Chapter 6 – Game and Other High-Interest Species

The childhood training of hunters is not so much practical training as the opening of spiritual doors.... Hunting had put a premium on physical good health, on sensitivity to environment and to the nuances and clues in a delicate and beautiful world, on independence, confidence, persistence, generosity, and had given them a powerful sense of the non-human creation.

— Paul Shepard (1973)

There is a value in any experience that exercises those ethical restraints collectively called 'sportsmanship.' Our tools for the pursuit of wildlife improve faster than we do, and sportsmanship is a voluntary limitation in the use of those armaments... a peculiar virtue of wildlife ethics is that the hunter ordinarily has no gallery to applaud or disapprove of his conduct. Whatever his acts, they are dictated by his own conscience rather than by a mob of onlookers. It is difficult to exaggerate the importance of this fact.

— Aldo Leopold (1966)

Key Questions

- **What is the current status of major game and other high-interest animal populations in the coastal mountains of southern California?**
- **What are the primary management issues for these species?**

This chapter examines the current status and trends of the most popular game animals in the region as well as several other species that are of particularly high interest to people. Hunting and fishing are popular activities in the assessment area. State and federal land and resource management agencies invest considerable time and effort managing habitats and monitoring populations of game species. Many of the same habitats that are important to rare and at-risk species are also important to game animals.

Fish

The majority of anglers who go to the mountains and foothills of southern California head for the lakes, where a variety of popular sport fish are planted. These lake fisheries are primarily managed by local water districts and the California Department of Fish and Game (CDFG), usually with minimal involvement from the public land management agencies. For this reason we do not address lake sport fish in this report. For those who prefer flowing waters, there are many fishable mountain streams. The primary sport fish in these streams is the rainbow trout.

Rainbow Trout *(Oncorhynchus mykiss)*

Status and Distribution: Rainbow trout occur throughout the assessment area. A few populations of native steelhead remain (an anadramous or ocean-going rainbow trout; see "Fish" section, chapter 4) primarily in the Los Padres National Forest where some are now landlocked by downstream barriers to the ocean. However, most of the trout found in southern California today are stocked hatchery fish. Many streams in the region are regularly restocked to maintain a recreational fishery.

A few local streams that support productive, self-sustaining trout populations have been designated as "wild trout streams" by the CDFG. These include Sespe Creek and Piru Creek in the southern Los Padres, the West Fork of the San Gabriel River in the San Gabriel Mountains, and Deep Creek and Bear Creek in the San Bernardino Mountains (Deinstadt et al. 1990). These streams have special fishing regulations, including catch-and-release requirements and barbless hooks. Wild trout management plans have been developed for Deep Creek and Bear Creek (Hoover 1983; Hoover and Deinstadt 1989).

Several other local trout streams have the special catch-and-release and barbless hooks regulations. These include the San Antonio River, South Fork of the San Jacinto River, and Pauma Creek and the West Fork of the San Luis Rey River on Palomar Mountain.

Habitat: Rainbow trout can tolerate a variety of water conditions but prefer cool waters. They do best in streams that have deep pools and a well-developed canopy of riparian trees that shade the water (Deinstadt et al. 1990). Aquatic vegetation provides excellent cover for trout.

Management Issues: The biggest issue for the region's trout streams is maintaining adequate stream flows. Most of the wild trout streams lie below dams, and their survival is dependent on sustained water releases from those impoundments. Organizations such as Cal Trout, Trout Unlimited, and San Diego Trout have played a major role in persuading water agencies to commit to sustained water releases in these systems. Trout stocking programs must increasingly consider the effects of this activity on native fish and amphibians, many of which are rare and declining. The special regulations applied to keep wild trout waters from being overfished generally seem to be working. Many of these streams are in back-country areas that are relatively difficult to access. This helps reduce fishing pressure on these waters.

Birds

Quail, turkeys, and pigeons are addressed in this section because they are the most commonly hunted game birds in the assessment area. Waterfowl and doves are not addressed because, although they do occur in the mountains, they are not found in large numbers and few people go to the mountains to hunt them.

