

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

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## Montane Hardwood-Conifer

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### Vegetation

**Structure--** Montane Hardwood-Conifer (MHC) habitat includes both conifers and hardwoods (Anderson et al. 1976), often as a closed forest. To be considered MHC, at least one-third of the trees must be conifer and at least one-third must be broad-leaved (Anderson et al. 1976). The habitat often occurs in a mosaic-like pattern with small pure stands of conifers interspersed with small stands of broad-leaved trees (Sawyer 1980). This diverse habitat consists of a broad spectrum of mixed, vigorously growing conifer and hardwood species. Typically, conifers to 65 m (200 ft) in height form the upper canopy and broad-leaved trees 10 to 30 m (30 to 100 ft) in height comprise the lower canopy (Proctor et al. 1980, Sawyer 1980). Most of the broad-leaved trees are sclerophyllous evergreen, but winter-deciduous species also occur (Cheatham and Haller 1975).

Relatively little understory occurs under the dense, bilayered canopy of MHC. However, considerable ground and shrub cover can occur in ecotones or following disturbance such as fire or logging. Steeper slopes are normally devoid of litter; however, gentle slopes often contain considerable accumulations of leaf and branch litter (Cheatham and Haller 1975).

**Composition--** Common associates in MHC are ponderosa pine, Douglas-fir, incense-cedar, California black oak, tanoak, Pacific madrone, Oregon white oak, and other localized species. Species composition varies substantially among different geographic areas.

In the north coast, California black oak, Oregon white oak, golden chinquapin, and canyon live oak are commonly found with white fir, Douglas-fir, and ponderosa pine (Parker and Matyas 1981). In the Klamath Mountains and north coast from the Oregon border to Marin County, Oregon white oak, tanoak, Pacific madrone, red alder, Douglas-fir, western red cedar, western hemlock, ponderosa pine, sugar pine, and knobcone pine are common (Küchler 1977, McDonald 1980( Is it a or b Lit Cite), Parker and Matyas 1981). In the northern interior, California black oak, bigleaf maple, Pacific madrone, and tanoak are common with ponderosa pine, white fir, incense-cedar, Douglas-fir, and sugar pine forming the overstory. In the northern Sierra Nevada, common associates include California black oak, bigleaf maple, white alder, dogwood, Douglas-fir, incense-cedar and ponderosa pine. In the southern Sierra Nevada, common associates include California black oak, black cottonwood, canyon live oak, Jeffrey pine, Douglas-fir, ponderosa pine,

sugar pine, incense-cedar, and localized areas of giant sequoia (Küchler 1977, Parker and Matyas 1981). In the central coast, common associates include coast live oak, big leaf maple, Pacific madrone, tanoak, canyon live oak, Coulter pine, coastal redwood and, to a lesser extent, California black oak and ponderosa pine. In the northern central coast, Douglas-fir is found; while in the southern areas, bigcone Douglas-fir occurs. In the Tehachapi, transverse and peninsular ranges of Southern California, common associates include canyon live oak, Pacific madrone, coast live oak and, to a lesser extent, California black oak, ponderosa pine, sugar pine, and incense-cedar (Thorne 1976, Küchler 1977, Parker and Matyas 1981).

**Other Classifications--** Montane Hardwood-Conifer is very diverse and has been given a variety of names in the literature including: Mixed Evergreen Forest (Munz and Keck 1973); Mixed Evergreen Zone - Second Growth Forest (Broadleaf 1.1.1H) (Mixed 1.2.31) (Proctor et al. 1980); Mixed Evergreen Forest with Chinquapin, Mixed Hardwood Forest, Mixed Hardwood and Redwood Forest, Oregon Oak Forest, Coulter Pine Forest (Küchler 1977); Mixed Evergreen Forest, Coast Range Mixed Conifer Forest, Santa Lucia Fir Forest, Coast Range Ponderosa Pine Forest, Coulter Pine Forest (Cheatham and Haller 1975); Santa Lucia Fir Series, Bigcone Douglas-fir Series, Madrone Series and Black Oak Series (Paysen 1980)(No Paysen 1980 Lit Cite. There is a Paysen et al. Cite.); Oregon White Oak (Stein 1980); California Black Oak (McDonald 1980); Douglas-fir-Tanoak-Pacific Madrone (Sawyer, 1980); Black Oak Series, Maple-Alder-Dogwood Series, Mixed Conifer-Pine Series, Madrone-Tanoak Series (Parker and Matyas 1981).

