Evaluation of the Use of the Escape Terrain and Buffer Model to Depict Northwestern Nebraska's Bighorn Sheep Habitat

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Abstract: The natural range of bighorn sheep (*Ovis canadensis*) historically extended eastward into parts of North Dakota, South Dakota, and Nebraska. Audubon's bighorn (*O. c. auduboni*) historically occurred in this area, but were extirpated in the early 1900s. In 1981, the Nebraska Game and Parks Commission transplanted six Rocky Mountain bighorn sheep (*O. c. canadensis*) into the Pine Ridge region of Nebraska, an escarpment of the Black Hills of South Dakota, in an effort to reestablish this species to the landscape. Since that time, three additional herds have been established in Nebraska. One additional herd was added to the Pine Ridge, and two herds were established in the Wildcat Hills, which lie approximately 100 km southwest. Nebraska's bighorn sheep population currently is estimated at 300 individuals. Systematic monitoring of these herds through radio-telemetry has led to a wealth of data regarding their population dynamics, herd health, and landscape use. We used Zimmerman's (2008) Escape Terrain and Buffer Model (ETBM), which places a 300m buffer around areas with a slope ≥40°, derived from a Digital Elevation Model (DEM) at 10-meter resolution to define suitable bighorn sheep habitat in Nebraska. Zimmerman's 2008 study found that the ETBM model is a better predictor of low-elevation bighorn sheep habitat use than traditional models, which generally use a lower limit of 27° for its slope cutoff and 30-meter DEMs. Preliminary tests of a subset of Nebraska's bighorn sheep population showed that 305 of 394 locations, or 77.4%, fell within available habitat defined by the ETBM. Additional locations from Nebraska's bighorn sheep population will be used to determine the validity of this model for predicting suitable bighorn sheep habitat.

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