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RANGE MANAGEMENT IN ALASKA: SEWARD PENINSULA REINDEER HERDERS ON THE FAST TRACK

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ABSTRACT

Domestic reindeer were introduced to Alaska from Siberia over 100 years ago to be used in an animal production system. The current reindeer industry is centralized on the Seward Peninsula, Alaska where reindeer are managed over large, rugged and remote areas with little or no transportation infrastructure. The extent and management of reindeer in Alaska has changed considerably over time but has recently evolved into a progressive industry, mainly because of a partnership between the Reindeer Herders Association (RHA), government agencies and research institutions. The reindeer producers and the Reindeer Research Program, University of Alaska Fairbanks (RRP-UAF) developed a state-of-the-art animal identification and computerized record keeping system when coupled with demographic data can be used to monitor herd production and develop and evaluate management decisions. The Natural Resources Conservation Service (NRCS) inventoried and mapped the vegetation of the S.P. to support the development and implementation of range management plans. The RRP-UAF integrated the seasonal nutritional profile of forage plants with ecological site biomass data into an on-line interactive, mapping program to be used by reindeer herders. The herders can now identify prime grazing areas based on the seasonal chemical characteristics of the forage base to complement grazing strategies with the nutritional dynamics of the tundra.

Recently, tens of thousands of wild caribou have shifted their migratory path onto traditional reindeer ranges of the Seward Peninsula which resulted in the loss of thousands of reindeer to commingling and outmigration with caribou. RHA, RRP-UAF and NRCS worked closely to develop satellite telemetry and mapping system to address this problem. Satellite collars placed on reindeer transmit locations to an automated mapping system located at the RRP-UAF. Location maps are automatically posted to a designated web site for use by reindeer producers to track and move reindeer out of the path of migrating caribou. An abrupt change in reindeer

movement patterns may also signal harassment by predators and intervention of herders.

The use of enclosures and supplemental feeding are now being used by some reindeer herders on the Seward Peninsula to move away from extensive herding to more intensive management. Enclosures are being used to increase control of reindeer in the presence of migrating caribou. Supplemental feeding can be used in response to severe weather events such as midwinter icing or during calving when additional surveillance and nutrition may increase production. The practice of reindeer herding in Alaska is changing rapidly in response to the physical and socio-economic environment with the integration of many "cutting edge" management technologies and the collaboration of agencies and research institutions.

INTRODUCTION

The inability of humans to directly consume the 19 billion metric tons of forage produced annually necessitates converting the nutrients found in rangeland vegetation into animal production, a food source directly consumable by humans. Grazers were domesticated beginning 10–11,000 years ago to increase the utilization of rangeland vegetation by manipulation of the timing and distribution of animals.

For thousands of years the Eskimos of Northwestern Alaska had relied upon the relatively stable populations of marine and terrestrial mammals for their survival. Sea mammals, caribou and muskoxen provided the mainstay of their diet (Burch, 1975). However the influence of Euro-Americans changed the stability of the ecosystem and the socio-economic dynamics of western Alaska starting the mid to late 1800's. Significant changes in the traditional hunting cycle, settlement pattern, social organization, and population distribution of all Eskimo groups in Northwestern were initiated during the period from 1850 to 1890 (Burch, 1975; Ray,

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1975). Whaling ships ran up and down the coast of Alaska harvesting the marine mammals that were associated with the annual receding pack ice. Depending on spring weather conditions, the whaling ships were often delayed in pushing through the pack ice to reach the Chukchi Sea and Arctic Ocean. For that reason many whaling ships began to over-winter in protected areas such as Point Barrow, Point Hope, Port Clarence and Golovin Bay (Stern *et al.*, 1980). Establishing permanent shore stations enabled the whalers to start the following whaling season much earlier than before. During the winter months the whalers traded with the Natives, introduced liquor and repeating rifles, and hired the local men to hunt for them. As the whaling industry grew, hunting of local stocks of wildlife increased to supply the whalers with meat, fur, baleen, and walrus ivory. The marine and terrestrial animal populations eventually declined due to increased hunting pressure to supply the "White" commercial market. By the 1890's muskoxen and caribou were virtually eliminated on the Seward Peninsula (Skoog, 1968) and the marine mammal population declined significantly (Foote, 1965; Stern *et al.* 1980). Thus, by the 1890's the Seward Peninsula was devoid of any large grazing herbivores.

