CHARACTERIZATION AND MANAGEMENT OF GRASSLAND AND ASSOCIATED PLANT COMMUNITIES ON KODIAK ISLAND, ALASKA

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ABSTRACT

A range survey on Kodiak Island grazing leases was conducted summers of 1995-96 to update management plans for areas grazed by cattle (*Bos tarus*) and bison (*Bison bison*). Ecological site (site) mapping and descriptions were updated, ecological status and grazing use was evaluated. Spatial data were acquired and summarized using Geographic Information System (GIS). New sites were developed for beaches and cliffs to facilitate ecosystem planning and enhance GIS capabilities.

KEYWORDS

Cattle, bison, sites, Kodiak Island, Bluejoint (*Calamagrostis canadensis*).

INTRODUCTION

Cattle grazing on Kodiak Island is recorded as early as 1795 (Bancroft, 1959). Cattle numbers peaked to 2,500 in the mid 1970's (W. Fields, 1997) and declined to the present 310 cattle. In addition, 160 horses and 210 bison utilize the area. Total utilization at present is 735 animal units/year long. Continued conflicts with Kodiak Brown bear(*Ursus arctos* subsp. *horribilis*), marginal cattle profits, limited winter range, and high supplemental feed costs, have reduced opportunities for livestock producers. Prior to the 1971 Alaska Native Claims Settlement Act (ANCSA), the Bureau of Land Management adjudicated 20-25 year leases under authority of the Alaska Grazing Act of 1927. Post ANCSA, land ownership, livestock numbers, lease tenure and lessee's changed. These changes prompted this survey update by the Natural Resources Conservation Service (NRCS). The survey area (including in-holdings of private land) contains 97,900 acres. Grazing leases include valleys north of Saltery Cove, Portage Bay, Pasagshak Bay and Narrow Cape north to Sequel Point. The northern portion of the area is rimmed by the Marin mountain range and other mountain peaks rising over 2,000 feet. The grazing land is characterized by valleys, hills and mountain slopes. Bluejoint (*Calamagrostis canadensis*) dominates all but the forested sites. Associated with Bluejoint are Tufted Hairgrass (*Deschampsia caespitosa*) and Alpine Fescue (*Festuca brachyphylla*). Large herbaceous plants include Fireweed (*Epilobium angustifolium*), Boreal Yarrow (*Achillea borealis)*, Ladyfern (*Athyrium filix-femina*), Wild Geranium (*Geranium erianthum*), Cow Parsnip (Heracleum lanatum) and Nootka Lupine (*Lupinus nootkatensis*). Woody plants are locally dominant and include Salmonberry (*Rubus spectabilis*) and Red Elderberry (*Sambucus racemosa*).

Throughout the grassland are thickets of alder (*Alnus sinuata, A. crispa*), and willow (*Salix commutata, S. Barclayi*). Parallel to the coast and at the head of bays, Lyme grass (*Elymus arenarius* subsp. mollis) dominates. Bering Hairgrass (*Deschampsia beringensis*) is present to a lesser extent. Notable herbaceous species in this zone are Sea Vetchling (*Lathyrus maritimus*) and Scottish Wild Lovage (*Ligusticum scoticum*). Saline meadows are dominated by Lyngbye's Sedge (*Carex lyngbyaei*) with scattered Arctic Dock (*Rumex arcticus*) and Panicled Bullrush (*Scirpus microcarpus*). Small pioneer stands of Sitka spruce (*Picea sitchensis*) occur scattered throughout northern and eastern uplands. Stands of Black Cottonwood (*Populus trichocarpa*) with a Bluejoint understory occur along lower elevation riparian zones. Vegetation for the area is further described in Mitchell (1974), Rieger et al. (1960), Society for Range Management (1994) and Viereck et al. (1992).

MATERIALS AND METHODS

Collecting Information: Color infrared aerial photos (1:60,000) and black and white contact prints (1:24,000), were interpreted to evaluate site and soil mapping (Rieger et al., 1960). Photos were interpreted and locations for field sampling were identified. In the field, approximately ten percent of site and soil polygons were checked and updated as needed. Plant species, total annual herbage production, plant height, plant cover, tree diameter (breast height) and age was collected at selected transects. A Garmin 40 Global Position System was used to acquire transect locations.

