*Stands of mixed conifers are common in the North Sierra Nevada/Cascade bioregion. In this "thinned" stand a well developed understory is present which deer use as a forage and escape cover. Unfortunately, many of these mixed conifer stands are overgrown by conifers, offering little or no understory vegetation for deer and other wildlife.*

*Photo by Tom Kucera*

## C. North Sierra Nevada/Cascade

### 1. Deer Habitats and Ecology

Mule deer in the North Sierra Nevada/Cascade bioregion are mostly migratory. They spend summers at higher elevations in conifer forests with montane shrubs such as deerbrush and mountain whitethorn and with riparian areas with willows, aspens, and cottonwoods. Oaks, especially black oak, and the acorns, leaves, and mistletoe they produce are important in the fall. Acorns provide an abundant source of nutrition during the period when much of the vegetation is dry and of low quality.

Winter ranges are on both sides of the mountains. On the east side, Great Basin shrub habitats are the most important winter ranges. These are dominated by bitterbrush, big sagebrush, and mountain mahogany; juniper woodlands and even cheatgrass-dominated areas with trace amount of shrubs also are occasionally used. Many deer in this region cross the state line and winter in Nevada, and management authority for them is shared with the NDOW. West-side winter ranges

*At higher elevations Jeffery pine habitat is a common summer range component of the North Sierra Nevada/Cascade bioregion. Note the understory of mountain whitethorn and manzanita. The mountain whitethorn is excellent deer forage that can be rejuvenated through fire or mechanical means.*

*Photo by Joe McBride*

extend from the black oak woodland belt down to the woodland-grass areas below 2,000 feet. Again, acorns are highly favored food when they are present.

### 2. Limiting or Important Habitat Factors

The absence of disturbance on summer ranges, caused especially by long-term fire suppression policies, has allowed the growth of dense, closed canopy forest that provides poor quality deer habitat. Heavy livestock use has degraded many riparian areas, removing forage and fawning and thermal cover for deer. Human developments have negatively affected some winter ranges.

### 3. Major Land Practices

In the North Sierra Nevada/Cascade bioregion, timber production and livestock grazing are the most important land management practices affecting deer habitats. The most important landowner is the USFS, although much of the lower elevation is private (Figure 5 on page 30). Most timber harvest occurs on deer summer ranges in the form of selective logging and salvage. Fire is actively suppressed. Fuels reduction and biomass harvest from densely stocked conifer forests, in which small-diameter stems are removed from the forest stand, are also common practices. On the winter range, the major land management activity is livestock grazing.

### 4. Habitat Improvement Practices

The absence of large-scale disturbance has resulted in the diminished quality of deer summer habitat in the bioregion. As in other Northern California bioregions, what is needed is to produce early successional vegetation, namely shrubs and herbs, and then not hurry it along into later successional types such as closed canopy forest with a poorly developed understory. More patch cuts, which open the tree canopy, will favor deer as well as not suppressing shrubs after trees are harvested. On moist areas of summer range that have been degraded by livestock, fencing of riparian habitat and planting willows, if subsequently protected from grazing, can be effective.

On summer ranges, controlled burns should be encouraged. Reforestation following catastrophic wildfire should accommodate the development of understory shrubs, important components of habitat for deer and other wildlife. Broadscale application of herbicides to suppress the understory should be discouraged. Fuels reduction and biomass thinning have the potential to open the canopy and favor growth of the understory; however, such

benefits are yet to be documented in practice. Mechanical removal of vegetation does not provide the same factors, such as heat and mineral input, that fire does, and by stimulating tree growth, it may suppress the understory.

On the winter range, the major land management activity is livestock grazing. Appropriate livestock control is important here, so that some of the annual production of forage is available for deer and does not go entirely to livestock. Fires that kill bitterbrush and sagebrush and allow the spread of cheatgrass should be suppressed; firebreaks around critical shrub habitats may be appropriate. Planting bitterbrush following fire on east-side ranges can rehabilitate deer habitat. Seed used should be from a local source, and young plants must be protected from browsing by wildlife and livestock for several years.

Degraded riparian areas and oak woodlands can be improved by planting riparian vegetation such as willows and oak seedlings and acorns.

