Reindeer in Alaska: Under New Management

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Merlin Henry did everything he could to save his reindeer herd. He went out riding his snowmachine across rough, hard-packed snow in the cold and dark, day after day, to keep what was left of his herd from mixing with the caribou. But no matter where he drove his reindeer, to the top of every hill and the bottom of every valley, into the spruce trees, and even close to the village of Koyuk, he encountered caribou wherever he went. It only took a storm and a snowmachine breakdown for him to lose his entire reindeer herd to the migrating caribou. Soon after losing his herd, he was hospitalized and underwent surgery to repair a brain aneurism. Three weeks later, against doctor's orders, he was out riding a snowmachine across his range in search of the lost herd. He caught glimpses of his reindeer mixed in with thousands of caribou, but was unable to segregate and control the now wild and unpredictable reindeer. Merlin was devastated. The herd was his father's legacy, entrusted to him with the hope of passing it on to his own sons and daughters. Merlin Henry had been a dedicated, compassionate, hard-working herder, and now his family and the village of Koyuk were without a reindeer herd for the first time in sixty years.

But all was not lost. Merlin Henry, along with the other members of the Reindeer Herders Association, have been solving problems and overcoming obstacles facing the reindeer industry for many years. All of their efforts to improve the reindeer industry have not been without help. The Reindeer Herders Association (RHA) has been working closely in a partnership with the Reindeer Research Program at the University of Alaska Fairbanks (RRP) since 1981 to address needs of the industry.

Rural communities of Alaska have been experiencing tremendous environmental and social change over the last thirty years, and 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, were instrumental in developing a state-of-the-art, computerized, animal identification and record-keeping system, and adopted radiotelemetry as a conventional herding tool to locate and track reindeer across large ranges.

Reindeer herding itself is relative new to the Eskimos of northwestern Alaska. For thousands of years they 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

Unloading building materials for a reindeer enclosure at Koyuk, Alaska in 2005. The SNRAS research project on supplemental feeding and enclosures of which this work was a part was supported with federal money as part of the New Crops appropriations and by the Bureau of Indian Affairs. These funds are helping the University of Alaska to develop new agricultural products and to improve Alaska's agricultural independence.

the stability of the ecosystem and the socioeconomic dynamics of western Alaska starting the mid to late 1800s.

Significant changes in the traditional hunting cycle, settlement pattern, social organization, and population distribution of all Eskimo groups in northwestern Alaska began during the period from 1850 to 1890 (Burch 1975; Ray 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 overwinter 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 1890s 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). By the 1890s the Seward Peninsula was devoid of any large grazing herbivores, but there remained a vast tundra rangeland that could potentially be utilized in a managed grazing system, if a domestic animal could be found that was compatible with the characteristics of the forage base.

Although it is not clear when and where reindeer (*Rangifer tarandus tarandus*) were originally domesticated, across the northern Eurasian continent many groups of people selectively bred and kept them in animal production systems. Different reindeer varieties were developed to suit local conditions and human needs. The Saami of northern Scandinavia used reindeer as a milk-producing animal, while the Samoyed and the Vogul people used reindeer primarily to draw sledges. In contrast, the Tungus people of Russia bred for extremely tame reindeer used as pack and saddle animals. The Chukchi and Koryak people of Siberia developed their breed around 1000 AD in Chukotka and northeastern Yakutia. Because they herded the animals on foot, reindeer were selected for a strong

herding instinct and weak migratory behavior. Chukotkan reindeer exhibit a high degree of site fidelity even if local areas become overgrazed. This breed was further developed in Russia through selective breeding at state farms in Chukotka, Yakutia, and on the Kamchatka Peninsula to produce carcasses noted for their very fine muscle fibers and a high ratio of muscle tissue to bone.

Reindeer were imported into Alaska from Russia starting in 1891 as a means for Alaska Natives to produce a predictable red meat supply and to provide economic development. By 1896, approximately 1,200 reindeer had been introduced and were grazing on the Seward Peninsula. The forage base encountered by the reindeer must have provided good nutrition because the reindeer 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 1920s; however, they have continued to be the dominant grazer and a major influence on the Seward Peninsula ecosystem during the last eighty years.

In 1944 the Bureau of Indian Affairs (BIA) took over administration of the Alaska 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 nineteen reindeer grazing permit areas in large designated ranges on state and federal lands, to introduce intensive herding, and improve handling and slaughtering methods (Fig. 1, p. 21) (Stern et al. 1980).

