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RH: Bison Browse Use - Waggoner and Hinkes

Summer and Fall Browse Utilization by an Alaskan Bison Herd

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Abstract:

The food habits of the Farewell, Alaska, bison (*Bison bison*) herd were studied by collecting fresh fecal samples on summer and fall range. The mean shrub content of the summer samples was 94.2%. The fall shrub component varied, with shrubs making up most of the diet in the areas where grasses and sedges were scarce.

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Food habits of several bison herds have been described or alluded to (Soper 1941, Peden 1976, Reynolds et. al. 1978, Cairns and Telfer 1980, Van Vuren and Bray 1983). Campbell and Hinkes (1983) have described the winter food habits and habitat use of the Farewell, Alaska, bison herd. These authors indicate that free roaming American bison are grazing animals whose mainstay is a wide variety of grasses and sedges. Our study of the Farewell herd indicates shrubs, especially willow (*Salix spp.*) may be important in the diet during summer and fall.

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Study Area and Methods

The Farewell bison herd summers near the headwaters of the South Fork of the Kuskokwim River in the central Alaska Range approximately 250 km northwest of Anchorage, Alaska. They winter near Farewell on the middle reaches of the South Fork and on a nearby area that was burned in 1977 (Campbell and Hinkes 1983). During spring and fall the animals migrate between the 2 areas, a distance of approximately 50 km.

The climate of the study area is typical of interior Alaska with long, cold winters and short, cool summers (Campbell and Hinkes 1983). In summer, bison are found on narrow braided river valleys that range from 800-5,000 m in width and approximately 460-820 m in elevation (R.E. Pegau, pers. commun.). These river floodplains are surrounded by steep, rugged mountains with elevations #2,000 m. The bison winter range is just below these mountain valleys on flat, glacial, outwash plains with interspersed glacial moraines and braided river flood plains (Fernald 1960, Campbell and Hinkes 1983).

On the summer range vegetation varies with distance and elevation from the river floodplains. Within the intermittent floodplain small patches of grasses, sedges, and herbs are scattered on sand and gravel bars. On the active floodplain, streamside vegetation consists of shrubs with willow and alder (*Alnus spp.*) predominating. On the slightly higher and periodically flooded alluvial terraces, soils are gravelly and well drained, and vegetation is comprised of mature, closed white spruce (*Picea glauca*) forest with a thick moss mat on the forest floor. Some paper birch (*Betula papyrifera*) and balsam poplar (*Populus balsamifera*) stands also occur on these elevated sites, and a few shrubs are interspersed widely throughout the timber stands.

The wintering habitat is a mixture of the river floodplains described above, dry glacial lake beds covered with grasses and sedges, shallow lakes with sedges along the margins, and grass and sedge lands resulting from a wildfire that burned a mixture of shrublands, woodlands, and forest in 1977 (Campbell and Hinkes 1983). The wintering area is windblown which keeps normal snow accumulations <50 cm making the existing forage available to bison. The summer range usually is iced over or covered with deep snow during most of the winter. Vegetation along the migration route has components similar to both the summer and winter ranges.

Twelve fresh, bison fecal samples were collected from 1 site in June 1981 on summer range. Sixteen samples were collected from 3 sites on the migration route and winter range in early October 1981. Three of the October samples were collected from gravel and sand bars along the South Fork between the summer and winter ranges; 4 were collected from dry, glacial lake beds on the terrace bordering the middle reaches of the South Fork; and 9 were obtained on the 1977 burn from animals that already had arrived on the winter range. These samples were forwarded to the Composition Analysis Laboratory at Colorado State University where microhistological analyses were performed using the techniques of Hansen and Flinders (1969) and Flinders and Hansen (1972).

Results and Discussion

The summer diet was composed of 94.2% willow, whereas the fall shrub diet was composed of approximately 60% willow and 40% silverberry (*Elaeagnus spp.*)/buffaloberry (*Sheperdia spp.*) (Fig. 1). The grass component included bentgrass (*Agrostis spp.*), reedgrass (*Calamagrostis spp.*), wildrye (*Elymus spp.*), fescue (*Festuca spp.*), and bluegrass (*Poa spp.*)

Bison are restricted to narrow river flood plains due to surrounding topography over much of the route between winter and summer range. The 3 samples collected from this part of the migration route indicate heavy use of shrubs (39.7% willow and 28.2% silverberry and buffaloberry). When grasses and sedges are available on the migration route they are used heavily. The winter diet consists almost entirely of grasses and sedges although shrubs are taken consistently in small quantities (Campbell and Hinkes 1983).

Delta bison of Interior Alaska prematurely strip grasses and forbs from their summer range, and may have contributed to soil erosion along the Delta River (McKendrick 1982). McKendrick (1982) indicated that summer habitat may be a major limiting factor for the Delta herd. We made no quantitative evaluation of the Farewell summer habitat, but no habitat disturbance caused by bison activity was noted during our incidental observations of this range. We believe that summer range is not a limiting factor for Farewell bison.

Another hypothesis to explain the large consumption of browse is that bison summer higher elevations to avoid insects. On this range, only browse is readily available, and it can be digested efficiently in summer and fall before annual growth lignifies. Richmond et al. (1977) tested the comparative digestive capacities of cattle, yak (*Bos grunniens*), and bison on 3 forages of varying quality. Bison were the most indiscriminate and most efficient in digesting all 3 forages which suggests they can utilize a variety of plants efficiently. The closely related European bison (*Bison bonasus*) selects a high proportion of browse in its diet (Borowski et al. 1967). These observations suggest that American bison could efficiently utilize browse when grasses and sedges are unavailable.

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Fig. 1. Percent composition of shrubs, grasses, and sedges in bison diets near Farewell, Alaska, summer and fall 1981. Numbers in parenthesis indicate the range in sample values.

