

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

Bitterbrush

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Vegetation

Structure-- Bitterbrush stands range from small, widely spaced shrubs to large, closely spaced shrubs with more than 90 percent canopy cover (Nord 1965). Stands usually contain 750 to 3000 plants per hectare (300 to 1200 per acre). Two species occur, which differ in stature and stand structure. Antelope bitterbrush is slightly larger and generally grows in more mesic sites than desert bitterbrush. Stands of antelope bitterbrush tend to be dense. Antelope bitterbrush is typically 1 to 2.5 m (3 to 8.5 ft) tall and 2 to 4 m (6.5 to 13 ft) in diameter. Plants can take on an arborescent form and become very tall in good sites and without significant browsing in the early years of growth. Hormay (1943b) reports plants to 4.8 m (16 ft) in height. On exposed ridges at high elevations or with very heavy browsing, the shrubs may be held to 0.5 m (1.5 ft) in height. Shrubs moderately browsed since they were young tend to become globular and tightly hedged, which protects them from overuse. Unbrowsed or lightly browsed plants tend to remain open-crowned and are susceptible to damaging overbrowsing and early death.

Composition-- Bitterbrush is only occasionally found in pure stands. Antelope bitterbrush often occurs as a codominant with big sagebrush or rubber rabbitbrush. It is also found with gray horsebrush, Douglas rabbitbrush, Mormon tea, curlleaf mountain mahogany, and desert peach. Overstory species found in Bitterbrush habitats are ponderosa or Jeffrey pine, lodgepole pine, or western juniper. Understory herbaceous plants vary greatly in composition and density; examples include Idaho fescue, bottlebrush squirreltail, needlegrass, bluebunch wheatgrass, eriogonum, and phlox. The total understory usually makes up less than 10 percent cover. Desert bitterbrush is found mixed with big sagebrush, fourwing saltbush, creosotebush, rubber rabbitbrush, Mormon tea, spiny hopsage, and, on the north end of its range, antelope bitterbrush. Overstory species commonly found with desert bitterbrush are Utah juniper, singleleaf pinyon, Joshua tree, and, at higher elevations, Jeffrey pine. Some of the common understory species are Thurber needlegrass, eriogonum, common snakeweed, and big galleta. These usually total less than 5 percent ground cover.

Other Classifications-- Bitterbrush habitats of both types are included in Cheatham and Haller's (1975) Sagebrush Scrub (3.31). Antelope bitterbrush is also found in their Eastside Ponderosa Pine Forests (8.422), and desert bitterbrush is included in their Blackbrush Scrub (3.32), and Shadscale Shrub (3.33). Küchler's (1977) Sagebrush Steppe includes both species, his Northern Jeffrey Pine, Yellow Pine-Shrub Forest, Upper

Montane-Subalpine Forests, and Juniper-Shrub Savanna include Bitterbrush habitats dominated by antelope bitterbrush. Desert bitterbrush is found in his Southern Jeffrey Pine, Juniper-Pinyon Woodland, Joshua Tree Scrub, Blackbrush Scrub, and parts of the Mohave Creosote Bush types. Barbour and Major (1977) list "Pinyon-Juniper Woodlands, Sagebrush Steppe, Mountain Brush, Juniper Savanna, and Juniper-Shrub Savanna types that include both antelope and desert bitterbrush habitats. In addition, their Northern Juniper Woodland includes antelope bitterbrush habitat and the Joshua Tree Scrub and Mohave Creosote Bush types include desert bitterbrush habitats.

Habitat Stages

Vegetation Changes--1,2,4.S-D. Bitterbrush reproduces sexually by seeds, vegetatively by stem layering, and by sprouting after fire or mechanical damage. According to Nord (1965), sprouting by antelope bitterbrush is rare in California. However, prescription burning of antelope bitterbrush stands in Plumas County in the spring induced substantial sprouting (Tom Ratcliff, pers. comm., 1984). However, some dieback occurred among sprouts from decadent plants and plants that burned very hot. Some stands of desert bitterbrush have been repeatedly renewed by fire, as it sprouts more readily than antelope bitterbrush.