California Quail *(Callipepla californica)* and Mountain Quail *(Oreortyx pictus)*

Status and Distribution: California quail and mountain quail are native gallinaceous birds found throughout the assessment area in a wide variety of habitats. California quail range from sea level to about 5,000 feet, while mountain quail extend from below 2,000 to over 9,000 feet (Garrett and Dunn 1981). The range of these two species overlaps broadly, but they have distinct habitat and behavioral differences. Mountain quail occur in more densely vegetated habitats and are dispersed in relatively small coveys of fewer than fifteen birds. California quail prefer more open habitats and typically form coveys of forty to sixty birds, with some containing well over one hundred (Leopold et al. 1981). California quail tend to burst into flight to escape a threat, while mountain quail have a greater tendency to flee on foot. The larger coveys, propensity to fly, and occurrence in open habitats make the California quail more desirable to hunt and thus a much more popular game bird.

Habitat: Mountain quail typically inhabit forested habitat and dense chaparral, while California quail tend to frequent openings and edge habitats (Leopold et al. 1981). Prime habitat for mountain quail is extensive and well represented on public lands within the assessment area. This is less true for California quail; commonly called "valley quail," they reach peak abundance in valley and foothill bottom lands where there is a good mix of openings, brushy cover, and water. These productive bottom-land habitats are predominantly in private ownership and many acres have been converted to croplands and subdivisions that support few quail. California quail do occur in the chaparral-covered hills but mostly at low

densities. Biswell et al. (1952) found 100 quail per square mile in unbroken chaparral, with numbers increasing to 250 per square mile in areas where small openings had been created by burning.

Management Issues: The California quail's popularity as a game bird, combined with the fact that much of its prime low-elevation habitat has been converted for other uses, make it a higher priority for management attention than mountain quail. California quail do best in habitat mosaics that contain a mix of open feeding areas and protective brushy cover. Small clumps of trees and shrubs scattered among open feeding areas provide a maximum of "edge" and are ideal for quail when water is available (Leopold 1977). Large, continuous blocks of a single vegetation type provide poor habitat. Thus large stands of unbroken chaparral support low numbers of quail.

The most commonly encountered habitat limitations for quail on national forest system lands are lack of water and lack of suitable openings in the chaparral. Over the years, a large number of water developments (e.g., guzzlers and catchments) have been installed to improve habitat for quail. Local chapters of Quail Unlimited have been particularly instrumental in organizing and implementing these projects. Prescribed burning has been used to create openings and increase age-class diversity in the chaparral.

Wild Turkey *(Meleagris gallopavo)*

Status and Distribution: This popular game bird is native to much of North America but was not present in California at the time of its discovery and settlement by Europeans (Burger 1954). Believing that the distribution of the wild turkey was restricted by geographical barriers and not by a lack of suitable habitat in California, the State Division of Fish and Game began, in the early 1900s, to experiment with introductions of turkeys in various parts of the state (Burger 1954). Most of the early introductions failed, often because the planted birds were too tame to survive for long in the wild. Yet, transplant and release techniques have improved substantially over the last thirty years and wild turkey populations are now established in many parts of California, particularly along the west side of the Sierra Nevada and in the northern and central coast ranges (CDFG 1990).

Turkey populations have been well established for many years in the foothills of Monterey, San Luis Obispo, and northern Santa Barbara counties (Smith and Browning 1967; Garrett and Dunn 1981). The southernmost mountains of California are some of the last areas of potential habitat in the state to have self-sustaining wild turkey populations. A population was successfully established in the San Bernardino Mountains north of Lake Arrowhead in 1988. It is now a very popular resource that attracts hunters from throughout southern California and Nevada (S. Loe, San Bernardino NF, pers. comm). In 1993, turkey populations were established on private lands at several locations in the mountains of San Diego County. Introductions are also proposed for the Cleveland National Forest but have been delayed by litigation over the potential impact on native species. However, the turkeys planted on private lands have dispersed widely and some presently occur on the Cleveland National Forest.

