

Wildlife Management in Southwestern Piñon-Juniper Woodlands

Jeffery C. Whitney¹

Introduction

Piñon-juniper woodlands in the southwestern United States (Arizona and New Mexico) represent approximately 54,000 square miles, equivalent to roughly 20% of the land base for the two states. Within this broad habitat type, there is a high degree of variability of vegetation in terms of species composition, their relative abundance, percent canopy cover, and typically inverse percentages of associated mixed shrub and herbaceous ground cover. This variation is explained by climate, soil type, elevation, slope, aspect, interspecies competition, and past anthropogenic activities. Another important consideration is the extent of individual stands of piñon-juniper, their arrangement on the landscape, and proximity to other general habitat types (i.e. riparian areas, chaparral, pine, oak woodlands, and/or desert grasslands).

Species Composition

In general terms, piñon-juniper in the Southwest is dominated by two-needle piñon (*Pinus edulis*), singleleaf piñon (*P. monophylla*), oneseed juniper (*Juniperus monosperma*), Utah juniper (*J. oosteosperma*), and alligator juniper (*J. deppeana*).

Understory vegetation is highly variable depending upon geographical location and local environmental conditions. Representative shrubs are generally sagebrush (*Artemisia* spp.), shrub live oak (*Quercus turbinella*), mountain mahogany (*Cercocarpus montana*, *C. betuloides*), and bitter brush (*Purshia* spp.)

Grasses and forbs vary considerably with generally cool season (C₃) grasses in the northern or upper elevation extents, and warm season (C₄) grasses at the southern or lower elevations.

Geographic Distribution

Piñon-juniper woodlands occur in foothills, mesas, and lower mountain slopes below 7,500 ft in elevation. These woodlands often form a transition zone with more homogeneous cover types, e.g., ponderosa pine (*P. ponderosa*) at higher elevations and oak woodlands at lower elevations.

Wildlife Species

Numerous wildlife species frequent piñon-juniper habitats in the western United States. At least 70 species of birds and 48 species of mammals have been associated with these woodlands (Gottfried and others 1995). In general, they

In: Gottfried, Gerald J.; Shaw, John D.; Ford, Paulette L., compilers. 2008. Ecology, management, and restoration of piñon-juniper and ponderosa pine ecosystems: combined proceedings of the 2005 St. George, Utah and 2006 Albuquerque, New Mexico workshops. Proceedings RMRS-P-51. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

¹ Biological Resources Group Leader, U.S. Forest Service, Tonto National Forest, Phoenix AZ.

include most classes including ungulates, large and small mammals, reptiles, avian species, and invertebrates. Although only a few species rely solely on the woodland habitats, many species utilize the wide array of piñon-juniper habitats for food, shelter, or breeding during part of the year.

Habitat Characteristics

There are four basic components that comprise wildlife habitat: space, cover, forage, and water. Obviously, the latter two generally are the limiting factors. Construction of artificial waters and/or silvicultural treatments can often be undertaken with the management objective of enhancing potential or existing habitat. It should also be noted that there are management issues related to endangered species within piñon-juniper habitats due to the expanse and extent.

Ecological Considerations

Much of the ecological considerations related to piñon-juniper woodlands center around, site capability, soil condition, successional status and state and transition model considerations that identify successional affecters. Past and current management activities and site potential are directly affected by site potential. There are considerable opportunities to meet identified desired conditions and habitat improvement.

Watershed Value

Not only do piñon-juniper woodlands provide habitat *in situ*, but these areas also represent substantial components within many watersheds. Woodland character and condition directly affect habitats within local stands but also can impact associated aquatic and terrestrial habitats “downstream” because of rapid runoff and accelerated erosion that affect channel characteristics.

Management Implications

Due to the large land base represented by piñon-juniper:

- Most wildlife species occur within this habitat type, at least seasonally, or as migratory species, pass through them;
- The high degree of variability within piñon-juniper in the Southwest provides an array of conditions and management opportunities;
- At lower successional states (lower densities), piñon-juniper provides high quality habitat; and
- Opportunities exist to generally improve piñon-juniper stand conditions depending upon management goals and objectives.

Mechanical, chemical, and prescribed burning treatments have been applied most frequently to decrease basal area/canopy cover and to increase production of grasses. Direct effects on target and non-target vegetation depend on how a particular method meets stated resource objectives. Indirect effects on non-target vegetation depend, in part, on the previous use of basic resources (i.e., water, soil nutrients, light) by the target vegetation and their availability to other species.

Reference

Gottfried, Gerald J.; Swetnam, Thomas W; Allen, Craig D.; Betancourt, Julio L.; Chung-MacCoubrey. 1995. Chapter 6-Pinyon-juniper woodlands. *In*. Finch, D.M.; Tainter, J.A., tech. eds., Ecology, diversity, and sustainability of the Middle Rio Grande Basin. Gen. Tech. Rep. RM-GTR-268. Fort Collins, CO. U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station: 95-132.