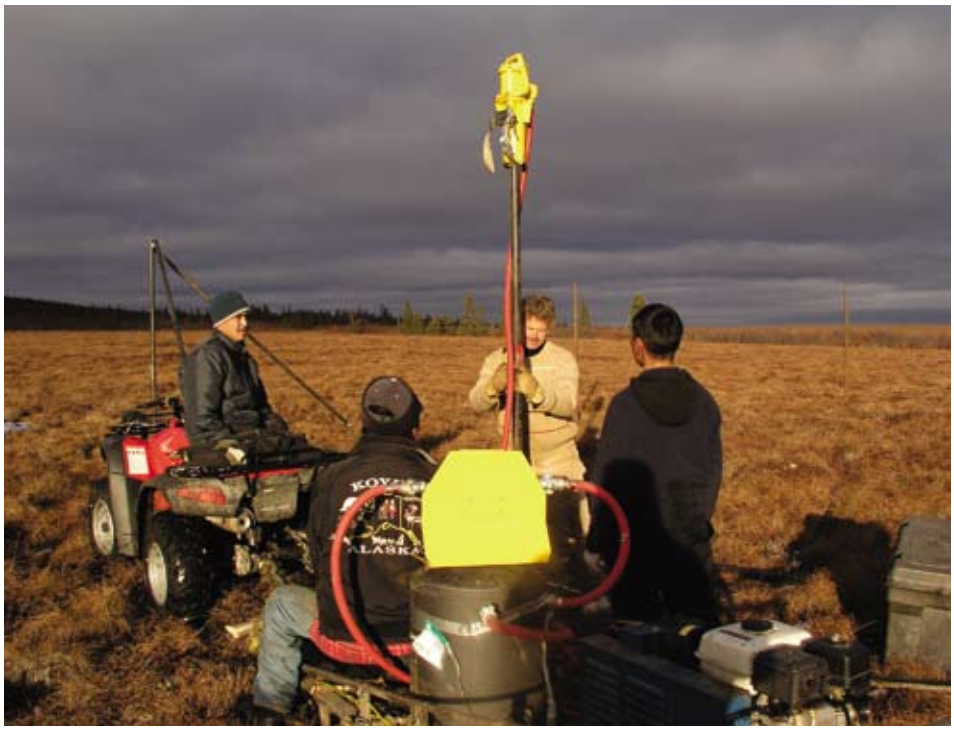
In 1971 the reindeer producers organized into the Reindeer Herders Association and initiated a plan to standardize and improve range management practices (Bader and Finstad 1999). Since the 1970s RHA has been particularly aggressive in its goal to modernize the Seward Peninsula reindeer industry and be on the "cutting edge" of developing new strategies, techniques, products, and technological advances (RHA 1979).

The Reindeer Herders Association and the Reindeer Research Program have collected years of animal production and health records for Seward Peninsula reindeer herds. These records, organized in a database, are used by herders to make management decisions. Initially they did not have direct access to this database because it was stored in proprietary software on unnetworked computers. Now, via the Internet, they will be able to view records and make management decisions before summer or winter handlings and query and browse herd records year round. Viewing individual animal records on line, they can 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. 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 to, and has a vested interest in, managing the reindeer and grazing resources in a sustainable manner. To develop sustainable range management plans for reindeer, the herders association requested assistance from the Alaska Soil & Water Conservation District and the United States Department of Agriculture Soil Conservation Service (SCS), now the Natural Resources Conservation Service (NRCS).

In response, the NRCS initiated a vegetation inventory and mapping of the four million hectares of permitted rangeland on the Seward Peninsula. The range 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; and quantify plant communities in terms of species composition and annual productivity.

