



# Ecological Restoration Institute



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*Fact Sheet: Summer Habitat Use by Adult Female Mule Deer in a Restoration-treated Ponderosa Pine Forest*

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## Summer Habitat Use by Adult Female Mule Deer in a Restoration-Treated Ponderosa Pine Forest

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### INTRODUCTION

Mule deer (*Odocoileus hemionus*) populations in the Southwest have experienced declines in the past 50 years due to habitat degradation from fire suppression, exotic species invasion, and increased livestock grazing. Habitat requirements of mule deer include an abundance of high-quality herbaceous forage, vegetation cover that provides protection from predators and weather, and access to reliable water sources. Summer forage availability and quality affects doe productivity and lactation, and fawn survival and growth prior to a resource-limited winter; therefore, high-quality summer habitat is essential for maintaining healthy populations.



Restoration treatments that open tree canopies often increase forage abundance and subsequent use by mule deer. *Photo courtesy of the Arizona Game and Fish Department*

In northern Arizona, mule deer summer home ranges commonly include ponderosa pine-dominated vegetation types, including extensive areas where large-scale restoration treatments have been implemented or are currently being planned. Restoration treatments that open tree canopies in ponderosa pine and mixed-conifer forests often increase forage abundance and diversity and subsequent use by mule deer; however, these treatments may also reduce hiding cover and alter the microclimate and physical characteristics of day-bed sites. In this study, we sought to examine the effects of forest restoration on the relative intensity of summer habitat-use patterns of mule deer. Our objectives were to 1) spatially define individual home range and core areas, 2) develop a spatially explicit statistical model of intensity of habitat use, and 3) make recommendations that will help land managers provide essential forage and cover attributes for mule deer

while restoring forest structure and reducing the risk of uncharacteristic, high-intensity wildfire.

### METHODS

We examined a managed herd of mule deer occupying ponderosa pine-dominated areas and that had been recently treated in the Grand Canyon–Parashant National Monument in northern Arizona. Throughout the study area, forest restoration treatments were initiated in 1996. The restoration prescription followed pre-1870 reference conditions for tree species composition and spatial arrangement. Treatments were designed to include thinning, burning, and reseedling with a native herb mix dominated by grasses and all Gambel oak, Utah juniper, and New Mexican locust were retained during thinning treatments. By 2003, >1,110 acres of ponderosa pine forest had received thin and burn treatment and an additional 790 acres were only thinned. An untreated control area of approximately 1,235 acres was present in the southeastern portion of the study area, along with five 25–75-acre controls embedded among treated areas. Within a rigorous statistical modeling framework, we leveraged high temporal and spatial resolution Global Positioning System (GPS) collar data from 10 adult female mule deer from 2003–2005, and determined home range size and deer-habitat associations.

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## RESEARCH FINDINGS

- The estimated home range size ranged from 237–2,693 acres and averaged 909 acres.
- Deer were observed in all treatments across the study area.
- Thin-only areas were not used as intensively as thin and burn areas.
- Gentle slope, thin and burn treatment areas, and ponderosa-pine dominated land cover had positive associations with mule deer summer habitat use on our study area.
- Increased pinyon-juniper land cover and rugged areas had less use by female mule deer.
- We found that mule deer intensively used areas closer to reliable water sources.
- Elevation, northness, and thin-only areas had less important positive associations when compared to other variables.

## MANAGEMENT IMPLICATIONS

- Maintain the surface fire regime to stimulate herbaceous understory vegetation, which is an important dietary component for mule deer in the summer months.
- Since oak stands can be the primary mid-story canopy component in a treated ponderosa pine forest, develop treatment prescriptions that promote the retention of this species.
- Maintain adequate water levels at developed wildlife waters; haul water during periods of low water levels, if necessary.



Prescribed fire stimulates herbaceous understory vegetation, providing an important dietary component for mule deer. *Photo courtesy of the Arizona Game and Fish Department*

### **This Fact Sheet summarizes information from the following publication:**

Horncastle, V.J., R.F. Yarborough, B.G. Dickson, and S.S. Rosenstock. 2013. Summer Habitat Use by Adult Female Mule Deer in a Restoration-Treated Ponderosa Pine Forest. *Wildlife Society Bulletin*. [http://library.eri.nau.edu/gsd/collect/erilibra/index/assoc/D2014001\\_dir/doc.pdf](http://library.eri.nau.edu/gsd/collect/erilibra/index/assoc/D2014001_dir/doc.pdf)

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