In any event, a vast tundra rangeland existed on the Seward Peninsula that could potentially be utilized in a managed grazing system if a domestic animal could be found that was compatible with this extreme environment. It is not clear when and where reindeer were originally domesticated but many groups of people selectively bred and kept reindeer across the northern Eurasian continent in animal production systems (Mirov, 1945) Different reindeer varieties (*Rangifer tarandus tarandus*) were developed to suit local conditions and human needs. The Saami people of Norway used reindeer as a milk producing animal where the Samoyed and Vogul people of Siberia used reindeer primarily to draw sledges. In contrast, the Tungus people bred for extremely tame reindeer used as pack and saddle animals (Dmitriez and Ernst, 1989). The Chukchi and Koryak people of present day Siberis developed their breed around 1000 AD in Chukotka and north-eastern Yakutia. Their method of herding was conducted on foot so animals with a strong herding instinct and weak migratory behavior were selected for. Chukotkan reindeer exhibit a high degree of site-fidelity even if local areas become overgrazed (Dmitriez and Ernst, 1989). This breed was further developed in Russia through selective breeding at state farms in Chukotka, Yakutia, and Kamchatka Peninsula to produce carcasses noted for their very fine muscle fibers and a high ratio of muscle tissue to bone (Dmitriez and Ernst, 1989).

REINDEER RANGE MANAGEMENT

Reindeer were imported into Alaska from Russia starting in 1891 as a means for Alaskan Natives to utilize the tundra rangelands of Alaska in production of a predictable red meat supply and to provide economic development. By 1896, approximately 1200 reindeer had been introduced and were grazing on the Seward Peninsula. The reindeer thrived on these ranges because the population swiftly colonized the Seward Peninsula and by 1924 had risen to 242,000 animals (Stern *et al.*, 1980). The numbers and distribution of reindeer has varied dramatically since the 1920's, however they have continued to be the dominant grazer and a major influence on the Seward Peninsula ecosystem during the last 80 years.

In 1944 the Bureau of Indian Affairs (BIA) took over administration of the Alaskan reindeer operation and initiated a program

to privatize and improve reindeer management on the Seward Peninsula (Stern *et al.*, 1980). A plan was developed to set up 19 reindeer grazing permit areas in large designated ranges, consisting of state and federal lands, and to introduce intensive herding and improve methods of handling and slaughtering (Fig. 1), (Stern *et al.*, 1980). In 1971 the reindeer producers organized into the Reindeer Herder's Association (RHA) and initiated a plan to standardize and improve range management practices (Bader & Finstad, 1999). Since the 1970's RHA has been particularly aggressive in its goal to modernize the S.P reindeer industry and be on the "cutting edge" of developing new strategies, techniques, products and technological advances (RHA, 1979).

RHA and RRP-UAF has collected years of animal production and health records on Seward Peninsula reindeer herds that have been used by reindeer herders to monitor production and to make management decisions. Herders, historically, did not have immediate access to this database because it was stored in proprietary software on non-networked computers. However, now these data are being made much more accessible as the RRP-UAF recently developed an on-line web-browser to query and browse herd records. Reindeer herders will now be able to query and browse an archived database year round, via the internet and have an increased capacity to make management decisions and monitor production. The herders will also be able to browse individual animal records online and select animals for culling or breeding based on production history.

The management structure of the Seward Peninsula reindeer industry is much different than found in Scandinavian countries or Russia. Rather than being organized in cooperatives, Individuals or families were given exclusive grazing rights on designated ranges averaging 400,000 hectares in size (Fig. 1).