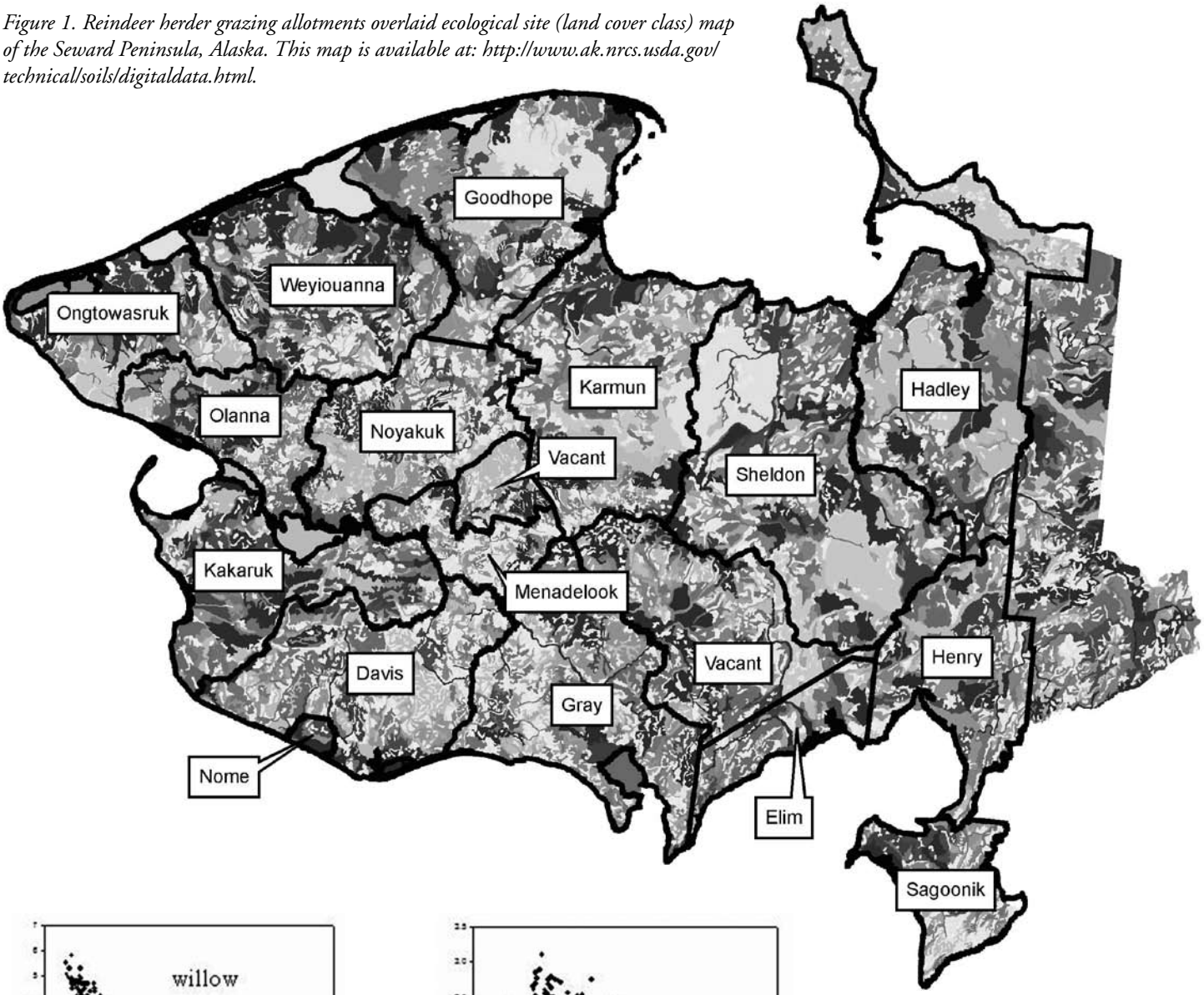
Seward Peninsula vegetation is classified as tundra. The diversity of soil environments and microclimatic zones create a mosaic of vegetation types ranging from high elevation alpine tundra to tidal-influenced marshlands. The landscape is not dominated by one or two vegetation communities, but by an assortment of communities made up by a multitude of graminoid, shrub, forb, and lichen species. The NRCS developed digitized maps of thirty-nine ecological



Merlin Henry (center, facing away from camera), two of his nephews, and Greg Finstad (center, facing toward camera), who is using a pneumatic post pounder in 2005 to construct an enclosure for Henry's reindeer.

—PHOTO COURTESY REINDEER RESEARCH PROGRAM

Figure 1. Reindeer herder grazing allotments overlaid ecological site (land cover class) map of the Seward Peninsula, Alaska. This map is available at: http://www.ak.nrcs.usda.gov/technical/soils/digitaldata.html.



