Yale SCHOOL OF THE ENVIRONMENT

Ucross High Plains Stewardship

RESEARCH BRIEF

Landscape Factors that Influence Habitat Selection and Movement for Pronghorn in Southwestern Montana

Jeremy Pustilnik - Master of Environmental Science ‘25

The Need.

Habitat connectivity is essential for wildlife to track shifting resources, respond to disturbance, and maintain resilient populations in the face of environmental change. However, urbanization and other human-mediated land modification projects such as the installation of fences and roads can fragment rangelands and impede the movement of wide-ranging species like pronghorn (*Antilocapra americana*), whose persistence depends on the ability to move freely across large, open landscapes. These linear barriers restrict access to critical resources and historic migratory routes, potentially disrupting seasonal movements, reducing effective habitat, and impairing population performance.

Understanding how land use patterns and barriers interact with wildlife populations in space enables conservation practitioners to prioritize areas for protection, restoration, and mitigation—such as modifying existing infrastructure to be more wildlife-friendly or enhancing movement corridors. By spatially modeling these interacting components, targeted areas for conservation actions can be identified to mitigate human-wildlife conflicts and promote coexistence across increasingly fragmented landscapes.

Photo Credit: Collin Peterson

The Project.

Jeremy worked with the National Wildlife Federation (NWF) in Montana to identify, gather, and create publicly available biologically-relevant landscape-level GIS layers for pronghorn in southwestern Montana, which will be used with pronghorn GPS location data in movement models to help understand habitat use during their migration. These layers included a digital elevation model from the U.S. Geological Survey (USGS), landcover classes from the Montana State Library, sagebrush core habitat and growth areas from the USGS, rangeland vegetation from the University of Montana, and NDVI and snow cover from the NASA MODIS satellite constellation. Using the USGS digital elevation model he was able to derive layers of slope, aspect, and a vector ruggedness measure, which is a multivariate representation of topography that quantifies the variability in both aspect and gradient by measuring the 3D dispersion of normal vectors within a moving window, providing a better depiction of landscape heterogeneity. He also derived distance-to-river and distance-to-road layers from vector river and road layers from the Montana State Library and Montana Fish, Wildlife & Parks, respectively.

The Impact.

With the GIS layer package and another layer on fencing density, NWF biologists and Jeremy are working on using step selection functions to model the movement of a number of radio-collared pronghorn within the geographical area that the layers cover. This work and the insights gleaned from it are planned to be released in a future peer-reviewed scientific journal publication. This exercise in spatial and movement ecology will provide environmental managers and conservation biologists in southwestern Montana with targeted information about areas of ideal pronghorn habitat used during their migration and potential locations where fences may act as barriers that inhibit their movement within and among ideal sites to aid in their conservation. By modeling pronghorn movement corridors, environmental managers can strategically pinpoint where barrier removal projects will have the greatest impact, maximizing conservation outcomes and ensuring efficient use of financial resources.

The Student.

Jeremy Pustilnik – Research Assistant | Jeremy Pustilnik is a Master of Environmental Science candidate at the Yale School of the Environment (YSE) where he works on the movement ecology and territorial dynamics of Argentinian owl monkeys. He received his B.S. in ecology and evolutionary biology from Cornell University where he worked on the predator-prey interactions between foxes and rabbits at groundhog burrows, the movement of stone martens across the Mediterranean, and the population ecology of salamanders. Prior to YSE, Jeremy worked on the tundra of the Arctic Circle with the USGS monitoring goose and shorebird nesting success and in the desert scrub of central Texas on the disease ecology of mice and metacommunity dynamics of soil arthropods. In his free time, he enjoys flipping over rocks and logs to find snakes and bugs, flying his drone for service projects like mapping local parks, and reviewing scientific manuscripts for the journal Urban Naturalist, at which he is an editor. Blog