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Vegetative Characteristics of Pronghorn Bed Sites in Wind Cave National Park, South Dakota

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NOTES

VEGETATIVE CHARACTERISTICS OF PRONGHORN BED SITES IN WIND CAVE NATIONAL PARK, SOUTH DAKOTA -- Much of the previous literature on pronghorn (*Antilocapra americana*) fawns has focused on fawn mortality (Beale 1978, Barrett 1984, Gregg et al. 2001) and social behavior (Kitchen 1974, Autenrieth and Fichter 1975, Bromley 1977). Selection of bed sites by pronghorn fawns is a major factor affecting fawn survival (Bromley 1978, Barrett 1981, O'Gara et al. 1986, VanSchmus 1990) because adequate cover is a crucial component of fawn bed site selection (Autenrieth 1984). Alldredge et al. (1991) reported that fawns selected dense shrub cover but avoided the most-dense cover in sagebrush-steppe communities in southcentral Wyoming while Tucker and Garner (1983) noted that height and density of vegetation provided concealment cover to hiding fawns. Canon and Bryant (1997) also found density and height of vegetation to be factors affecting survival of fawns and suggested that increased grass and forb production provided necessary hiding cover for fawns. Bromley (1978) and Smith and Beale (1980) noted that fawns selected bed sites that offered the greatest opportunity for visual detection of predators rather than concealment The pronghorn was reintroduced into Wind Cave National Park, South Dakota, i 1914 and thus, has been maintained within its boundaries for nearly a centur However, no information is available on fawning habitat within Wind Cav National Park. The objective of our study was to quantify vegetative characteris tics of fawn bed sites throughout Wind Cave National Park.

Wind Cave National Park encompassed an area of 115 km^2, with an averag elevation of 1,257 m and was located in Custer County, South Dakota, in the southeast region of the Black Hills. Wind Cave National Park was enclosed by a 2.5-m woven-wire fence, with cattle (*Bos taurus*) guards present at all road entrances to prevent movement by ungulates out of Wind Cave National Park. Wind Cave National Park was characterized by a mosaic of mixed-grass prairie interspersed with a ponderosa pine (*Pinus ponderosa*) dominated forest. Plant species occurring in the mixed grass prairie within Wind Cave National Park included Kentucky bluegrass (*Poa pratensis*), blue grama (*Bouteloua gracilis*), western wheatgrass (*Pascopyrum smithii*), western snowberry (*Symphoricarpos occidentalis*), common juniper (*Juniperus communis*), and northern bedstraw (*Galium boreale*). Plant nomenclature followed Larson and Johnson (1999) and Johnson and Larson (1999).

We obtained fawn bed site locations at the time fawns were captured and fitted with expansion breakaway radiocollars (Advanced Telemetry Systems, Isanti, Minnesota); Universal Transverse Mercator coordinates were recorded for each

capture (i.e., bed site) location. We obtained subsequent bed site locations by locating radiocollared fawns (n = 26) 2 to 4 times per week from the ground by using hand-held directional antennas (Telonics Telemetry Electronics Consultants, Mesa, Arizona). We defined a bed site as the area immediately surrounding (i.e., within 3 m) the fawn at the time of location. We made all efforts to ensure that bedded fawns were not disturbed.

We used bed sites from initial fawn capture locations and the first subsequent location of individuals following capture to collect microhabitat information throughout Wind Cave National Park. Thus, habitat information was collected at a maximum of two bed site locations for each radiocollared fawn. We measured overstory vegetation height to the nearest cm and estimated abundance of forbs, grasses, and shrubs in 20, 20 x 50 cm plots placed at 20 cm intervals along two perpendicular 6 m transects intersecting at the center of fawn bed sites (Daubenmire 1959). We estimated abundance of forbs, grasses, and shrubs by visual observation and ranked vegetation classes in order of dominance from 1 (most dominant) to 4 (not present). We measured microhabitat characteristics 1 to 10 days after fawns had moved to new bedding locations and between 15 May and 30 June of 2002 and 2003, when cover selection by fawns was most critical (Pyrah 1987). Additionally, we collected microhabitat data at random locations throughout suitable pronghorn fawning habitats (i.e., flat, open areas dominated by grassland habitats) within Wind Cave National Park. We generated random locations by using the Alaskapak extension to Arcview 3.3 software (Environmental Systems Research Institute, Redlands, California). Bed sites of fawns greater than 3 weeks of age were not measured.

