

**Alaska Department of Fish and Game
Division of Wildlife Conservation
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Monitoring of Fortymile ungulates and wolves following wolf sterilization and translocation

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**Research Final Performance Report
1 July 2007–30 June 2008
Federal Aid in Wildlife Restoration
W-33-6
Study 3.48**

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FEDERAL AID FINAL RESEARCH PERFORMANCE REPORT

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 115526
Juneau, AK 99811-5526

PROJECT TITLE: Monitoring of Fortymile ungulates and wolves following wolf sterilization and translocation

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FEDERAL AID GRANT PROGRAM: Wildlife Restoration

GRANT AND SEGMENT NO. W-33-6

PROJECT NO. 3.48

WORK LOCATION: Eastcentral Alaska and adjacent Yukon Territory; portions of Units 12, 20B, 20D, 20E, and 25C

STATE: Alaska

PERIOD: 1 July 2007 – 30 June 2008

I. PROBLEM OR NEED THAT PROMPTED THIS RESEARCH

In Project 3.48, we needed to monitor the recovery of 15 wolf packs that we reduced during November 1997–May 2001. We also studied the demography of caribou, moose, and Dall sheep to evaluate potential responses to the increase in wolf numbers.

We tested the hypothesis that caribou numbers would decline or stabilize as wolf numbers increased. In past studies, wolves were the dominant factor affecting demography of the caribou herd. The Fortymile caribou herd increased during the period when wolves were reduced. We also tested the hypothesis that moose and Dall sheep would show little or no response to the increase in wolf numbers because previous studies showed that wolf predation was not the major factor affecting these populations.

In the previous 6-year plan (Project 3.43, 1 July 1997–30 June 2003) we sterilized the dominant pair of wolves and translocated remaining wolves from 15 packs in the core Fortymile caribou range as part of the *Fortymile Caribou Management Plan* of October 1995 (Boertje and Gardner 1996). The Team described reasons for developing the 1995 recovery plan for the Fortymile herd as follows:

- ❖ For the long-term benefit of the Fortymile ecosystem and, specifically, the biodiversity of this ecosystem;
- ❖ Help recover the Fortymile caribou herd to its traditional range and to benefit the people who value the herd and its ecosystem;

- ❖ Promote viewing opportunities of the Fortymile herd during its spring and fall migrations, particularly along the Steese, Taylor, Top of the World, and Klondike Highways where people once witnessed thousands of migrating caribou;
- ❖ Promote similar goals among the agencies involved in management of the Fortymile caribou herd;
- ❖ Resolve conflicts among interest groups;
- ❖ Encourage sound wildlife management decisions recognizing diverse values.

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

Boertje and Gardner (2000) published the proposed management and relevant biology of the Fortymile caribou herd from 1992 through 1997. This included the results of Project 3.38, entitled “Factors limiting the Fortymile caribou herd.” Stability of the herd during 1990–1995 directly resulted from high mortality, not reduced natality, except in 1993 when a low natality rate was documented throughout Interior Alaska caribou herds as a consequence of the short growing season in 1992. Except in 1993, we found consistent evidence for moderate to high nutritional status of the Fortymile herd when indices were compared among herds. Also, no significant diseases were found among Fortymile caribou. We deemed the winter range adequate to support elevated caribou numbers both in regards to the lichen availability on currently used winter ranges and on the availability of vast expanses of winter range formerly used by the herd.

By collaring large numbers of adult and calf caribou and investigating causes and rate of mortality, we documented that wolf predation was consistently the major cause of mortality among Fortymile caribou during 1992–1997. We estimated that wolves killed between 2000 and 3000 caribou calves annually during this period and between 1000 and 2300 older caribou. To reduce wolf predation, the Team envisioned state-sponsored wolf translocations and fertility control in 15 key wolf packs during November 1997–May 2001.

