

**FEDERAL AID  
RESEARCH FINAL PERFORMANCE  
REPORT**

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

**PROJECT TITLE:** Habitat use, foraging behavior, and nutritional ecology of Nelchina caribou

**PRINCIPAL INVESTIGATOR:** William B. Collins

**COOPERATORS:**

**FEDERAL AID GRANT PROGRAM:** Wildlife Restoration

**GRANT AND SEGMENT NR:** Initiated under W-27-5, completed under W-33-4

**PROJECT NUMBER:** 3.47

**WORK LOCATION:** Units 12, 13, and 20 E

**STATE:** Alaska

**PERIOD:** 1 July 2001–30 June 2006

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**I. PROBLEM OR NEED THAT PROMPTED THIS RESEARCH**

Management of caribou herds for sustained yield has always been difficult for wildlife managers, in part because the principal determinants of range productivity relative to caribou requirements are not well understood. The Nelchina caribou herd has long been important for consumptive use, and many users would prefer increased numbers and harvest. Recent estimates place the herd at about 30,000 animals. However, historic population highs (60,000–70,000), dramatic declines, and recent fluctuations in body mass, productivity, and survival of caribou discourage managers from increasing numbers. Managers would like to have indicators of carrying capacity to develop population objectives and harvest strategies for the Nelchina herd.

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

While lichen availability is considered significant to caribou in winter and it is well known that lichens are readily destroyed by fire, the effect of fires on caribou populations has remained in debate. Kelsall (1960), Thomas (1969), and Scotter (1965 and 1970) believed fires had a detrimental effect on caribou, whereas Skoog (1968) and Bergerud (1972) indicated little or no impact of fire on population dynamics of caribou. Thomas et al. (1998) found that caribou of the migratory Beverly Herd in Northwest Territories readily traveled through most burns, but spent little time in them and avoided very large burns. They suggested the herd expanded its range to

compensate for area lost to fire. Schaefer and Pruitt (1991) concluded that quality and accessibility of winter forages in burned uplands declined. By contrast, Lutz (1956), Ahti and Hepburn (1967), Rowe et al. (1975), Kershaw (1977), and Klein (1982) believed fire helped maintain lichen productivity or allowed recovery of overgrazed winter ranges. Empirical data addressing these relationships are lacking for Alaskan spruce forests, and time-scales vary greatly among locales (Andreev 1954). Furthermore, it is not known what represents a maintenance level of lichen availability to caribou.

### **Literature Cited**

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- Klein, D. R. 1982. Fire, lichens, and caribou. J. Range Manage. 35:390-395.
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- Skoog, R. O. 1968. Ecology of caribou in Alaska. Ph.D. Diss., Univ. California-Berkley.
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### III. APPROACHES USED AND FINDINGS RELATED TO THE OBJECTIVES AND TO PROBLEM OR NEED

OBJECTIVE 1: Lichen availability does not increase in linear manner relative to stand age.

I have measured lichen availability and corresponding stand age at 340 sites in the Copper River Basin and in Unit 20 E. Primary and secondary forage lichen species do not recover until 50 to 60 years following fire, and their availability does not peak until stand ages of approximately 120 and 180 years, respectively.

OBJECTIVE 2: In winter, Nelchina caribou habitat preference is not affected by lichen availability.

I have measured lichen availability at 100 sites in the Copper River Basin and at 240 sites in Unit 20 E. One half of these sites represent points selected by radiocollared caribou, and the other half represent random points. Caribou preferred stands where primary forage lichens were most abundant. Caribou avoided sites younger than 50 years, because those sites have little or no forage lichens available.

OBJECTIVE 3: Digestible energy intake and digestive efficiency, including digestibility, rumen turnover, and total passage rates of caribou, were not favored by high lichen availability.

Digestibility of individual forages, rumen turnover, and total passage rates have been determined for 6 tractable caribou in paddocks of 5 different levels of lichen availability. Digestibility, rumen turnover rate, and total passage rate are positively correlated with availability of forage lichens.

OBJECTIVE 4: Forage lichen establishment and growth are not affected by substrate.

These test plots were destroyed by fire.

OBJECTIVE 5: Branching of *Cladina* species is not indicative of lichen age.

Marked lichens were destroyed by the Taylor Highway fire one week before their final assessment.

OBJECTIVE 6: Summer forage quality is not enhanced by fire.

Productivity and availability of herbaceous summer forages that I found in the summer diets of caribou are mostly increased by fire, but I have not yet determined if the quality of resprouting willows (species representing principal components of the diet) is adversely affected by fire. Caribou consume the same lichen species in summer as in winter but do not limit their distribution to ranges having lichens.

#### **IV. MANAGEMENT IMPLICATIONS**

Lichen availability is the principal determinant of where caribou will winter in Interior Alaska. Fire eliminates burned stands as winter foraging areas for caribou in Interior Alaska for 50 to 60 years following fire; recovery by forage lichens is essentially unusable by caribou until that time. This understanding enables assessment of rangeland values for caribou versus early successional species such as moose. Forest age structures in historic versus more recent winter ranges of Nelchina caribou show that, contrary to popular opinion, fire is nearly as significant in the long-term survival of lichen stands in the Copper River Basin as it is north of the Alaska Range. Determination of caribou diets in the summer range of Nelchina caribou has allowed us to rule out competitive dietary overlap with nutritionally stressed Nelchina moose.

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

##### JOB 10: Determine principal forages consumed by caribou on Nelchina summer range.

Summer diets of caribou were determined by bite counts on tractable and wild caribou from approximately 1 week following leaf out until vegetation development was at its zenith in late July. These data were compared with summer and winter diets of moose in the same range.

##### JOB 12: Report writing

I made revisions on manuscripts previously submitted for review.

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

None

#### **VII. PUBLICATIONS**

Collins, W. B., B. W. Dale, D. E. McElwain, K. Joly, and L. G. Adams. (in review). Fire, lichen abundance, grazing history and distribution of barren-ground caribou in Alaska's taiga.

Collins, W. B., N. Cassara, D. Spalinger, B. W. Dale, and K. Joly. (in review). Behavioral responses to lichen availability by barren-ground caribou.

#### **VIII. RESEARCH EVALUATION AND RECOMMENDATIONS**

#### **IX. PROJECT COSTS FROM LAST SEGMENT PERIOD ONLY**

##### **Total Costs**


FEDERAL AID SHARE \$13,597    STATE SHARE \$4,532    TOTAL \$18,130

**X. APPENDIX**

**XI. PREPARED BY:**

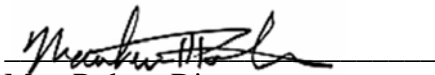
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**APPROVAL DATE:** September 30, 2006