Plant species annual herbage production and cover was estimated in 0.2 m plots and corrected using clipped samples (NRCS, 1996). Soils and vegetation data were recorded. Herbivore grazing use was estimated based upon the percent of current years plant growth removed. Range similarity indices, (RSI, similar to previously used range condition), and trend (when trend was apparent) was estimated (NRCS, 1996). USGS 1:63,360 quadrangle maps were enlarged to 1:21,120, and used by livestock producers to identify seasonal ranges and physical features in their grazing lease.

Data summary: Herbage production, plant cover and height data were summarized using Microsoft EXCEL 5.0. No statistical analysis was done because of the limited number of herbage production transects. Site descriptions, site and soil maps were up-dated and new site descriptions were developed. Sites were rated for livestock grazing values to enhance GIS interpretative capabilities. Low, moderate and high site values were based upon livestock access, forage supply and preferred forage plant production. Vegetation, hydrology, soils, land status, lease boundary and management data were digitized. Site acreage by seasonal management unit was summarized using GIS Grass 4.12 software.

RESULTS AND DISCUSSION

Grazing Value Rating: Twenty-two sites were identified (Table 1). Annual herbage production, old or new site description status and livestock grazing values are summarized in Table 2. For the purpose of our interpretations, it was decided that differences in cattle and bison grazing was not significant. Following is a summary of low, moderate and high value sites for livestock grazing.

Low value sites include Banks, Beach Transition, Fresh Water, Rock Outcrop, Sea Cliffs and Sitka Spruce Forest. These sites provide none to little livestock forage and grazing use was non-existent to slight. Although these low value sites make up a small percent of the landscape, they comprise important habitats for a number of indigenous flora and fauna. For example, sea cliffs are inaccessible to livestock but provide essential nesting habitat for sea birds.

Moderate value sites are Alder Scrubland, Gravel Beach, Rough Mountainous Land, Sandy Beach, Submerged Saline Aquatic, and Willow Scrubland. These sites produce some livestock forage but have either a physical limitation e.g., steep slopes or periodic forage availability. The Submerged Saline Aquatic site forage is available in the tidal zone only during low tide periods, and Gravel Beach and Sandy Beach provide fresh kelp forage after major storm tides.

Although livestock only periodically use Rough Mountainous Land in summer, the site provides important summer habitat for Sitka black-tailed deer (*Odecoileus hemionus* subsp. sitkensis) and Mountain Goat (*Oreamnos americanus*). Alder Scrubland site, which yields low quantities of livestock forage and restricts livestock access, provides excellent escape and loafing cover for Kodiak Brown bear. High value sites are Beach Dunes and Ridges, Loamy Bottomland, Loamy Slopes, Saline Wet Meadow, Sitka Spruce Woodland, Shallow Loam, Steep Loamy Slopes, Steep Stony Uplands, Upland Meadow, and Wet Meadow. These sites provide most of the winter and summer forage and make up the greatest part of the lease areas. Of these, Beach Dunes and Ridges, Loamy Bottomland, Saline Wet Meadow, low elevation Loamy Slopes and Wet Meadow are the most important winter sites.