Harvest was consistently $\leq 2\%$ of the herd from 1990–1995; only 200–500 bulls were harvested. Therefore harvest was a minor influence on the herd compared with wolf predation. In part to increase social acceptance of the Team’s plan to reduce wolf predation, the harvest during 1996–2000 was reduced to 150 bulls ($< 1\%$ of the herd). This action probably had only a slight positive effect ($< 2\%$ annually) on herd numbers. We saw no significant increase in the bull:cow ratio during this period, therefore we assume the change was too low to measure or wolves may have compensated for the reduced harvest by consuming a higher proportion of bulls. If wolf predation on bulls increased, wolves may have slightly reduced predation of adult female caribou, which would have had a beneficial effect on herd numbers. However, we were unable to detect any measurable change in wolf predation on adult female caribou. We concluded that changes in survival that allowed the herd to increase were subtle changes that could not be attributed to specific causes using samples of 50–90 adult caribou.

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

OBJECTIVE 1: Continue a literature review of canid fertility control, responses of caribou, moose, and Dall sheep to reduced predation, ecology and interactions of these predators and prey, nonlethal techniques for reducing predation, and effects of harvest on wolves, caribou, and moose.

We routinely reviewed new abstracts using a subscription to a weekly Thomson Internet bibliographic service (ISI Discovery Agent). Desired references were retrieved through ARLIS or the UAF library. I estimated that 20 person-days were spent on this job annually.

OBJECTIVE 2: Monitor distribution, numbers, and fates of wolf packs with sterilized wolves using radiotelemetry. We want to know if sterilized wolves accept several wolves into their territories, the relative size of these territories compared with territories of fertile wolves, and the condition and age of sterilized wolves versus fertile wolves.

Average territory size declined after the dominant pairs were sterilized and remaining wolves were translocated. Reduced territory size was expected because, in previous studies, pairs of wolves had smaller average territory size compared with larger packs. Dominant pairs of sterile wolves retained territories for several years. Sterile wolves accepted ≤ 1 wolf into territories and lived longer than non-sterile wolves. Wolves were sterilized from November 1997 to April 2001, and radio collars were last deployed in March 2003 under this project. No collars were active after winter 2004–2005 because of potential conflicts with an aerial wolf control program by private citizens.

The aerial wolf control program repeatedly reduced a portion of the wolves in the 15 pack territories where we had sterilized and translocated wolves. However, wolves increased from 2001 levels because aerial wolf control was not as effective as the sterilization–translocation program in reducing wolf numbers. Aerial wolf control occurred during winters 2004–2005 through 2007–2008, and was the primary factor keeping wolf numbers from recovering to the 1996–1997 pre-sterilization levels. Wolves in some adjacent packs were radiocollared by John Burch, NPS, during February and March 2006 and 2007 and regularly radiotracked.

OBJECTIVE 3: We will continue to model Fortymile caribou herd production and causes and rate of mortality (see Boertje and Gardner 1996:22–23) to evaluate the effects of wolf-caused mortality on herd trend. Two calf mortality studies are planned during spring 2006 and 2007 to gather data on causes and rates of mortality after wolves recover to pretreatment levels. Data will be compared with data from pretreatment and treatment years.

We flew aerial surveys in late May each year to record parturition rates of radiocollared cows ≥ 3 years of age. The average parturition rate ($n = 39$ – 68 adult cows) since 1992 (17 years) was 86%, and the 5-year average during this study (2004–2008) was 85%. Low parturition rates ($< 77\%$) occurred only in 1993 (68%) and 2003 (69%).

The annual survival rates of female caribou ≥ 12 months old ($n = 45$ – 89) since 1992 was 91%, and the 5-year average during this study was 91%. The lowest mortality rate was in