Bitterbrush may occur in any of structural classes 1;2-4:S-D. It may pioneer on some sites given a seed source, especially on harsh coarse granite, pumice, or highly eroded soils. It provides organic matter and protection for a site, thereby producing conditions for establishment of other species that may eventually dominate a stand (Nord 1965). Many stands of antelope bitterbrush are even-aged because they resulted from disturbance by fire or destructive grazing, which reduced competition when seed was available (Leopold 1950, Longhurst et al. 1952, Neal 1981). Following disturbance, bitterbrush may reestablish itself on a site and exist as a nearly pure stand or as a component of a mixed shrub type (Martin 1983).

Seeds of antelope bitterbrush are often infested with insects, rendering them infertile (Ferguson et al. 1963). Late spring freezes frequently kill seeds, and rodents consume a large portion of the seed crop. Seedlings emerging from rodent caches, often including hundreds of seeds, frequently die from intraspecific competition. Rodents and other animals, including insects, may damage or consume the seedlings in the cotyledon stage. Cold spring weather following snowmelt often causes frost heaving, which lifts the young plants from the soil and kills them. Seedlings also have difficulty competing with grasses; many succumb to a lack of moisture the first summer (Hubbard 1956, Sanderson 1962). With all these common hazards, years in which many seedlings become established are rare in California. Desert bitterbrush usually reproduces by sprouting, thereby avoiding many of these hazards.

Duration of Stages-- Several bitterbrush stands over 125 years old have been found on deep, well-drained soils (Nord 1965). Giunta et al. (1978) reported a plant 162 year old. However, stands often become decadent at 30 years of age and die at 40 to 50 years.

Stands tend to result from a single event, either a catastrophic disturbance or a rare year when many seedling survive all the hazards listed above. This tends to produce even aged stands in which all plants become decadent and die without replacement over a short period.

Biological Setting

Habitat-- Bitterbrush habitats occur together with a variety of wildlife habitats. At higher elevations both species mix with Ponderosa Pine (PPN) and Jeffrey Pine (JPN). At lower elevations antelope bitterbrush mixes with Sagebrush (SGB) and Pinyon-Juniper (PJN). Desert bitterbrush occurs with Pinyon-Juniper (PJN), Juniper (JUN), Joshua Tree (JST), and adjoins Desert Scrub (DSC).

Wildlife Considerations-- Bitterbrush is highly digestible and contains desirable levels of moisture, calcium, phosphorus, and fat (Hickman 1975). It tolerates considerable browsing. Its leaves and twigs are favored by mule deer, pronghorn, cattle, sheep, and horses. Dietz (1965) listed the minimum level of crude protein required in mule deer diets as 6 to 7 percent. Antelope bitterbrush exceeds that level, even in winter when it is especially important in the deer diet. It exceeds 17 percent crude protein during the period of rapid growth in early June. Many species of birds, rodents, and insects use seeds. Birds also eat the loopers and tent caterpillars that feed on the vegetative parts of bitterbrush. Some of the more characteristic wildlife species found in Bitterbrush habitat include the western fence lizard, gray flycatcher, Brewer's blackbird, green-tailed towhee, jackrabbits, least chipmunk, Belding's ground squirrel, kangaroo rats, and badger.

Physical Setting

Bitterbrush is found on flats and slopes with deep, well-drained, rapidly permeable soils having a slightly acid reaction (ph 6.0 to 7.0). Precipitation in bitterbrush types varies from about 30 to 90 cm (12 to 35 in) and is mostly snow in the winter. Desert bitterbrush sites receive about 25 cm (10 in) or less and snow is important only at the northern end of the range and at higher elevations. For antelope bitterbrush the summers are warm and the winters very cold. For desert bitterbrush the summers are hot and the winters somewhat milder. Basins and lowlands that have restricted drainage or alkali give way to low sagebrush, silver sagebrush or one of the more moisture tolerant species.

Distribution

Elevation of bitterbrush varies with latitude, exposure, soil, and precipitation. Antelope bitterbrush ranges from about 1050 to 3350 m (3500-11,000 ft) east of the Cascade and Sierra Nevada crest from the north border of the state, south to Inyo County. It extends west of the crest in the Transverse ranges of Shasta and Siskiyou counties. Desert bitterbrush is found from 900 to 3200 m (3000-10,500 ft) elevation, from Inyo and

Mono counties on the north, where it mixes with antelope bitterbrush, south along the mountains bordering the west side of the Colorado desert. It extends west into western Kern County, and in isolated canyons and mountain slopes, south to the Mexican border.

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