In this way the herder is encouraged and has a vested interest to manage his reindeer and grazing resources in a sustainable manner. RHA requested the Alaska Soil & Water Conservation District and the United States Department of Agriculture, Soil Conservation Service (SCS), now the Natural Resources Conservation Service (NRCS, 1954) for assistance in developing sustainable range management plans for reindeer. In response, the SCS initiated a vegetation inventory and mapping of the 4 million hectares of permitted rangeland on the Seward Peninsula. This survey was conducted to provide information useful for reindeer range planning and management, with special emphasis on monitoring range conditions and establishing maximum stocking densities. Survey objectives were to: identify, map and describe "ecological sites"; describe plant community characteristics of each ecological site; quantify plant communities in terms of species composition and annual productivity. Vegetation of the S.P. is classified as tundra (Walker *et al.*, 2003). The diversity of soil environments and micro-climatic zones create a mosaic of vegetation types ranging from high elevation alpine tundra to tidal-influenced marshlands. The landscape is not dominated by one or two vegetation communities but by an assortment of communities made up by a multitude of graminoid, shrub, forb and lichen species. NRCS identified and developed digitized maps of thirty-nine ecological sites found across the Seward Peninsula. (Fig 1). In each ecological site plant species composition and cover, annual plant productivity and biomass were described (Swanson *et al.*, 1985).

Reindeer on the S.P. exhibit fast growth rates during summer and achieve higher body mass and reproductive rate compared to other circumpolar *Rangifer* populations (Prichard *et al.*, 1998; Finstad and Prichard, 1999). Thus, they have high demands for nutrients during times when nutritional characteristics of the forage base are

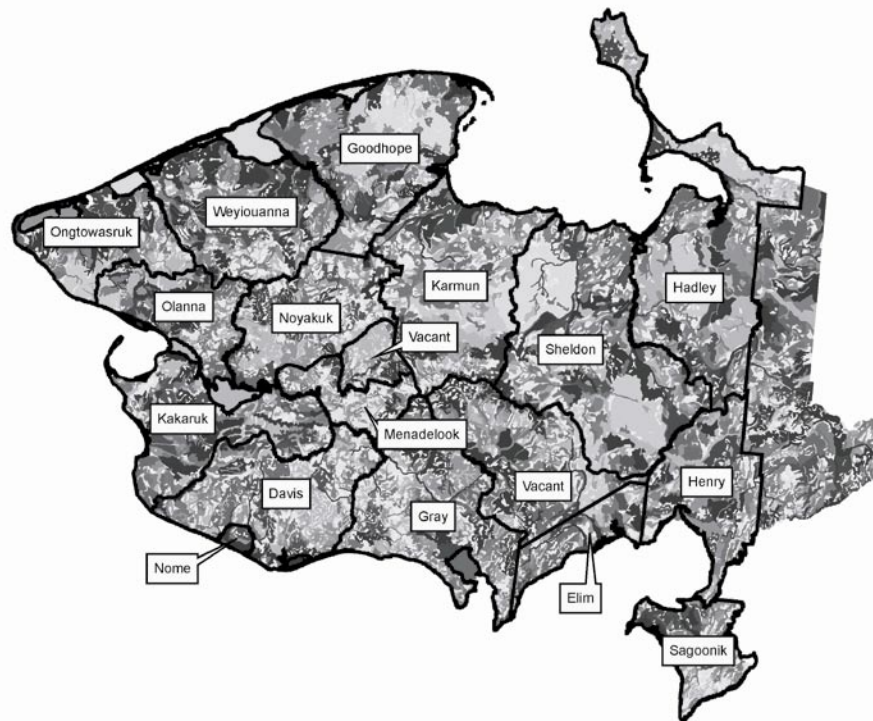


Figure 1. Reindeer herder grazing allotments overlaid Ecological Site (land cover class) map of the Seward Peninsula, Alaska. Map available: <http://www.ak.nrcs.usda.gov/technical/soils/digitaldata.html>