2004 (86%). A calf mortality study was proposed after wolves fully recovered in the treated area, but an aerial wolf control program by private citizens was approved for expansion into all of the 15 territories during winter 2006–2007. Therefore, the 15 packs did not recover to levels observed prior to the wolf sterilization–translocation project. We conducted calf mortality studies from mid May 1994 through early May 2003. Annual calf survival rates averaged 45% ($n = 9$ years) and ranged from 32% in 1999 to 65% in 1997. Calf survival had the highest variability of population parameters used to estimate trend. Overwinter calf survival was 74% ($n = 14$ years, 1994–2007), and averaged 66% during the 5 years of this project. Wolf predation was the single most important cause of mortality among calves and adults in all years. In the most recent annual model of 39,500 caribou in early May plus 16,400 newborn calves in late May, wolves subsequently killed 4100 calf caribou and 2700 older caribou in the next 12 months. In comparison, grizzly bears killed 3100 calves and 500 adults, and other predators killed 2200 calves. Accidents and diseases accounted for 480 calf deaths and 400 adult deaths, and hunters reported killing 850 caribou.

During late September–early October each year, we counted the proportion of calves, cows, and bulls among several thousand Fortymile caribou. The counts were spatially distributed in proportion to 79–146 independent radio collars. Calf:cow ratios averaged 32 during the past 16 years and 27 during the past 5 years. The lowest ratios since 1991 were 17 calves:100 cows in 2003 and 18 calves:100 cows in 2005. Bull:cow ratios averaged 45 during the past 16 years and 45 during the past 5 years.

Elevated wolf predation on calves was likely the major proximate cause for the decline in herd numbers during this project. We counted 38,364 caribou from photos of the herd in late June 2007, a decline from 43,375 in late June 2003.

OBJECTIVE 4: Document whether a significant increase in moose density occurs in the treatment area versus an adjacent treated area between October 2003 and October 2007.

Our long-term (10 years) objective was to document whether moose will increase above the low-density dynamic equilibrium (45–417 moose/1000 km²) described for this wolf–bear–moose–caribou–human system when predators are not harvest-limited (Gasaway et al. 1992). Estimates of moose density in treated and untreated survey areas remained well below 300 moose/1000 km² during this study. Moose numbers and calf survival did not increase significantly during treatment of wolves. Grizzly bears have been documented as the primary predator of moose calves in this area (Gasaway et al. 1992), and an increase in the grizzly bear harvest has not occurred.

OBJECTIVE 5: Document whether significant increases in sheep numbers occur in the treatment area between summer 2003 and summer 2007.

No significant increase in lamb:ewe ratios or total numbers of sheep were observed during treatment of wolves. Previous studies in other areas indicated that sheep populations were largely limited by factors other than wolf predation.

OBJECTIVE 6: Follow guidelines presented in Part V of the management plan to continue to increase public awareness of Fortymile wildlife issues.

Results of the above studies were presented at local Fish and Game advisory committee meetings in Fairbanks, Central, Delta, Eagle, and Tok; Board of Game meetings; and

high school classrooms. A new harvest management plan was approved by the Board of Game during this project. In addition we participated in briefings with the military and continued to post current caribou locations on a website to expedite mitigation of overflights each May. An issue of the *The Comeback Trail* newsletter is planned for 2008.

IV. MANAGEMENT IMPLICATIONS

Small changes in calf survival can result in a decline in caribou numbers. As calf survival declined, the herd declined. No declines in productivity or adult mortality were detected with large sample sizes. Thus, well-distributed late September–early October calf:cow counts of 5% of the herd should continue to be cost-efficient indicators of herd trend. Photocensuses will remain essential to document actual changes in herd size. Studies of the causes and rate of mortality among 50–90 collared adult caribou were insufficient to determine trend.

During this project, a partial recovery of wolf numbers occurred and caribou numbers declined. In the former project, we reduced wolf predation and caribou numbers increased. Wolves were the dominant cause of calf and adult caribou mortality before, during, and after treatment. Circumstantial evidence from adjacent herds indicates that the Fortymile herd probably would not have increased substantially without treating wolves. For example, all Interior Alaska caribou herds were stable or declining during the treatment period. We conclude that management directed at increasing the Fortymile caribou herd or harvest should focus on reducing wolf predation.