*Biomass harvesting in overgrown conifer stands can significantly improve deer habitat by opening up the stand and encouraging the establishment of a well developed understory. However, this does not always occur if the stand is not opened up enough to allow sunlight to reach the forest floor, thus allowing the establishment of shrubs. When this occurs, little deer habitat improvement is achieved.*

*Photo by Tom Kucera*

## D. South Sierra Nevada

### 1. Deer Habitats and Ecology

Mule deer in the South Sierra Nevada bioregion are mostly migratory, spending summers at higher elevations and winters lower on both sides of the range. West-side winter ranges are between about 1,500 and 4,000 feet of elevation in areas of wedgeleaf ceanothus (buckbrush), manzanita, mountain mahogany, redberry and canyon and interior live oak. At the higher portions of the winter range are stands of yellow pine and black oak; at the lower elevations are blue oaks and grassland. Important forage species are wedgeleaf ceanothus, mountain mahogany, bear clover in some locations, as well as numerous other shrubs. Seasonally, forbs such as clover, filaree and numerous other herbaceous forage plants and annual grasses become important after fall rains initiate plant growth. Acorns from all oak species are especially important. East-side winter ranges are mostly Great Basin Desert shrub communities with bitterbrush and sagebrush, and also pinyon pine and mountain mahogany.

Opposite Page: *Typical summer range found in the South Sierra Nevada bioregion.*
*Photo by Tom Kucera*

Summer ranges in the South Sierra Nevada are from about 5,500 to 10,000 feet elevation and higher, although most habitat occurs between 5,500 and 8,500 feet, and most of this is on the west slope. It is here where the greatest abundance of cover, food, and water occur. Preferred forage on summer ranges includes mountain whitethorn, bittercherry, and willow, as well as a variety of herbaceous species. Meadows, streams, and seeps are important habitat components, especially for pregnant or lactating does.

Migration routes to and from seasonal ranges frequently contain holding areas, where deer delay migration from a few days to a month or more. Areas with herbaceous forage at the base of slopes seem to be used as spring holding areas. In the fall, areas at the top of slopes with oaks and other browse are used.

## 2. Limiting or Important Habitat Factors

Fire suppression throughout the range has resulted in the absence of the earlier successional stages that are favorable for deer. Fire is the most important factor in restoring young mountain whitethorn and other favored browse species. Heavy grazing by livestock in meadows and aspen stands on summer ranges removes forage and cover necessary for fawning habitat. Urban development in the foothills is removing some winter range and mandating continued fire suppression policies. In places where wildfires have occurred, post-fire treatments with herbicides and conifer planting diminish habitat value for deer.

## 3. Major Land Practices

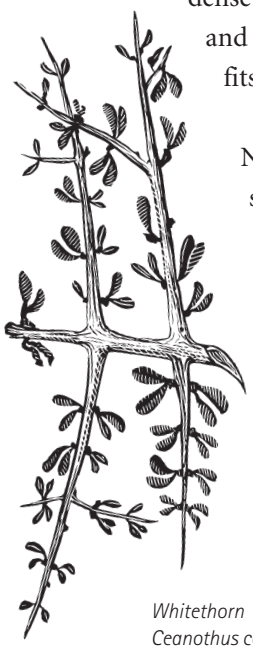
On the summer range, timber harvest and livestock grazing are the most important land-management practices. On the winter range, livestock use is widespread, but urbanization and recreational development is an increasingly important factor affecting deer habitat. The most important landowner is the USFS, although much of the lower elevation is private (Figure 5 on page 30).

## 4. Habitat Improvement Practices

The absence of large-scale disturbance has resulted in the diminished quality of summer habitat for deer in the region. As in several other California bioregions, what is needed is to produce early successional vegetation, namely shrubs and herbs, and then not hurry it along into later successional types such as closed canopy forest with a poorly developed understory. More patch cuts, which open the tree canopy, will favor deer, as will not suppressing shrubs after trees are harvested. Oaks should be retained wherever present. On moist areas of summer range that have been degraded by livestock, fencing of riparian habitat and planting willows, if subsequently protected from grazing, can be effective. Wedgeleaf ceanothus and redberry also can be planted to enhance deer habitat value.

Controlled burns should be encouraged on summer ranges, and reforestation following catastrophic wildfire should accommodate the development of understory shrubs, important components of habitat for deer and other wildlife. Written comments to USFS officials regarding post-fire management are very important. Broad-scale application of herbicides to suppress the growth of the understory should be discouraged. Fuels reduction by thinning dense forest stands has the potential to open the canopy and favor growth of the understory; however, such benefits are yet to be documented in practice.