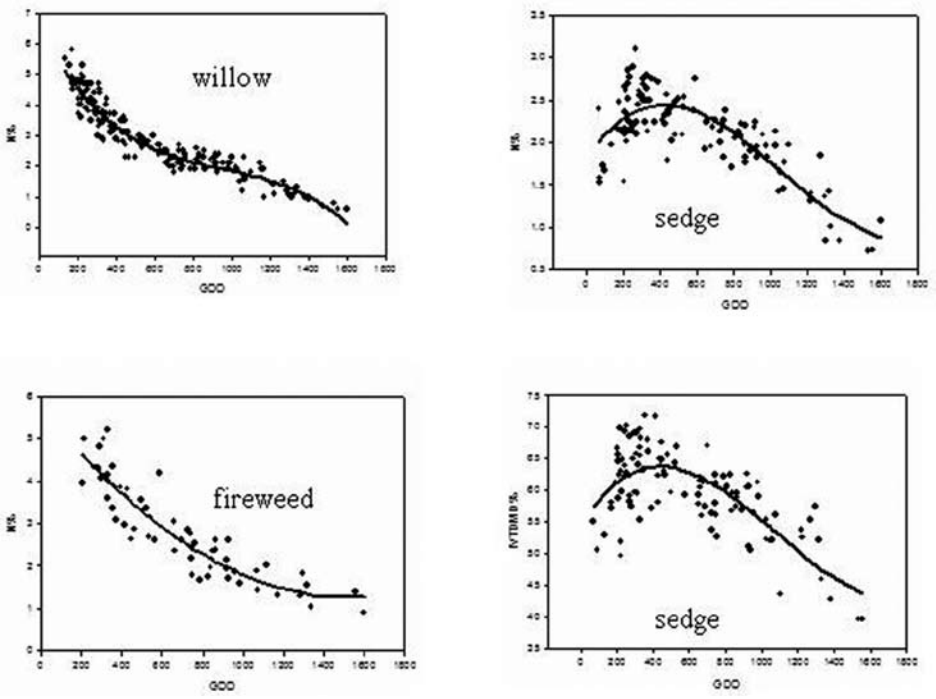


Figure 2. Examples of the relationship between Growing-Degree-Days (GDD) and some of the nutritional characteristics of reindeer forage plants found on the Seward Peninsula. These relationships were integrated with ecological site biomass data to generate seasonal nutritional maps to be used by reindeer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

sites found across the Seward Peninsula (Fig 1). Plant species composition and cover, annual plant productivity, and biomass were described for each ecological site (Swanson et al. 1985).

Reindeer on the Seward Peninsula exhibit fast growth rates during summer and achieve a high body mass and reproductive rate compared to other circumpolar *Rangifer* populations (Finstad and Prichard 1999). Thus, because they have high demands for nutrients during times when nutritional characteristics of the forage base are diverse and ephemeral, being in the right place at the right time is very critical for their productivity (Klein 1990, Staaland, and Saebo 1993). This means that reindeer producers must recognize the dynamic nature of forage chemistry

Randy Fulweber, left, a SNRAS graduate student studying range ecology of reindeer, and Merlin Henry, right, attaching a satelite radio collar on one of Henry's animals. The animal is safely held in a padded reindeer "crush."

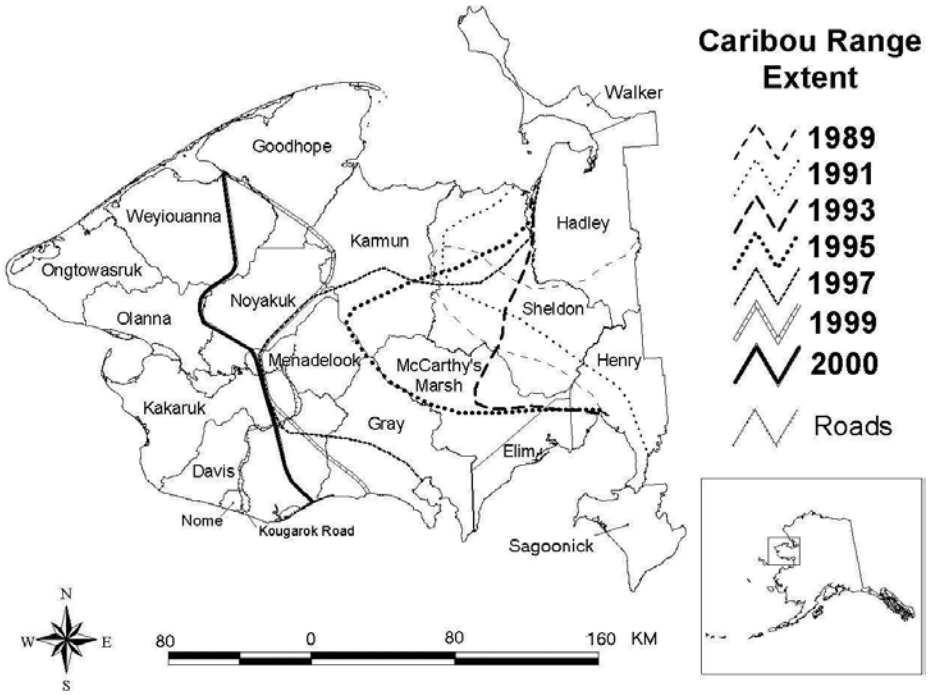


Figure 3. The westward shift of the Western Arctic Caribou Herd winter range on traditional ranges of the Seward Peninsula.

so they can 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 Reindeer Research Program developed seasonal nutritional profile models of forage plants found across the Seward Peninsula to predict and identify high-quality forage areas throughout the growing season (Fig 2). The seasonal nutritional profile was coupled with forage biomass data to construct an online mapping program to identify the most nutritious ecological sites or larger grazing areas for reindeer (Fig. 1).