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

JOB/ACTIVITY 1A: Continue a literature review of canid fertility control, responses of caribou, moose, and Dall sheep to reduced predation, ecology and interactions of these predators and prey, nonlethal techniques for reducing predation, and effects of harvest on wolves, caribou, and moose.

Internet searches were conducted weekly via ISI Discovery and peer contact was maintained to keep informed of new references.

JOB/ACTIVITY 2A: Monitor distribution, numbers, and fates of wolf packs with sterilized wolves using radiotelemetry. We want to know if sterilized wolves accept several wolves into their territories, the relative size of these territories compared with territories of fertile wolves, and the condition and age of sterilized wolves versus fertile wolves.

We conducted wolf surveys throughout the area where wolves were originally sterilized and we corresponded with John Burch, NPS, who collared several wolf packs in and adjacent to the area where wolves were previously sterilized.

JOB/ACTIVITY 3A: We will continue to model Fortymile caribou herd production and causes and rate of mortality (see Boertje and Gardner 1996:22–23) to evaluate the effects of wolf-caused mortality on herd trend. Two calf mortality studies are planned during spring 2006 and 2007 to gather data on causes and rates of mortality after wolves recover to pretreatment levels. Data will be compared with data from pretreatment and treatment years.

Wolves failed to increase to pretreatment levels because of an aerial wolf control program by private citizens. As a result, we did not conduct the planned calf mortality studies.

We examined all radioed cows older than 2 years of age during May 2008 to determine parturition rates. We estimated 90% of 59 cows gave birth. We weighed 15 calves in late September 2007 to evaluate summer growing conditions and winter mortality rates. No calves died from capture-related causes. Calves averaged 53.9 kg, compared to the mean of 54.3 kg observed during early winter 1990–2007 ($n = 273$). We also evaluated causes and rates of natural mortality for caribou older than 5 months of age during this reporting period using monthly flights and examination of mortality sites. We used a helicopter for transportation to these sites, and derived mortality rates using Kaplan–Meier techniques. The mortality rate of radioed yearling and adult females from 15 May 2007 to 14 May 2008 was 4%, compared to the annual average of 9% during 1993–2008. Wolf predation was the single most important cause of mortality, as in all previous years.

On 4 October 2007 we counted the proportion of calves, cows and bulls among 5228 caribou. These caribou were spatially distributed in proportion to about 70 independent radio collars. The calf:cow ratio was 37 calves:100 cows. The high calf:cow ratio indicated an increasing trend.

JOB/ACTIVITY 4A: Document whether a significant increase in moose density occurs in the treatment area versus an adjacent treated area between October 2003 and October 2007.

In November 2007, moose surveys were conducted in the southern portion of the treatment area and nearby untreated areas to test the effect of reducing wolf numbers on moose. No significant increase in moose numbers was noted in the wolf treatment area.

JOB/ACTIVITY 5A: Document whether significant increases in sheep numbers occur in the treatment area between summer 2003 and summer 2007.

We flew sheep surveys in the treated areas in summer 2007 as in previous years. No clear increase in sheep numbers or lamb survival was noted in the wolf treatment area.

JOB/ACTIVITY 6A: Follow guidelines presented in Part V of the management plan to continue to increase public awareness of Fortymile wildlife issues.

Results of the above studies were presented at local Fish and Game advisory committee meetings in Fairbanks, Central, Delta, Eagle, and Tok; Board of Game meetings; and high school classrooms. In addition we participated in briefings with the military and continued to post current caribou locations on a website to expedite mitigation of overflights during May 2008.

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

We flew about 20 additional telemetry flights to monitor caribou distribution and movements during June, August, September, and December using funds from Tok caribou survey and inventory sources. Specifically, these flights provided precensus and harvest monitoring data, as well as mortality data. The caribou census, caribou

composition count, moose surveys, and sheep surveys were also funded using Tok survey and inventory funds.

VII. PUBLICATIONS

Most of the following summaries of data were from the 2 previous, contiguous projects associated with Fortymile research. Four additional papers have been proposed for Fortymile research under Project 3.50 initiated 1 July 2008.