## Habitat Stages

**Vegetation Changes--** 1;2-5:S-D;6. This habitat is climax in most cases; however, it can occur as a seral stage of mixed conifer forests. Vegetation response following disturbance, such as fire or logging, begins with a dense shrubby stage dominated by taller broad-leaved species. The stand gradually increases in height, simultaneously developing into two canopy strata with faster growing conifers above and broad-leaved species below. On mesic sites the conifer component overtakes the hardwood component more rapidly than on xeric sites, where the hardwood component is dominant longer (McDonald 1980).

**Duration of Stages--** Secondary succession following disturbance is vigorous, with shrubs and trees regenerating together. The conifer component develops into relatively large, mature trees within 30 to 50 years. The broad-leaved component normally requires 60-90 years. Eventually the conifer component overtakes the broad-leaved component. Successional sequence and timing varies geographically and differs depending on species and environmental factors such as climate, water, and soil.

## Biological Setting

**Habitat--** Geographically and biologically, Montane Hardwood-Conifer is transitional between dense coniferous forests and montane hardwood, mixed chaparral, or open woodlands and savannahs. MHC merges with many other habitats at its upper and lower ecotones. These habitats include Valley-Foothill Hardwood (VFH), Valley-Foothill Hardwood-Conifer (VHC), Valley-Foothill Riparian (VRI), Closed-Cone Pine-Cypress (CPC), Montane Hardwood (MHW), Mixed Conifer (MCN), Douglas-fir (DFR), Redwood (RDW), Montane Riparian (MRI), Montane Chaparral (MCP), and Mixed Chaparral (MCH). The habitat is an area of vegetational and floristic diversity with large numbers of endemic species (Proctor et al. 1980).

**Wildlife Considerations--** Montane Hardwood-Conifer provides habitat for a variety of wildlife species. Mature forests are valuable to cavity nesting birds. Moreover, mast crops are an important food source for many birds as well as mammals. Canopy cover and understory vegetation are variable which makes the habitat suitable for numerous species. In mesic areas, many amphibians are found in the detrital layer. Due to geographic variation in components of Montane Hardwood-Conifer, caution must be exercised when predicting wildlife species use.

## Physical Setting

Montane Hardwood-Conifer generally occurs on coarse, well drained mesic soils, in mountainous terrain with narrow valleys. Slopes average approximately 57 percent with all aspects encountered. Winters are cool and wet; summers are hot and dry. Northern California Montane Hardwood-Conifer sites have less rainfall and fog than Redwood (RDW) or Mixed Conifer (MCN) habitats. In southern California, this habitat is found at higher elevations, and in moist canyons. Average rainfall is 60 to 170 mm (25 to 65 in), with some fog. The growing season is 7 to 11 months, with 200 to 300 frost-free days. Mean summer maximum temperatures are 25 to 36 C (75 to 95 F). Mean winter minima are 2 to 4 C (29 to 30 F) (Munz and Keck 1970)(No Munz and Keck 1970 Lit Cite).

## Distribution

Montane Hardwood-Conifer occurs throughout California and is somewhat continuous from Santa Cruz County northward through outer coast range into Oregon, usually some distance inland m the coast (Cheatham and Haller 1975). The habitat typically lows the upper and/or inland margins of the coastal redwood RDW) or Douglas fir (DFR) habitats. It can also be found on north facing slopes of the inner north coast ranges, the Santa Lucia Mountains, as well as small patches extending to Santa Barbara County (Cheatham and Haller 1975). Montane Hardwood-Conifer also occurs somewhat continuously down the Sierra Nevada to the transverse ranges. Elevations range from 300 to 10 m (1000 to 4000 ft) in the north to 605 to 1760 m (2000 to 00 ft) in the south. Isolated patches of MHC can be found throughout the transverse and peninsular ranges of southern California.

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