

California Wildlife Habitat Relationships System
California Department of Fish and Game
California Interagency Wildlife Task Group

Pinyon-Juniper

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Vegetation

Structure-- Pinyon-juniper (PJN) habitat typically is an open woodland of low, round crowned, bushy trees (Lanner 1975) that are needle-leaved, evergreen, and depending on site suitability, range from less than 10 m (30 ft) (Küchler 1977) to 15 m (50 ft) (Tueller and Clark 1975) in height. Crowns of individual trees rarely touch and canopy cover generally is less than 50 percent (Larson 1980). These open groves of overstory trees often have a dense to open layer of shrubs reaching heights of 1.5 m (5 ft) (Küchler 1977). Low herbaceous plants may also be present in this habitat (Küchler 1977).

Stand structure varies depending on site quality and elevation. On favorable sites with little disturbance, pinyon-juniper forms dense cover; whereas on drier sites, spacing between trees increases and tree size decreases (Lanner 1975). At low elevations, pinyon-juniper stands are rather open, becoming denser at higher elevations. At maximal elevations, this habitat grades rapidly into adjacent habitats (Zarn 1977).

Composition-- Overstory species composition at lower and mid-level elevations ranges from pure stands of pinyon, either singleleaf or Parry, to stands of pinyon mixed with juniper (western, Utah, or California), oaks (shrub live, California scrub, or canyon live), or Mojave yucca (Bradley and Deacon 1967, Munz 1974, Cheatham and Haller 1975, Küchler 1977, Vasek and Thorne 1977, Larson 1980, Paysen et al. 1980, Parker and Matyas 1981). At higher elevations, ponderosa and Jeffrey pine may be found in this habitat (Parker and Matyas 1981). Shrub-size plants in the subcanopy include small individuals of the overstory species, especially California juniper, as well as big sagebrush, blackbrush, common snakeweed, narrowleaf golden bush, Parry nolina, curlleaf mountain mahogany, antelope bitterbrush, Parry rabbitbrush, chamise, and redshank (Cheatham and Haller 1975, Küchler 1977, Vasek and Thorne 1977, Larson 1980, Parker and Matyas 1981). Grasses and forbs associated with this habitat include western wheatgrass, blue grama, and Indian ricegrass (Larson 1980). Vasek and Thorne (1977) describe in great detail pinyon-juniper vegetation elements found in various locations within California.

Other Classifications-- Other names for pinyon-juniper habitat include Singleleaf Pinyon Series, Singleleaf Pinyon-Utah Juniper Series (Parker and Matyas 1981), Pinyon Pine Series (Paysen, et al. 1980) Juniper-Pinyon Woodlands-28 (Munz and Keck 1970), and Pinyon-Juniper Woodlands-7.2 (Cheatham and Haller 1975). Cheatham and Haller (1975) further divide Pinyon-Juniper Woodlands into Nevadan Pinyon-Juniper

Woodland-7.212, Mojavean Pinyon-Juniper Woodland-7.22, and Baja California Pinyon-Juniper Woodland-7.23.

Habitat Stages

Vegetation Changes-- 1;2-5:S-D. After disturbance or following an invasion, pinyon-juniper habitats slowly proceed through the successional sequence. Initial establishment is by seedling pinyons and junipers. Dispersal of the wingless pinyon seeds may be largely by animals, especially birds. Seeds of the closely related Colorado pinyon generally are dispersed by pinyon jays (Balda and Bateman 1971, Ligon 1978) and Clark's nutcracker (VanderWall and Balda 1977). Some junipers also appear to depend on vertebrates to aid in seed dispersal (Salomonson 1978). Shade is important for the establishment of young pinyons; older trees become shade intolerant (Tueller and Clark 1975). Following establishment, pinyons and junipers proceed through sapling to mature stages. Pinyon-juniper is a climax vegetation type (Larson 1980). As such, most stands become multiple-aged through time. Pinyon-juniper habitats are expanding into savannah, grassland, and shrub steppe areas in the intermountain west (West et al. 1975). Tree densities in pinyon-juniper habitats have increased in the past 100 years at the expense of the formerly more abundant shrub and herbaceous understory (West et al. 1975). These changes in successional patterns probably result from complex interactions between unrestricted livestock grazing (until about 1935), a warmer and wetter climatic period (1880-1940), and control of natural fire (West et al. 1975).

