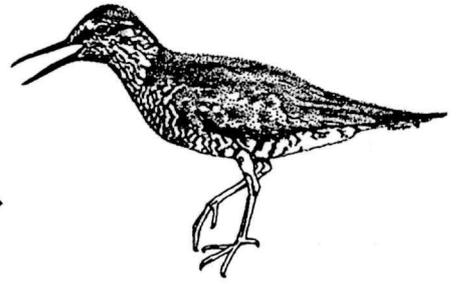


THE TATTLER



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MOOSE RESEARCH IN DENALI

Research at Denali on several aspects of moose ecology has been directed by Vic Van Ballenberghe of the U.S. Forest Service since 1980. Denali, with its naturally regulated moose populations, road access, tolerant moose, and habitat typical of sub-arctic treeline plant communities, is the ideal place to study foraging ecology, rutting behavior, and population dynamics. These three areas have been the major focus of the moose work to date.

The study area has been from the Park entrance to Igloo. This part of the Park contains much of the better habitat and currently supports a population of about 200 animals. Between 12 and 20 animals each year have worn radio collars that allow us to follow individuals over time to determine daily and seasonal movements, survival, calf production, daily activity, traditional use of rutting areas, and several other variables.

The foraging ecology studies have focused on four central questions: 1) Where do moose eat? 2) What do moose eat? 3) When do moose eat? 4) Why do moose display these patterns? The first question relates to habitat selection. Moose habitat in the Park is patchy and of great varying quality. We have documented a distinct summer/winter pattern of habitat selection by moose with mature bulls selecting stream bottom habitats (such as upper Jenny Creek) in winter as opposed to cows and younger bulls that prefer spruce/aspens forest. In summer, cows with calves segregate from other moose and prefer densely forested sites that apparently confer some protection from predators.

The second question relates to diet composition. We have documented that moose at Denali are primarily willow eaters with 94% of the winter diet

and 80-85% of the summer diet being willow. Two species are especially important: diamond leaf willow is about half the summer diet with feltleaf willow being preferred in winter. Moose in eastern Denali eat few forbs (2% of the summer diet) and aquatics unlike moose in the lowland habitats.

The third question relates to activity budgets. There are sharp differences in daily activity of moose during winter and summer. In summer, activity peaks in early June at about 12 hours per day with most of that time spent feeding. Moose process large quantities of nutritious food in summer in order to acquire the fat and protein they need for the rest of the year, as well as provide milk for calves, grow hair and antlers, and replenish lost minerals. In winter, they reduce their metabolic rate and daily activity to about half that of summer in response to a diet of much lower quality.

The fourth question (why do they do that?) is the most difficult and we are in the process of trying to formulate answers. Ultimately, all of this relates to energetics and nutrition.

The rutting behavior studies have involved research on the breeding system, traditional use of rutting areas, and fighting and antler breakage. Moose at Denali have a harem-like breeding system whereby dominant bulls defend groups of up to 25 cows from other bulls by fighting. Only mature bulls have the experience and body size to be successful and they typically die after three years of dominance. Fights are frequent and violent and often result in injuries. Antler breakage is common and we are trying to identify factors that predispose certain bulls to this and thereby affect reproductive success.

The population dynamics studies have focused on monitoring population trend over time through several aerial surveys in autumn, and on survival, recruitment, and population composition. We know

that the moose population in the eastern part of Denali has declined perhaps 50% since 1975. Recruitment has been poor with only 10-15% of the calves born each year surviving until autumn. Bear predation seems to be a major mortality factor. We hope to continue monitoring this population as it is one of the few naturally regulated moose populations in North America.

We have published many technical and popular articles on the results of our moose work at Denali including an article in National Geographic (August, 1987). If you are interested in reprints of these, please contact Vic Van Ballenberghe through the Research/Resources office at the Park.

PLACER MINE RESTORATION

The Glen Creek Watershed Recovery Project had some exciting accomplishments in 1990. Ken Karle, DENA hydraulic engineer, started the restoration of the stream and floodplain, working on the middle stretch of Glen Creek. Before Ken started working, some stream stretches were incised and eroding the banks, while the other stream stretches were braided and unstable, wandering over a large area. In either case, there was no floodplain where riparian vegetation could establish.

During the winter, Ken calculated the design for new stream and floodplain. After the site was surveyed and staked, Ken and Joe Van Horn used a bulldozer, front-loader, and dump truck to move the tailings to the desired configuration. Where the stream channel was incised, the adjacent material was cut back and lowered to create a new floodplain. The excess material was used to fill in the flat braided sections, encouraging a single channel and a stable floodplain.

The floodplain needs vegetation to control erosion and catch sediment, and we predict that natural revegetation will do the job in five to 10 years. Roseann Densmore is testing several methods to stabilize the new floodplains in the meantime. One method is brush bars 15-20 feet long made of alder branches tied in large bundles. These bundles are placed perpendicular to the stream and partially buried to anchor them. Streambank plantings of willow cuttings and alder seedlings were also established. The "veg crew", Mark Vander Meer, Jenny Forbes, Tyler Ledwith, and Greg Probst did all the hard work.