Ecological Considerations: In the lease areas, forage resources are abundant and can support increased livestock numbers, particularly if intensively managed. Improved grazing systems are needed to make use of higher elevation sites during the summer season. Grazing systems using these tenet's would enhance range winter feed, reduce hay feeding and feed supplement expenses. Grazing systems should be carefully designed to avoid conflicts with Kodiak Brown Bear and other wildlife species. RSI on low value sites was 95-100%. Upper, middle and most lower elevation moderate and high value sites for the most part are characterized by a RSI of 75-100% except in a few areas, where Wet Meadow RSI was 60-75%. On low elevation Loamy Uplands, a shift from Calamagrostis canadensis to Deschampsia spp. was apparent; the Calamagrostis canadensis production was noticeably reduced. Although livestock were grazing on these sites, densities were low and utilization was less than 40%. In some areas, the previous area of Beach Dunes and Ridges has been seriously reduced to a RSI of 10-20%. The actual extent of loss and cause is unknown, but the loss is thought to be related to lowered beach elevations after the 1964 earthquake, and to year long grazing by livestock. Repeated off-road vehicle (ORV) travel has damaged Wet Meadow and Upland Wet Meadow sites in the northern portion of the survey area. Rutted trails and increased ORV use of the meadows was noted to be serious. Off-road travel has created a significant impact to water quality, wildlife habitat and vegetation. While the fifteen new site descriptions significantly increased project expenses, the effort improved interpretative capabilities for wildlife and other land uses. Further investigations will be needed to further define climax plant communities, successional stages and soil microclimate relationships. Separating sites that exhibit large elevational deviations are needed to fully utilize GIS capabilities and improve ecosystem planning and management.

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Table 1
Ecological sites, elevation and plant Genus/Genera or material found on the site.

Ecological site	Elevation[3] range (ft)	Dominant plant Genus/Genra or material found on site
Alder Scrubland	50 - 1500	*Alnus*
Banks	10 - 500	*Lupinus, Senecio*
Beach Transition	20 - 50	*Honkenya*
Beach Dunes and Ridges	5 - 50	*Elymus, Lathyrus, Lupinus*
Fresh Water	30 - 500	Plankton and algae
Gravel Beach	0 - 10	flotsum, kelp
Loamy Bottomland	20 - 600	*Populus, Salix, Calamagrostis*
Loamy Slopes	50 - 1500	*Calamagrostis, Epilobium*
Rock Outcrop	50 - 2000	*Trisetum, Rhododendron*
Rough Mountainous Land	1000 - 2000	*Calamagrostis, Lupinus*
Sandy Beach	10 - 20	flotsum, kelp
Saline Wet Meadow	0 - 50	*Carex, Caltha*
Sea Cliffs	0 - 500	*Calamagrostis, Lupinus*
Shallow Loam	50 - 2000	*Calamagrostis, Deschampsia*
Sitka Spruce Forest	100 - 600	*Picea, Athyrium, Anitrichia*
Sitka Spruce Woodland	100 - 600	*Picea, Salix ,Alder, Solidago*
Steep Loamy Slopes	50 - 1500	*Calamagrostis, Deschampsia*
Steep Stony Upland	50 - 1500	*Calamagrostis, Thelypteris*
Submerged Saline Aquatic	0 - -5	*Carex, Vaccinium, Deschampsia*
Wet Meadow	20 - 200	*Carex, Juncus, Eriophorum*
Willow Scrubland	100 - 1000	*Salix, Deschampsia*

[3] from sea level.

Table 2
Kodiak Island ecological sites, total annual air-dry herbage production, old/new status and ecological site value for livestock.

Ecological site	Annual air-dry herbage production	Old (O) or new (N) status	Value for livestock
Alder Scrubland	3100	N	M
Banks	800	N	L
Beach Transition	1000	N	L
Beach Dunes and Ridges	3700	O	H
Fresh Water	400	N	L
Gravel Beach	0[4]	N	M
Loamy Bottomland	3125	N	H
Loamy Slopes	3600	O	H
Rock Outcrop	300	N	L
Rough Mountainous Land	1000	O	M
Sandy Beach	0[4]	N	M
Saline Wet Meadow	1700	N	H
Sea Cliffs	200	N	L
Shallow Loam	1500	O	H
Sitka Spruce Forest	100	N	L
Sitka Spruce Woodland	4300	N	H
Steep Loamy Slopes	3545	O	H
Steep Stony Upland	5000	O	H
Submerged Saline Aquatic	500	N	M
Upland Meadow	1000	N	H
Wet Meadow	3000	O	H
Willow Scrubland	4000	N	M

[4]No actual herbage production produced. Tide deposited kelp can account for tons of accumulated material.