diverse and ephemeral so being in the right place at the right time is very critical for productivity (Klein, 1990, Pullianen, 1971; Skogland, 1975; Staal and Saebo, 1993). Reindeer producers must recognize the dynamic nature of forage chemistry to develop seasonal or rotational grazing strategies that complement the unique nutritional qualities of each designated range. The seasonal placement of reindeer in areas where concentrations of nutrients and digestibility of forage plants are high will ensure maximum growth of the individual and overall production of the grazing system.

The RRP-UAF developed seasonal nutritional profile models of (N), phosphorus (P), potassium (K), Neutral Detergent Fiber (NDF), Acid Detergent Fiber (ADF) and in-vitro true dry matter digestibility (IVTDMD) of forage plants found across the Seward Peninsula using Julian date (JD), Growing-Degree-Days (GDD) and phenology to predict and identify high quality forage areas throughout the growing season (Fig. 2). The seasonal nutritional profile of forage plants was coupled with forage biomass data to construct an on line mapping program to identify the most nutritious ecological sites or larger grazing areas for reindeer (Fig. 3). Herders can use the interactive nutritional maps to guide placement of reindeer on large diverse and dynamic ranges. By using this nutritional atlas, the producer can develop a general seasonal grazing plan using species distribution and date as the predictor of forage emergence and quality and can refine his placement of animals depending upon the unique thermal characteristics of his range.

Recently, the Western Arctic Caribou Herd (WACH) has increased dramatically and is severely impacting Alaska's reindeer industry. The WACH has increased from 75 000 animals in 1976 to approximately 463 000 animals in 1996 (Dau, 2000). During this time, winter range of the WACH shifted west onto traditional reindeer ranges of the Seward Peninsula (Fig. 4). Thousands of reindeer have commingled with migratory caribou groups and left

the Seward Peninsula in the last 15 years (Finstad *et al.*, 2002). Reindeer have been observed with caribou 640 km from their home ranges (unpublished RRP-UAF satellite telemetry data). Occasionally, some out-migrating reindeer will return to their traditional range but many do not return and succumb to predation, harvest by caribou hunters, and other factors (Oleson, 2005). As a result, many herders have lost their herds. In addition, the presence of a small number of caribou in a reindeer herd will cause otherwise docile reindeer to become easily excited and difficult to herd. Locating and tracking reindeer on remote ranges when caribou are present has become critical to the viability of many herds.

The RRP-UAF, and RHA developed a new management technique using satellite radio-telemetry and the Internet to assist herders to more effectively monitor and herd animals in the presence of caribou. Beginning January 1999, reindeer herders placed Telonics® ST-18 satellite radio-collars, on either 5 or 10-day duty cycles, on large dominant female reindeer during either a June or February handling or captured them by lassoing or net-gun during winter. The RRP-UAF uses a mapping workstation to create real-time reindeer location maps that are placed on a dedicated website that is accessed through the Internet. Herders not only monitor locations of reindeer in their herds but also of reindeer swept up by caribou and at times make an effort to recapture them when travel conditions improve and regional caribou numbers decline. Some herders are using the system to hold their herds in refugia. However, this is not a permanent solution or even a long-term strategy, since the intensive year-round grazing in refugia will likely deplete lichen reserves (Oleson, 2005) and alter species composition (Grellmann, 2002; Väre, 1995). Others are using the system as a range management tool to move herds to areas less intensively grazed by both caribou and reindeer.

