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

Montane Hardwood

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Vegetation

Structure-- A typical montane hardwood habitat is composed of a pronounced hardwood tree layer, with an infrequent and poorly developed shrub stratum, and a sparse herbaceous layer. On better sites, individual trees or clumps of trees may be only 3 to 4 m (10 to 13 ft) apart. On poorer sites, spacing increases to 8 to 10 m (26 to 33 ft). Where trees are closely spaced, crowns may close but seldom overlap. Living crowns on mature canyon live oaks occupy about 60 percent of the bole on typical sites and up to 80 percent on poor sites. Tree heights tend to be uniform at most ages in mature stands where hardwoods occur, but subordinate to conifers. Mature oaks on better sites and in canyons range between 17 and 30 m (56 and 98 fl) tall and up to 150 cm (59) in) dbh. On poorer sites, mature trees typically are 10 to 15 m (33 to 49 ft) tall with boles up to 65 cm (26 in) in dbh, with dome-shaped crowns almost as wide as the trees are tall. On rocky summits, canyon live oak is a shrub of small diameter, usually less than 4 m (13 ft) in height. Snags and downed woody material generally are sparse throughout the montane hardwood habitat.

Composition-- In the Coast Range and Klamath Mountains, canyon live oak often forms pure stands on steep canyon slopes and rocky ridge tops. It is replaced at higher elevations by huckleberry oak (Parker and Matyas 1980)(No 1980 Lit Cite only 1979 and 1981.). At higher elevations, it is scattered in the overstory among ponderosa pine, Coulter pine, California white fir, and Jeffrey pine, the latter on serpentine and peridotite outcrops. Middle elevation associates are Douglas-fir, tanoak, Pacific madrone, California-laurel, California black oak, and bristlecone fir. Knobcone pine, foothill pine, Oregon white oak, and coast live oak are abundant at lower elevations. Understory vegetation is mostly scattered woody shrubs (manzanita, mountain-mahogany, poison-oak) and a few forbs.

In the Transverse and Peninsular ranges of southern California, overstory associates at middle and higher elevations are Jeffrey pine, ponderosa pine, sugar pine, incense-cedar, California white fir, bigcone Douglas-fir, California black oak, and Coulter pine. At lower elevations, associates are white alder, coast live oak, bigleaf maple, California-laurel, bigcone Douglas-fir, and occasionally valley oak, foothill pine, and blue oak (Cheatham and Haller 1975, McDonald and Littrell 1976). Understory shrub species are manzanita, poison-oak, coffeeberry, currant, and ceanothus.

In the southern Cascade and Sierra Nevada ranges, steep, rocky south slopes of major river canyons often are clothed extensively by canyon live oak and scattered old-growth Douglas-fir. Elsewhere, higher elevation overstory associates are typical mixed conifer and California black oak; lower elevation associates are foothill pine, knobcone pine, tanoak, Pacific madrone, and scrubby California-laurel. Associated understory vegetation includes Oregon-grape, currant, wood rose, snowberry, manzanita, poison-oak, and a few forbs and grasses.

Other Classifications-- In southwest Oregon, the species is part of the mixed evergreen (Pseudotsuga-sclerophyll) zone and to a lessor extent the conifer forest zone on drier areas (Franklin and Dryness 1969). These classifications are pertinent to California as well. In California, canyon live oak occurs in 12 of the 17 forest communities described by Munz and Keck (1968)(No Munz and Keck 1968 in Hab Lit Cite.), in 8 dominance types in the Sierra Nevada (Myatt 1980), and in 6 ecological provinces (Parker and Matyas 1980). Cheatham and Haller (1975) place canyon live oak in 8 minor subdivisions of 2 habitat types. Canyon live oak is recognized as a forest cover type by the Society of American Foresters and is an associate species in eight other types (Eyre 1980).