On winter ranges on both sides of the South Sierra Nevada, the major land management activity is livestock grazing. Appropriate livestock control is important here, so that some of the annual production of forage is available for deer and does not go



*Whitethorn*
*Ceanothus cordulatus*

entirely to livestock. Livestock allotment planning (e.g., timing of grazing and performance standards) on the public lands is a key consideration. On the east side of the Sierra Nevada, fires that kill bitterbrush and sagebrush and allow the spread of cheatgrass should be suppressed; firebreaks around critical shrub habitats may be appropriate. Planting bitterbrush following fire on east-side ranges can rehabilitate deer habitat. Seed used should be from a local source, and young plants must be protected from browsing by wildlife and livestock for several years.

On the west-side winter ranges, an aggressive program of controlled burning of shrubs should be encouraged. Degraded riparian areas and oak woodlands can be improved by planting riparian vegetation such as willows and oak seedlings and acorns. Seasonal road closures in key deer wintering areas has also been recommended as an important measure to protect deer at this critical time of the year.

## E. Central Coast

### 1. Deer Habitats and Ecology

Chaparral and oak woodlands comprise the most habitat for deer in the Central Coast bioregion. On steep or harsh sites, chaparral can be dominated by a single species, chamise. On sites with deeper soils, chaparral includes a variety of other species including buckbrush, hollyleaf cherry, redberry, manzanita, and scrub oak. Oak woodlands contain a variety of oak species, including blue and valley oak, and several types of live oak. Understory vegetation in the oak woodlands is mainly annual grasses and forbs, such as wild oats and filaree. Riparian areas along streams, with willows and wild rose, are particularly important components of deer habitat both in chaparral and oak woodlands.

Mule deer in the Central Coast bioregion are not migratory. They spend the entire year on home ranges of a square mile or less. However, they may shift activities within their particular home range seasonally to take advantage of preferred conditions. For example, they may use south-facing slopes more in winter and north-facing slopes in summer, or spend more time in riparian

Opposite Page: *Blue oak-pine habitat common to the Central Coast bioregion. Both blue oak and live oak provide excellent deer forage in the form of acorns, leaves, and mistletoe.*

*Photo by Jared Verner*

vegetation during fawning in spring or seeking succulent forage in late summer. When acorns are available, deer will spend more time foraging in oak woodlands. Areas offering edges between grassland, oak woodlands and chaparral usually support higher deer densities.

The period of greatest nutritional stress for mule deer in the Central Coast bioregion is the late summer and early fall. Adult does experience the demands of lactation and fawns are weaned at that time; most vegetation is dry and of poor quality. If available at this time, riparian vegetation is especially important. These poor nutritional conditions are reversed only with the availability of acorns in the fall, or with the onset of rains that initiate production of grasses and forbs.

## 2. Limiting or Important Habitat Factors

Fire is an essential component of chaparral; many chaparral plants sprout vigorously after a fire, and the seeds of some species will germinate only after a fire. Historically, low intensity fires frequently occurred in this bioregion. In the past 40 years or so, with the emphasis on fire suppression, fires have been more intense and of larger scale. Low-intensity, frequent fires tend to produce a mosaic of forage and cover that is favorable for deer; large, intense fires tend to produce a deficiency of cover for several years, followed by several years of abundant forage. In all cases, after about ten years, chaparral shrubs have matured and habitat capacity for deer is reduced. Thus, programs of frequent controlled burns in chaparral habitats will produce high-quality habitat for deer, if conducted at a sufficiently large scale. Contact local CDF and CDFG personnel to find out how you can support plans to burn chaparral.

Riparian areas, which provide water, succulent forage, and thermal and fawning cover, are important components of deer habitat. If degraded, they may need to be protected from livestock for several years until they recover. In some of the drier areas, the water provided by seeps, springs, and guzzlers is essential for local deer.

### 3. Major Land Practices

Much land in the Central Coast bioregion is privately owned, with some USFS land (Figure 5 on page 30). The dominant activity in oak woodlands historically has been livestock grazing, and this remains true in many areas. Removal of oaks, both for range type-conversions and fuelwood, has been recognized as a threat to habitat quality for deer and many other wildlife species. Intensive agricultural development, including dryland farming, row crops, and extensive vineyards surrounded by deer-proof fences, has removed deer habitat. Finally, residential development has locally important effects on deer habitat in the Central Coast, causing direct habitat loss and increasing the need for fire suppression.