The traditional management regime of Seward Peninsula reindeer has been to allow animals to free range over large areas

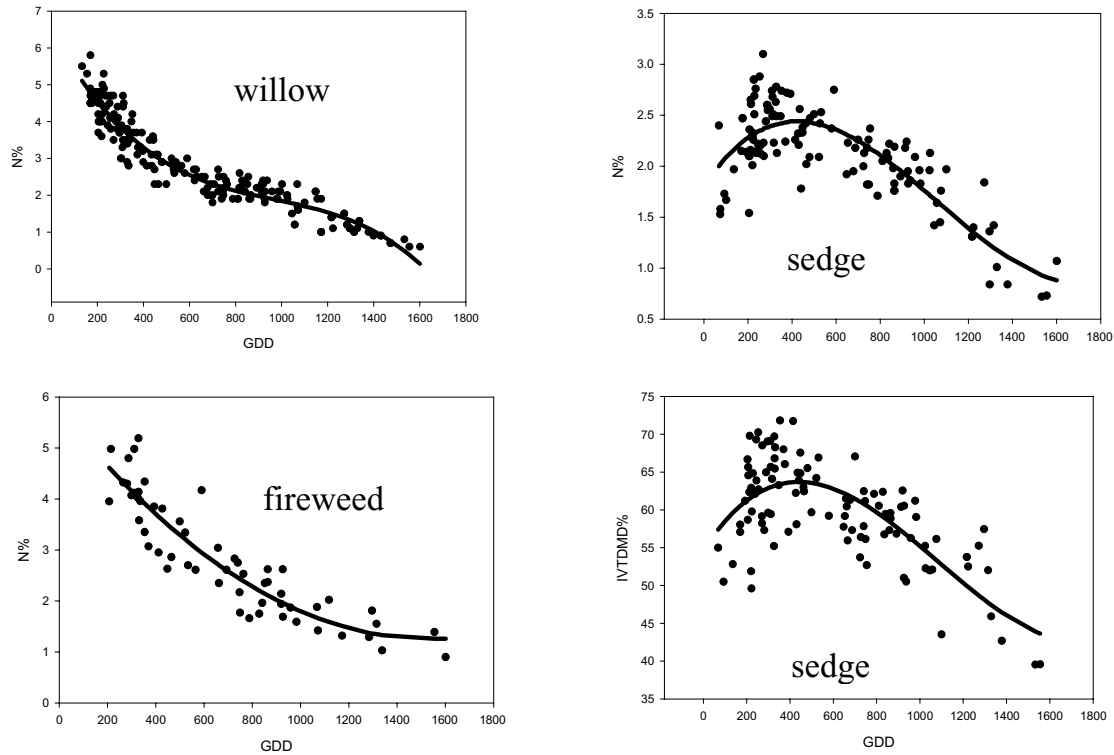


Figure 2. Examples of the relationship between Growing-Degree-Days (GDD) and some of the nutritional characteristics of reindeer forage plants found on the Seward Peninsula, Alaska. These relationships were integrated with ecological site biomass data to generate seasonal nutritional maps (See Figure 3) to be used by reindeer herders to place animals in areas of high quality forage.

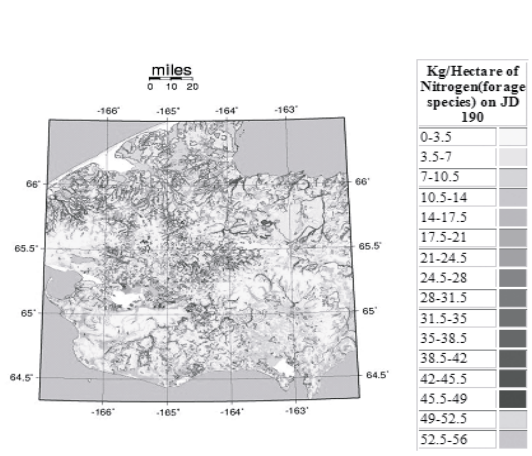


Figure 3. On-line map generated by reindeer herders identifying areas with a high proportion of forage plants containing high concentrations of protein. The map was generated by inputting nutrient of concern (N) and the date (JD).

