Introduction: Subsistence harvest for moose (*Alces alces*) in the Lake Clark National Park (LACL) portion of Game Management Unit 9B is concentrated in a relatively small area of the Park on the northeastern lakeshore adjacent to outlets of the Tlikilila, Chokotonk, Current & Tanalian Rivers. Park lands comprise less than 25% of the lands immediately adjacent to Lake Clark. Demand for moose is rapidly increasing as the human population grows around Lake Clark and in the adjacent villages of Port Alsworth and Nondalton. The construction of a bridge over Newhalen River in 1998 will provide greater access to this resource by residents of Iliamna and Newhalen. Subsistence hunting regulations have been liberalized in recent years with the establishment of a year-round potlatch permit for Nondalton residents and extension of the fall/winter hunting seasons from 30 to 58 days.

Aerial trend surveys and herd composition counts indicate that moose in the Park/Preserve exhibit low rates of recruitment (8-10 calves/100 cows) and that numbers have declined at an annual rate of 3% since 1989 (Bennett 1994). In 1994, an aerial survey using the stratified block design (Gasaway et al., 1992) revealed moose densities of 0.8 animals mi$^{-2}$ (295±31) in this area (Bennett 1994). This density is similar to northern boreal forests in westcentral Alaska where moose are the major prey of lightly harvested wolf (*Canis lupus*) and brown bear (*Ursus arctos*) populations (Gasaway et al., 1992).

Aerial moose survey data and local knowledge suggest that the subsistence moose hunting area in the Lake Clark drainage supports both resident and migratory subpopulations of moose. The two subpopulations briefly commingle at low elevations near the lakeshore in mid to late winter when then migratory component is displaced from summer range by deep snow. If this hypothesis is correct, the current fall season and the proposed year-round hunting would largely be directed at the resident animals because they are the least mobile and occupy lakeshore habitat where they are accessible to hunters. This low density and low productivity population is
very susceptible to overharvest under existing and proposed subsistence regulations.

The objectives of this project are to: (1) determine seasonal ranges and movement patterns; (2) estimate productivity; and (3) determine timing and rates of calf and cow mortality. This information is essential to assess whether “natural and healthy” moose populations are currently being maintained in the Park and to determine potential effects of increasing these harvest levels.

Methods: Cow moose were captured over a 2-year period during November or March using standard helicopter capture and immobilization techniques, and fitted with mortality sensing radio-collars (Gasaway et al. 1992). Collars were deployed on moose in lowland lakeshore habitat and in high elevation (>1,500 ft) habitats near the heads of river valleys. Blood samples were taken from all moose, and serum progesterone levels (P4) and pregnancy specific protein B (PSPB) will be analyzed to determine pregnancy status. Age was estimated in the field by examining incisor wear. Body condition index was obtained by examining fat levels and body mass (graded 1 to 10; modified from Robinson (1960). Capture of moose was a collaborative effort between NPS Personnel and the Alaska Department of Fish and Game (ADF&G).

Moose are located a minimum of twice monthly using a Piper PA-18 aircraft. On each location, an attempt to sight each animal is made to determine the sex and age of any accompanying individuals. During the late May-early June calving period female moose are relocated as often as weather allows to determine postnatal mortality. Home ranges will be calculated using the program Calhome (Kie et al. 1994) and entered into a Geographic Information System (ARCVIEW) where resource selection will be analyzed. Survival rates of adults and calves will be calculated using the program Mircomort (Heisey 1983).

Progress: Thirty-one cow moose wore active radio collars at the start of the reporting period. From November 1996 to November 1997 these moose were located 637 times during 117.3 hours of flight time. Three radio-collared moose (10%) died during May - July 1997. On 5 May 1997, while radio tracking moose, a brown bear was spotted on the still intact carcass of moose #100. The cause of the second mortality is unknown due to the inaccessible region where the moose died. The third mortality was likely human-caused as the radio collar was found across Lake Clark, 17 miles from the moose's home range adjacent to a four wheeler road. No remains of the moose were found in the area.

Between 16-30 May, 15 calves were seen associated with radio-collared cows. Previously located calves began disappearing on 30 May, and by 20 August 2 calves were left (13%). Calf carcasses were not examined to determine the cause of death. The calf/cow ratio for radio-collared moose was 6.4/100 in November 1997.

Moose that moved between separate home ranges seasonally are considered migratory (45%), while moose that maintained a single home range year round are resident moose (55%). Some moose (16%) moved high into box canyons during calving season and then returned to their home range for the remainder of the summer. Many moose (42%) spent October and November at higher elevations than they did throughout the rest of the year.

Thirteen additional cow moose were captured and radio-collared on 21 and 22 March 1998. The
capture crew consisted of Brad Shults (Western Arctic National Parklands), John Terenzi, Kyran Kunkel, Leon Alsworth (Lake Clark National Park), and Bill Merkley (Trans Alaska Helicopters). Similar to 1996, captured moose were blood-sampled and assessed for general condition. A canine was pulled to estimate age. Moose were captured at sites around the lake in a fashion to supplement and expand on areas selected for capture in 1996; especially the Chulitna River drainage. All moose were captured on low elevation winter ranges. All moose were judged to be in “good” condition and, based on tooth wear, were relatively young. No calves were seen with any of the captured moose.

Weather was good for capture operations excepting snow which was generally absent at very low elevations. On 21 March, a moose that was darted near the Koksetna River was lost from the sight of the spotter plane. We searched intensively on the ground and from the air with the helicopter and spotter plane but could not relocate the moose. We returned the following day and searched again with no success. On a radio-tracking flight the following week, wolves were sighted on a moose carcass in that same area. A site investigation revealed that this was the darted moose that had disappeared. She had moved across the river into thick timber about 500 m from the area we had searched on the ground. Over the 2 capture efforts on this project, we captured 45 moose, 1 of which (described above) likely died as a result of capture (2% capture mortality rate).

Moose survey- A moose population survey (Gasaway 1986) of Telaquana Lake/Trail Creek area, Game Management Unit 19B, was initiated but not completed due to unfavorable weather during November/December 1997. Nine units (7 high, 1 medium and 1 low; 177 km²) were surveyed on 28 November and 3 December. One hundred ninety-three moose were observed including 143 cows, 21 calves and 29 bulls yielding a calf/cow ratio of 14.7/100 and a bull/cow ratio of 20.3/100. These ratios were similar to the ratios from a 1994 trend survey conducted in the same area (11.7/100 and 25/100, respectively).

Future plans- Radio-tracking will continue biweekly through spring 1999 except during the calving season (mid-May through mid-June) when flights will occur 4-5 times/week so that we can more fully assess calf production and survival. We will examine factors affecting calf survival including a comparison of areas (via GIS) used by cows that successfully rear calves vs areas used by unsuccessful cows.

Literature Cited


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