Duration of Stages-- Pinyon pines may well be the slowest growing group of pines. Junipers also are slow growers (Tueller and Clark 1975). As a result, the successional sequence requires a relatively long period. The actual time necessary to proceed through the various successional stages is not known, but probably is quite variable and may well depend on climatic and soil factors. Tueller and Clark (1975) found that seedlings up to 30 cm (12 in) in height with a basal diameter of 1 cm (0.4 in) averaged 7 years of age. Similarly, apparently mature old trees 3 to 6 m (11 to 20 ft) in height with a basal diameter of 15 to 36 cm (6 to 14 in) had a mean age of 102 years (Tueller and Clark 1975). Pinyon longevity may exceed 1000 years (West et al. 1975). However, stands usually range in age from 100 to 225 years (Tueller and Clark 1975).

Biological Setting

Habitat. Pinyon-juniper habitat generally occurs at middle elevations adjoining a number of other wildlife habitats. At lower elevations, pinyon-juniper may interface with habitats such as Joshua tree and desert scrub. At higher elevations, habitats such as eastside pine, perennial grass, and Jeffrey pine border on pinyon-juniper. At similar elevations in more southerly latitudes, sagebrush, mixed chaparral, and chamise-redshank chaparral are found adjacent to pinyon-juniper. In several Mojave Desert locations, pinyons and junipers are found with white fir (Henrickson and Prigge 1975) as mixed conifer.

Wildlife Considerations. Characteristic species of this habitat include pinyon mouse, bushy-tailed woodrat, pinyon jay, plain titmouse, and bushtit. Both pinyon nuts and juniper berries are important food sources and many wildlife species serve as dispersal agents for these plants (Frischknecht 1975). Aldon and Springfield (1973) and West et al. (1973) provide bibliographies which address the biology and management of pinyon-juniper systems.

Physical Setting

Pinyon-juniper habitats generally are found on slopes that are steep, rocky (West et al. 1975), dry, and face east (Parker and Matyas 1981). Soils are mostly residual or recently weathered (Fowells 1965), typically rocky, coarse, porous (Fowells 1965), and well drained (Cheatham and Haller 1975). Pinyon-juniper may exist on deeper valley soils, but tree size and density increase as elevation increases and soil depth decreases (Vasek and Thorne 1977). Characteristic landforms include gently rolling hills to steep mountain slopes, rocky canyons, and narrow ridges (Bradley and Deacon 1967). Climatic conditions include low precipitation and relative humidity, hot summers with high evapotranspiration rates, and clear weather with intense sunlight (Larson 1980). Annual precipitation ranges from 17.5 cm (7 in) (Rowlands et al. 1982, P. G. Rowlands, pers. comm.) to 50 cm (20 in) (Munz 1974). Pinyon and juniper growth conditions are best when precipitation ranges from 30 to 45 cm (12 to 18 in) (West et al. 1975). Winter temperatures are cool, with lowest January temperatures ranging between 13 and 1 C (9 and 30 F) (Rowlands et al. 1982, P. G. Rowlands, pers. comm.). Potential evapotranspiration is from one to four times as great as precipitation (Rowlands et al. 1982, P. G. Rowlands, pers. comm.).

Distribution

Elevation of the pinyon-juniper habitat varies with latitude. This habitat is found from 1980 to 2745 m (6000 to 9000 ft) in the Sierra Nevada, 1220 to 2440 m (4000 to 8000 ft) in the Mojave Desert, and 1070 to 1680 m (3500 to 5500 ft) in the San Jacinto and Santa Rosa Mountains (Cheatham and Haller 1975). Most pinyon-juniper habitats are found east of the Sierra Nevada, although some one-leaved pinyons are found within 30 km (20 mi) of the Pacific Ocean in Santa Barbara County (West et al. 1975 Paysen et al. 1980).

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