We conducted t-tests to test for differences in height of overstory vegetation between bed sites and random locations. We used chi-square analyses to test for differences in dominance of grasses, forbs, and shrubs between bed sites and random sites. We set alpha at 0.05 and used Bonferroni correction factors to maintain experiment-wide error rates when performing multiple t-tests (Neu et al. 1974).

We sampled 15 bed sites from 13 radiocollared fawns and 23 random sites from 13 June to 22 June 2002. We sampled 30 bed sites from 15 radiocollared fawns and 27 random sites from 16 June to 26 June 2003. Bed sites and random sites were located in Red Valley, Rankin Ridge Valley, and Bison Flats regions of Wind Cave National Park. Occurrence of grasses, forbs, and shrubs at all bed sites was greater than or equal to 98.9%, greater than or equal to 54%, and less than or equal to 11.3%, respectively, during our study. Mean height of grass, forbs, and shrubs at all bed sites was 32.7, 41.2, and 48.4 cm, respectively. Fawn bed sites contained more grass ($t = 2.62$, $df = 65$, $P = 0.01$) and less forbs ($t = 2.73$, $df = 65$, $P = 0.008$) than random sites throughout Wind Cave National Park. We detected no significant differences in abundance of shrubs between bed sites and random sites during 2002 ($t = 1.56$, $df = 31$, $P = 0.13$) or 2003 ($t = 1.43$, $df = 65$, $P = 0.16$). We

detected no significant difference ($t \leq 1.43$, $df = 65$, $P \geq 0.13$) in plant dominance between bed sites and random sites for any category during our study.

During our study, grasses were the most dominant plant species that occurred at fawn bed sites. Forbs were frequently present at fawn bed sites but were less dominant than grasses. The greatest number of fawns was observed in the Rankin Ridge Valley during 2002 and in the Red Valley during 2003. Bed sites within these grassland regions were characterized by the tallest vegetative cover for fawns during our study. Our findings were consistent with previous investigations in Alberta (Mitchell and Smoliak 1971, Barrett 1981) and Wind Cave National Park (Bromley 1977), where fawns preferentially selected grasses as bedding cover to satisfy both horizontal and vertical cover components. Barrett (1981) also noted that vegetation greater than 25 cm tall constituted concealment cover from predators. Mean height of vegetation at bed sites was greater ($t = 1.92$, $df = 65$, $P = 0.05$) than vegetation height at random locations during our study, which suggested that vegetation height was a key microhabitat feature at fawn bed sites. Additionally, occurrence of grass at fawn bed sites was greater than or equal to 98.9%, which indicated that adequate fawning habitat was distributed widely throughout Wind Cave National Park. Despite high availability of fawning habitat, survival of fawns was low (Jacques et al. 2007). Thus, quality of fawning habitat was not a primary factor affecting fawn survival.

During our study, Wind Cave National Park likely was characterized by a non-typical coyote (*Canis latrans*) population because of protection from harvest and year round prey (i.e., black-tailed prairie dog [*Cynomys ludovicianus*]) availability. Chronert et al. (2007) documented a 58% reduction in coyote densities following a mange epidemic in Wind Cave National Park during 2003-2004. Consequently, pronghorn population estimates increased from 30 to 40 during our study to 90 to 100 during 2006 (J. M. Chronert, Wind Cave National Park, Hot Springs, South Dakota, personal communication). Thus, we suggest that high coyote densities and their effect on fawn survival limited pronghorn population growth in Wind Cave National Park. We hypothesize that the Wind Cave National Park pronghorn population was held in a predator trap and that reduced coyote densities functioned to release pronghorn, thereby contributing to increased pronghorn population growth.

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