After the stream and floodplain have been

recontoured, there is still a lot of excavated gravel and rock left over, high and dry above the floodplain, and there is little or no soil left to spread over the rock. Roseann has been working for three years to determine what limits plant growth and how to overcome the problems and revegetate these sites. The results show that both gravel covered with topsoil and unprocessed excavated gravel revegetate naturally. Processed gravel, however, revegetates very slowly, and one of the main problems is lack of nitrogen.

Planting alder seedlings, which fix nitrogen, has helped solve this problem. After three years, the alders are over three feet tall on even the worst sites. Furthermore, the plantings have so far encouraged natural revegetation. Naturally revegetated plants are larger and more numerous on the planted areas as compared to unplanted areas.

Roseann Densmore and Ken Karle

MOOSE COUNT

Funding from the regional office made it possible for research staff to do a moose survey in late October/early November. The survey used the park's Cessna 185 and four Piper Supercubs, and covered the old park (wilderness area), the Kantishna Hills and the Stampede Road area. The last large-scale moose count was in 1986. It appears that in spite of large increases in wolf numbers and two severe winters, moose numbers parkwide have remained relatively stable over the last 5 years. The price of their survival may have been paid by the Denali caribou herd, which sustained higher predation during this period. Our best estimate for the number of moose in the park and preserve north of the Alaska Range is 1800-2000 moose.

Individual parts of the park have experienced some changes in moose numbers and in the makeup of the moose population. The east end of the park (Teklanika drainage to the Nenana River) showed the lowest moose counts in 20 years of survey history, while there is evidence of a moose increase in the Stampede and central park areas. The north slope of the Alaska Range, from the Muldrow Glacier west to the Swift Fork of the Kuskokwim River, had showed large increases in moose numbers since the mid-1970's. This increase now appears to have leveled off, although calf production (35 calves per 100 cows in this survey) is still good in the area. Moose

numbers in the Kantishna Hills have remained relatively constant, but very low calf numbers (11 calves per 100 cows) do not bode well for the future there.

We were lucky this year not only in getting the money to do a big moose survey, but in getting the weather to do it. Since then, we have had trouble getting a single good day of flying weather, let alone the week it takes to do a moose survey. We hope to come up with a cheaper, quicker method of doing "trend counts" of moose in certain areas to at least detect large changes in moose numbers and determine when another major survey is needed.

Tom Meier

A BIT OF TRIVIA

Denali makes up 1/2 of 1 per cent of Alaska's land area, and harbors about that proportion of the state's caribou and black bears. Of the other large mammals found in the park, we have more than our share, with about 1 per cent of the state's moose and 3 per cent of its wolves and sheep living within the park boundaries.

GEOLOGIC NEWS

Several landmark accomplishments have occurred in the park's ice, rock, and mud department in the 1991 field season. **Glacial advances** include the establishment of flow and mass balance index stations on the Kahiltna and Traleika Glaciers, a GPS longitudinal profile of the Muldrow Glacier, the installation of terminus monitoring photo-survey stations on the Middle Fork Toklat Glacier, and a re-survey of a Bradford Washburn glacier flow rate target on the Muldrow Glacier. **Rockfalls** consist of a Denali Fault mapping project with USGS that has better refined the location of the fault in the Anderson Pass vicinity. Some groundwork has also been laid to update the geology of the McKinley USGS quadrangle, although a landslide of funding does not appear likely. **Mudslinging** reoccurred in the annual re-survey of the Drunken Forest Slump stations. Five new stations were established this season, and all stations were monumented with PVC pipe. Watch for the results of these dynamic processes in the next issue of the Tattler.

Phil Brease

SUBSISTENCE HIGHLIGHTS

1991 has been an active year for Federal subsistence management in Alaska, dominated primarily by the release for public review and comment of the Draft Environmental Impact Statement (Draft EIS) regarding subsistence management on Federal Public Lands in Alaska.

The Draft EIS described four alternative approaches for developing and implementing a Federal Subsistence Management Program. Public hearings were held in forty communities around Alaska and one to be held in Washington D.C.. Sixteen people attended the local Public Hearing in Cantwell and two workshops on the Draft EIS were conducted by the Middle Nenana Advisory Committee. The selection of a management alternative and publishing of the Final EIS are anticipated to be completed in March 1992.

In addition to the Draft EIS, public comments and proposals are being solicited on the existing Temporary Subsistence Regulations regarding seasons and bag limits for hunting, trapping and fishing. This comment period is open till January 29, 1992.

In general, for many species we are seeing a gradual liberalization of subsistence seasons and bag limits based upon the health and ability of the population to support harvest and a documented customary and traditional use of the resource by the subsistence users. When there is a biological concern about a wildlife population or the potential harvest level, a more conservative approach is taken such as utilizing Registration Permit Hunts.

Denali National Park and Preserve had three Federal Registration Permit Hunts this year. Two in GMU-13E for moose and caribou and one in GMU-16B for moose. Only eligible park subsistence users who reside within the Game Management Unit may register for these permit hunts. Park staff issued 56 moose and 84 caribou permits for the GMU-13 Federal Subsistence Registration Permit Hunts and 7 permits for the GMU-16B moose permit hunt.

Hollis Twitchell