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 animal placement depending upon the unique thermal characteristics of the range.

Locating and tracking reindeer on remote ranges when caribou are present has become critical to the viability of many herds because of the recent dramatic increase in the Western Arctic Caribou Herd that has severely affected Alaska's reindeer industry. This herd has increased from 75,000 animals in 1976 to approximately 463,000 animals in 1996 (Dau 2000). During this time, winter range of the Western Arctic Caribou Herd shifted west onto traditional reindeer ranges of the Seward Peninsula (Fig 3). Thousands of reindeer have commingled with migratory caribou groups and left the Seward Peninsula in the last fifteen years (Finstad et al. 2002). Reindeer have been observed with caribou 640 kilometers from their home ranges. Occasionally, some out-migrating reindeer will return to their traditional range, but many do not return, instead succumbing to predation, harvest by caribou hunters, and other factors. As a result, many herders have lost their herds. Also, 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.

The Reindeer Research Program and the Reindeer Herders Association developed a new management technique that uses satellite radiotelemetry and the Internet to help herders 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 five- or ten-day duty cycles) on large dominant female reindeer during either a June or a winter handling, or by lassoing or using a net-gun from a snowmachine. The Reindeer Research Program 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 and alter species composition. 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 range freely over large areas and forage on the native vegetation. This was the method Merlin Henry and his father had successfully used for many decades before the caribou showed up. Merlin Henry wanted to re-establish his herd, but the possibility still exists that caribou may again overrun his range. Henry, along with the RRP, developed the idea of using an enclosure as a refuge to keep his reindeer herd from mixing with the caribou. Reindeer could be acclimated to an enclosure and converted over to a pelleted ration, then held and supplementally fed until the caribou moved out of the area. Of course, free-range reindeer would have to be to be acclimated to living in an enclosure and eating a pelleted ration. Converting

Henry's enclosure near the village of Koyuk. These are large, healthy yearlings. An unexpected side benefit to the combination of enclosures and supplemental feeding was increased body size in the reindeer, meaning higher productivity for his herd.

reindeer to a pelleted ration may take up to two weeks, with some animals never accepting the new diet.

Henry and the RRP came up with a plan to train the reindeer to readily leave the enclosure for the day and graze in an area chosen by Henry. After the reindeer were allowed to forage they would then be returned to the enclosure at night. It was thought that if reindeer became accustomed to moving easily in and out of a pen and grazing close to home, then this strategy could be implemented if caribou suddenly moved into the area. If the caribou remained in the area, then reindeer would readily accept a supplemental ration without a difficult or prolonged conversion. After caribou moved out of the area, the reindeer could be released back unto the range and allowed to freely graze once again.

In October 2005 Henry and the RRP constructed an enclosure outside the village of Koyuk. Tom Gray, a herder from White Mountain, Alaska, donated one male and nine female calves with one adult female to use as seed stock to reestablish a reindeer herd in Koyuk. Crates were built and the animals were flown to Koyuk and released into the enclosure, their new home in January 2006. The RRP had manufactured an experimental lichen/barley starter pellet to facilitate feed conversion. Surprisingly, the animals converted to the pellet on the third day in the enclosure and consumed it with relish. The reindeer quickly habituated to close contact with humans and were eating out of Merlin Henry's hand in a matter of weeks. The reindeer soon developed a strong fidelity to the site and would remain in the general area when released from the enclosure. The enclosure and supplemental feeding are now being used by Henry on a needs basis to keep his new herd away from migrating caribou.

Some reindeer producers wish to use enclosures and supplemental feeding 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 a critical life event. Supplemental feeding of reindeer immediatelty pre- and postcalving may help the nutrition of females during a time when energy and nutrient demands are high.

The climate of the Seward Peninsula is expected to change, with 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 digging and foraging, which may negatively influence the winter condition of reindeer with dramatic downturns in overall production. Supplemental feeding of reindeer during winter in Scandinavia has been shown to increase nutritional status and production of reindeer (Jacobsen and Skjenneberg 1979, Stalaand and Sletten 1991, Nilsson 2003) and is being considered for Seward Peninsula reindeer herds.

The leadership of the Reindeer Herders Association 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. Supplemental feeding and enclosures are being used to intensify management by controlling animal locations and providing value-added use of their ranges. 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.

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