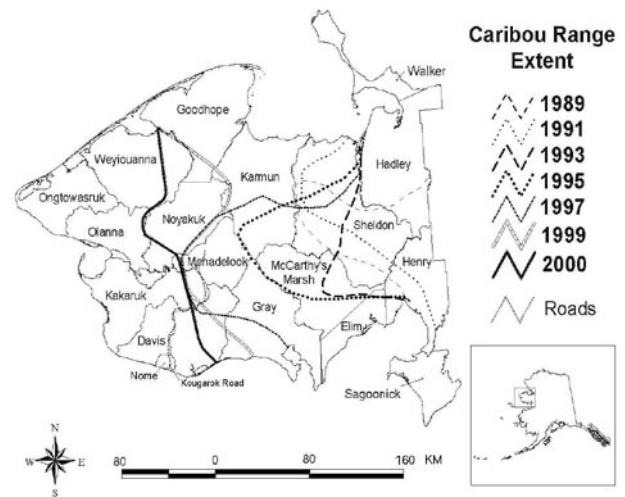


Figure 4. The westward shift of the Western Arctic Caribou Herd winter range on traditional ranges of the Seward Peninsula, Alaska.

and forage on the native vegetation. Recent events have created the need for reindeer producers to adopt a more intensive management style with the use of supplemental or emergency feeding. Some herders wish to re-establish their herds but the possibility still exists that caribou may yet again overrun their ranges. Recently a

reindeer producer in Koyuk, Alaska constructed an enclosure and acquired a small group of reindeer. The animals were kept in the enclosure and converted to a milled ration and habituated to close contact with humans. The reindeer quickly socialized to humans and became comfortable to intensive husbandry practices. The

animals developed a strong fidelity to the site and would remain in the general area when released from the enclosure. The enclosure and supplemental feeding will now be used on a needs basis to keep animals away from migrating caribou.

The climate of the Seward Peninsula is expected to change with the possibility of increased winter temperature, wind velocity, snowfall and occurrence of rain on snow events. These events will likely increase the depth and density of snow and increase the energetic costs of foraging and may negatively influence the winter condition of reindeer with dramatic downturns in production (Adamczewski et al., 1988; Fancy and White, 1984). Supplemental feeding of reindeer during winter in Scandinavia has been shown to increase nutritional status and production of reindeer (Aagnes and Mathieson, 1995; Jacobsen and Skjenneberg, 1979; Stalaand, and Sletten, 1991; Nilsson, 2003) and is being considered for herds on the Seward Peninsula.

Other reindeer producers wish to use enclosures and supplemental feeding of reindeer during the calving season. This management option is being looked at to reduce loss of calves to predation and to increase the control of animals during this critical life event. Supplemental feeding of reindeer immediately before and after calving may help the nutrition of females during a time when energy and nutrient demands are high.

Rural communities of Alaska have been experiencing tremendous environmental and social change over the last 30 years. Seward Peninsula reindeer herders have been riding this wave of change with amazing adaptability and resilience. Herders have adopted modern range management animal husbandry practices and were instrumental in developing a state-of-the-art, computerized, animal identification and record-keeping system. Radio-telemetry became a conventional herding tool to locate and track reindeer across large ranges.

The leadership of RHA has been a catalyst for change for the reindeer industry because the members have a keen interest in and a comprehensive understanding of the local environment, policies and a global awareness of the alternatives they have in taking action. This has been cultivated by the close working relationship they have had with researchers, and agencies. This relationship led to exposure to science and technologies through travel and exchanges, participation in workshops and conferences, and an active role in developing and evaluating research and policy.

Today, the practice of reindeer herding in Alaska is continuing to change dramatically in response to the physical and socio-economic environment. Satellite telemetry and forage quality mapping, coupled to the use of the Internet allow herders to monitor range use and move their animals across the landscape to optimize the use of their ranges like they never have before. Supplemental feeding and enclosures are being used to intensify management by controlling animal locations and providing value-added use of their ranges.

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