–30 June 2005

I. PROBLEM OR NEED THAT PROMPTED THIS RESEARCH

The GMU 13 moose population is an important wildlife resource for Alaska. Recent and persistent declines in population size and harvest have generated intensive management actions, including liberalized but fair chase harvest of bears and wolf control. The efficacy of these management efforts depends largely on the remaining effects of predators on the moose population, the ability of the habitat to produce increased moose for harvest, and interactions among these ecological components.

The research is needed to evaluate the efficacy of the current management actions and provide information to adapt or enhance those efforts.

II. REVIEW OF PRIOR RESEARCH AND STUDIES IN PROGRESS ON THE PROBLEM OR NEED

The Nelchina basin large mammal community has been well studied for several decades. Particular information from Ballard et al. noted the significant role of bears in moose population dynamics as well as the utility of reduction in bear and moose predation for increasing harvest of moose by humans or increasing the moose population size.

Survey and inventory activities reveal that the population has declined to low levels. Survey and inventory activities also indicate that twinning rates and autumn calf:cow ratios, at least in some parts of Unit 13, have never been high relative to some other populations even when the Unit 13 population was large and harvests were high.

Research by Testa surprisingly did not show a relationship between body condition and ovulation or twinning rate (as documented elsewhere), suggesting that genetic or other limitation of ovulation rate reduces the potential for high twinning rates in Nelchina moose. Testa also demonstrated how reproductive costs associated with rearing a calf to autumn resulted in poor body condition that reduced subsequent natality, thus somewhat offsetting benefits expected from reducing predation on neonates. However, Testa found that recruitment of calves was higher from cows that failed to produce subsequent calves. Modeling these life-history trade-offs, Testa concluded that reducing predation on neonates had more potential to improve population performance and harvest than did increases in pregnancy through increased nutrition.

Ongoing research by Spalinger and Collins suggests that high levels of tannins reduce the digestibility of protein to comparatively and absolutely low levels in the Nelchina Basin compared to other Alaskan moose ranges.

As part of more comprehensive study, current research efforts by Golden and Rinaldi are investigating spatial patterns in moose-wolf relationships to determine whether wolves influence the short term habitat use of moose.

III. APPROACHES USED AND FINDINGS RELATED TO THE OBJECTIVES AND TO PROBLEM OR NEED

OBJECTIVE 1: Establish a comprehensive geographic information system (GIS) for GMU 13.

A GIS database has been implemented for moose locations. Habitat coverages from satellite data have been evaluated for suitability, and feasibility of a nitrogen overlay has been investigated.

OBJECTIVE 2: Determine the feasibility and potential costs and benefits of replacing traditional moose counts with modern spatial density estimates.

Both methods were employed in 2000 to build the data set from which this objective will be addressed. Spatial density estimates have been used in portions of GMU 13 since then, while traditional trend counts have been used elsewhere in the unit.

OBJECTIVE 3: Develop statistical/biological models of population trends for moose in the Nelchina Study Area.

Population performance data was collected throughout the period of this investigation. Despite treatment of bear and wolf predation, the population does not yet appear to be responding. Low calf survival to autumn continues to be an important factor limiting population performance.

Bayesian models of population trend have been developed, as well as deterministic and stochastic models that incorporate population parameters determined from radiocollared moose.

OBJECTIVE 4: To develop and test landscape models of habitat quality and utilization for moose in GMU 13.

No work was done on this aspect.

OBJECTIVE 5: To develop and test landscape models of predation risk for moose in GMU 13.

Data on wolf movements relative to moose movements has been collected.

IV. MANAGEMENT IMPLICATIONS

The lack of an apparent response of the moose population to the predation control may be due to several factors. The population may just be so low that we cannot detect any changes, or there may be a slight lag in population performance. Alternatively, the reductions in bear or wolf numbers may not be adequate, or there may be functional responses (increased per capita kill rates) by the remaining predators. The timing and magnitude of moose calf mortality is consistent with that previously shown for bear predation. The nutritional condition of moose does not appear to have deteriorated since the evaluations by Testa in the 1990s. Additional evaluations are needed to determine the best courses of management actions.

V. SUMMARY OF WORK COMPLETED ON JOBS IDENTIFIED IN ANNUAL PLAN FOR LAST SEGMENT PERIOD ONLY

JOB 1: Trend-count and composition surveys. Trend count and composition surveys were not funded as part of this project this year

JOB 2: Moose density estimates. A spatial density estimate in the Nelchina Study Area was completed this year.

JOB 3: Radiocollaring adult and yearling moose. Twenty-four moose were captured and equipped with GPS-equipped radio collars. No capture-related mortalities occurred this year.

JOB 4: Radiotracking/survival/reproduction. Aerial radiotracking was conducted to assess reproductive status of 50 moose in the project period.

JOB 7: Spatial and population modeling. Deterministic spreadsheet models and stochastic models of population growth were used to estimate population growth rates.

JOB 8: Meetings and publications. The principal investigator attended the Northwest Section Meeting of the Wildlife Society and presented the following:

Hilderbrand, G., H. Golden, D. Spalinger, and W. Collins. 2004. Nelchina habitat, moose, and predators: current knowledge and future research. Annual Meeting of the Northwest Section of the Wildlife Society, Girdwood AK, May 2004.

VI. ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THE LAST SEGMENT PERIOD, IF NOT REPORTED PREVIOUSLY.

Hilderbrand, G., H. Golden, D. Spalinger, and W. Collins. 2004. Nelchina habitat, moose, and predators: current knowledge and future research. Annual Meeting of the Northwest Section of the Wildlife Society, Girdwood AK, May 2004.

VII. PUBLICATIONS

VIII. RESEARCH EVALUATION AND RECOMMENDATIONS

IX. PROJECT COSTS FROM LAST SEGMENT PERIOD ONLY

Stewardship Investment items purchased:
None

Total Costs
FEDERAL AID SHARE $125,991 STATE SHARE $41,997 = TOTAL $167,988

X. APPENDIX

XI. PREPARED BY:

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APPROVAL DATE: _____