- Boertje, R.D. 2007. From extraordinary to the brink and recovery: Lessons from the Fortymile herd. *Northern Perspectives* 31:26–28.
http://www.carc.org/pubs/v31no1/CARC_Northrn_Perspectives_spring_07.pdf
Accessed 28 Aug 2008.
- Boertje, R.D. and C.L. Gardner. 1996. Factors limiting the Fortymile caribou herd. Appendix (pp. 56–76): The Fortymile Caribou Herd Management Plan, 1995. The Fortymile Caribou Herd Planning Team, <http://aurora.ak.blm.gov/fmcaribou/>. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Study 3.38. Grants W-24-4. Juneau, Alaska.
- Boertje, R.D. and C.L. Gardner. 1998. Factors limiting the Fortymile caribou herd. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-24-1 through W-24-5. Study 3.38. Juneau, Alaska.
- Boertje, R.D. and C.L. Gardner. March 1999, December 1999, and December 2000. Reducing mortality of the Fortymile caribou herd. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Reports. Grants W-27-1 through W-27-4. Study 3.43. Juneau, Alaska.
- Boertje, R.D. and C.L. Gardner. 2000. The Fortymile Caribou Herd: Novel proposed management and relevant biology, 1992–1997. *Rangifer*, Special Issue 12:17–38.
- Lawler, J.P., A.J. Magoun, C.T. Seaton, C.L. Gardner, R.D. Boertje, J.M. Ver Hoef, and P.A. Del Vecchio. 2005. Short-term impacts of military overflights on caribou during calving season. *Journal of Wildlife Management* 69:1133–1146.
- Magoun, A.J., J.P. Lawler, C.L. Gardner, R.D. Boertje, and J.M. Ver Hoef. 2003. Short-term impacts of military jet overflights on the Fortymile caribou herd during calving season. Alaska Department of Fish and Game. Juneau, Alaska.

ADDITIONAL RELATED DOCUMENTATION:

- ❖ *The Comeback Trail* newsletter, 1994–2003. C.L. Gardner and L. Zaczkowski, editors. Issues 1–12. Alaska Department of Fish and Game. Tok, Alaska.
- ❖ Wolf Predation Control Implementation Plan, 1997. The Fortymile Caribou Herd Planning Team, Alaska State Miscellaneous Game Regulations 18:32–35. Juneau, Alaska.
- ❖ Habitat Management Needs Assessment for the Fortymile Caribou Herd, 2000. The Fortymile Caribou Herd Planning Team, Tok.

- ❖ Harvest Plan for the Fortymile Caribou Herd, 2001–2006. Authored by advisory committees in Tok, Fairbanks, Delta Junction, Eagle, and Central. Available from Alaska Department of Fish and Game, Tok, Alaska.
- ❖ Harvest Plan for the Fortymile Caribou Herd, 2006–2012. Authored by advisory committees in Tok, Fairbanks, Delta Junction, Eagle, and Central. Available from Alaska Department of Fish and Game, Tok, Alaska.

LITERATURE CITED

Gasaway, W.C., R.D. Boertje, D.V. Grangaard, D.G. Kelleyhouse, R.O. Stephenson, and D.G. Larsen. 1992. The role of predation in limiting moose at low densities in Alaska and Yukon and implications for conservation. *Wildlife Monographs* 120:1–59.

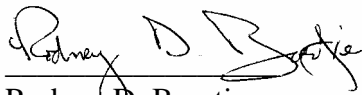
VIII. RESEARCH EVALUATION AND RECOMMENDATIONS

None.

IX. APPENDIX

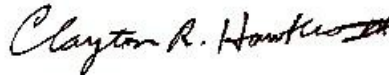
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PREPARED BY



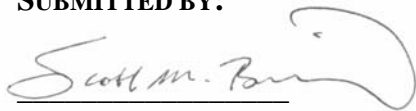
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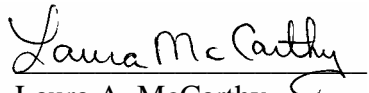


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