Habitat Stages

Vegetation Changes-- 1;2-5:S-D. Initial establishment of canyon live oak is by acorns, most of which do not move far from beneath tree crowns. Wider dissemination of acorns and seeds of associate species is by birds and mammals. After establishment, canyon live oak sprouts vigorously from the root crown. Most hardwood associates also sprout prolifically. Rapid sprout growth enables the hardwoods to capture most of the favorable micro sites, forcing the conifers to invade harsher sites, or those made harsh by hardwood roots below ground and hardwood shade above. Delayed establishment, slow growth, and sparse or clumpy distribution of conifers often results. In most instances, succession is slow. Seldom is canyon live oak a pioneer species, but occasionally it invades and becomes established on alluvial soils (Heady and Zinke 1978). Canyon live oak has loose, dead, flaky bark that catches fire readily and burns intensely (Plumb 1980). Occasional fire often changes a stand of canyon live oak to live oak chaparral, but without fire for sufficient time, trees again develop. Where fire is frequent, this oak becomes scarce or even drops out of the montane hardwood community.

Duration of Stages-- A type more stable than Montane Hard wood is difficult to envision. The large number of species in the type, both conifer and hardwood, allow it to occupy and persist in a wide range of environments. Good soils and poor, steep slopes and slight, frequently disturbed and pristine all are at least adequate habitats for one or more species. Longevity (at least 300 years for some species), and large size help to ensure dominance. Seed and sprout reproductive modes assure both wide spread and stationary reproduction, and consequently several age and size classes usually are present in most areas. Growth of most hardwoods, especially canyon live oak, generally

is slow and depends on depth and rockiness of soil, slope, and possibly length of time for roots to reach groundwater (Myatt 1980)

Biological Setting

Habitat-- At lower elevations, neighboring habitats are Valley foothill Hardwood-conifer (VHC) and, to a lesser extent, Closed cone Pine Cypress (CPC). At low and middle elevations, Mixed Chaparral (MCH) interfaces with Montane Hardwood. Wildlife habitats at middle elevations, often overlapping above and below, are Montane Hardwood-conifer (MHC), Mixed Conifer (MCN), Douglas-fir (DFR) and, to a lesser degree, Pine-juniper (PJN). At higher elevations, Montane Hardwood is neighbor to Eastside Pine (EPN), Jeffrey Pine (JPN), and Montane Chaparral (MCP).

Wildlife Considerations-- Bird and animal species characteristic of the Montane Hardwood habitat include disseminators of acorns (scrub and Steller's jays, acorn woodpecker, and western gray squirrel) plus those that utilize acorns as a major food source wild turkey, mountain quail, band-tailed pigeon, California ground squirrel, dusky-footed woodrat, black bear, and mule deer. Deer also use the foliage of several hardwoods to a moderate extent. Many amphibians and reptiles are found on the forest floor in the Montane Hardwood habitat. Among them are Mount Lyell salamander, ensatina, relictual slender salamander, western fence lizard, and sagebrush lizard. Snakes include rubber boa, ,western rattlesnake, California mountain kingsnake, and sharp tailed snake.

Physical Setting

Canyon live oak and associates are found on a wide range of slopes, especially those that are moderate to steep. Soils are for the most part rocky, alluvial, coarse textured, poorly developed, and well drained. Soil depth classes range from shallow to deep. L Canyon live oak, incense-cedar, and a few other associates are also found on ultrabasic soils. Mean summer temperatures in the Montane Hardwood habitat vary between 20 and 25 C (68 and 77 F) and mean winter temperatures between 3 and 7 C (37 and 45 F). Frost-free days range from 160 to 230 (Thornburgh 1986)(No Thornburgh 1986 in Habitat Lit Cite.). Annual precipitation varies from 2794 mm (110 in) in the northern Coast Range to 914 mm (36 in) in the mountains of southern California.

Distribution

The Montane Hardwood habitat ranges throughout California mostly west of the Cascade-Sierra Nevada crest. East of the crest, it is found in localized areas of Placer, El Dorado, Alpine and San Bernardino Counties. Elevations range from 100 m (300 fl) near the Pacific Ocean to 2745 m (9000 ft) in southern California

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