### 4. Habitat Improvement Practices

Probably the single most valuable habitat improvement practice for deer in the Central Coast bioregion is burning. In chaparral habitats, an aggressive program of controlled burning should be encouraged. Contact local CDFG and CDF personnel to find out how you can support such programs. Mechanical treatments of chaparral such as crushing also can stimulate new growth.

Fencing may be necessary to prevent access by deer and livestock to riparian areas so that willows and other vegetation can regenerate. As described previously, a curtain fence has been shown to be effective; see the previous section on the North Coast for more information on this type of fence.

Degraded riparian areas and oak woodlands can be improved by planting riparian vegetation such as willows and oak seedlings and acorns (See the previous section on Planting on page 50).

*Chamise*
*Andenostema fasciculatum*

*Typical chaparral habitats with tree-dominated ravines in the South Coast bioregion–Santa Margarita River, California.*

*Photo by Mark Hoshovsky*

## F. South Coast

### 1. Deer Habitats and Ecology

Most mule deer in the South Coast bioregion do not migrate, but are year-round residents. However, some deer inhabit higher mountain ranges. Riparian habitats, oak woodlands, coastal scrub, and meadows without an overabundance of cattle are important for mule deer. Principle browse species are hollyleaf cherry, mountain mahogany, chamise, and several species of oak. Herbaceous forage plants include annual grasses and various types of lotus and lupines. Oaks not only provide browse, but are especially important for their acorns, which supply valuable nutrition in the fall when most other vegetation is dry and of low quality.

### 2. Limiting or Important Habitat Factors

Loss of habitat to an increasing human population, largely due to urban

development, and decrease in habitat quality by fire suppression are the major factors adversely affecting habitat for mule deer in the South Coast bioregion.

### 3. Major Land Practices

Much of the land in the South Coast is privately owned, or managed by USFS (Figure 5 on page 30). Livestock grazing is the predominant management activity on non-urbanized areas. Human recreational activities, especially in riparian areas, has been shown to have a negative affect on deer and their habitats.

### 4. Habitat Improvement Practices

Burning chaparral at an appropriate scale is one of the most important habitat improvement practices in the South Coast bioregion. Degraded riparian areas and oak woodlands can be improved by planting riparian vegetation such as willow and oak seedlings and acorns. Limiting recreational use by humans where appropriate can improve conditions for deer.

*Live Oak*
*Quercus wislizenii*

*Great Basin habitats, such as this meadow, are common on the east slope of the Sierra Nevada. Overgrazing by livestock on some winter ranges have negatively affected deer populations.*

*Photo by Eric Loft*

## G. Inyo/Desert

### 1. Deer Habitats and Ecology

Mule deer in the Inyo/Desert bioregion use a variety of habitats, including pinyon-juniper woodlands, mountain mahogany, desert scrub, and, where they occur, riparian areas, aspens, and meadows. In the higher ranges such as the White Mountains, deer are migratory, descending to lower elevation desert scrub habitats in late winter to take advantage of spring "green-up". In much of the year, they are restricted to areas within two miles of water.

### 2. Limiting or Important Habitat Factors

The availability of free-standing water is important for deer in this bioregion, particularly during summer and fall. Riparian areas associated with springs and the occasional perennial stream are often heavily impacted by livestock and feral donkeys. Roads associated with stream courses in canyon

bottoms also can degrade riparian habitat, removing forage and cover needed by deer and a variety of other wildlife.

### 3. Major Land Practices

Much of the Inyo/Desert bioregion is managed by the National Park Service (Figure 5 on page 30). Outside these national park lands, mining and livestock grazing are major land uses, especially on lands managed by BLM. Mining often removes habitat and results in greater access for humans. Grazing and its impacts to water and riparian vegetation can result from both cattle, and feral burros.

### 4. Habitat Improvement Practices

One of the most useful things that can be done is to assist the agencies that manage grazing is to monitor the livestock allotments and document abuses. Grazing allotments are supposed to be monitored, but agencies rarely have the personnel to do it. Obtain a copy of the Allotment Management Plan for the area that you are particularly concerned about and determine the "on and off" dates for cattle, and the number of cattle that are permitted. Visit the area to document use not in compliance with the plan. Count and photograph the cattle; take photographs of overgrazing, muddy springs, or waters fouled by burros. Request the agency's monitoring data for livestock use, and be sure it is being used to determine livestock stocking rate and season of use.