Habitat: Turkeys can occur in a variety of habitats but are found primarily in pine, oak, and mixed hardwood/conifer woodlands. Important habitat components include large roost trees, openings that contain herbaceous plants, and the production of mast crops, especially acorns. Water is a critical habitat requirement for turkeys; they need to drink at least once a day and thus require a dependable year-round water supply (Schorger 1966). In southern California, the limited availability of year-round water substantially reduces the amount of suitable habitat for this species. It is perhaps significant that the turkey's native range corresponds quite closely with portions of the country that receive appreciable and dependable rainfall in the summer months.

Management Issues: Little is known about the effect of introduced turkey populations on California's native flora and fauna. There are no published scientific studies that directly address the subject; research on turkeys in California has focused on their numbers, movements, and food habitats (Schorger 1966; Smith and Browning 1967; Grenfell et al. 1980). On one hand, it can be accurately argued that there is no evidence that turkeys are imperiling native species. However, it can be equally well argued that there is no evidence demonstrating that they do not cause harm. This uncertainty has led to recent controversy over the appropriateness of introducing turkeys into areas where there are rare plants and animals that could potentially be harmed (via increased competition or direct consumption).

A California Department of Fish and Game plan to introduce turkeys on public lands in San Diego County has been stalled by a lawsuit, filed by the California Native Plant Society, over concerns about the impact on native species. These concerns have also triggered opposition from the California Department of Parks and Recreation. Turkeys that wander onto Cuyamaca Rancho State Park from nearby private lands are now being trapped and relocated outside the park's boundaries (LaRue 1995). CDFG is currently conducting a study to assess the effect of introduced turkeys on native species. Hopefully the results will be sufficiently conclusive to resolve this controversy.

This has been a frustrating process, particularly for those who have long sought a huntable turkey population in the San Diego area. It evokes deep-seated concerns among sportsmen who have watched the wildlife management agencies increasingly shift their focus to threatened and endangered species, often at the expense of game management programs. Unfortunately, this understandable frustration has caused some individuals to publicly suggest that an anti-hunting agenda is driving the land management agencies handling of the issue (Zieralski 1996). These baseless allegations only serve to polarize relationships between individuals, organizations, and agencies that should be working together to gather the necessary information and find workable solutions.

Band-tailed Pigeon *(Columba fasciata)*

Status and Distribution: The only pigeon native to California—and not to be confused with rock pigeons found in urban areas—band-tails occur throughout the assessment area and can be abundant in lower montane woodlands. The word "palomar" is Spanish for "pigeon roost," and thus Palomar Mountain is named for this species. There is little current information on the status of band-tailed pigeon populations in southern California. Statewide Breeding Bird Survey (BBS) data indicate a slight declining population trend since 1980, but it is not statistically significant (Sauer et al. 1997).

Habitat: Band-tailed pigeons are closely tied to oaks, occurring both in pure stands and in conifer/oak woodlands. They spend the summer months primarily in montane woodlands but commonly move downslope into the foothills in winter (Garrett and Dunn 1981).

Management Issues: Band-tailed pigeons do not receive a lot of management attention. A fast-moving bird found primarily in densely wooded areas, the band-tailed pigeon is often difficult to shoot. This probably explains why the birds do not experience a lot of hunting pressure in the assessment area. Protection of oak and conifer/oak woodlands is important to this species.

Mammals

The most popular game and nongame animals tend to be large mammals. Those that generate the most interest in the assessment area are addressed below.

Mule deer *(Odocoileus hemionus)*

Status and Distribution: The mule deer is the most important big game animal in southern California. The annual fall deer hunt attracts thousands of people to the mountains and foothills. The California Department of Fish and Game's management of this harvest

is aimed at providing a sustained yield and keeping the deer population within the food supply of its natural habitat, thus preventing damage to native habitats, agricultural crops, and orchards.

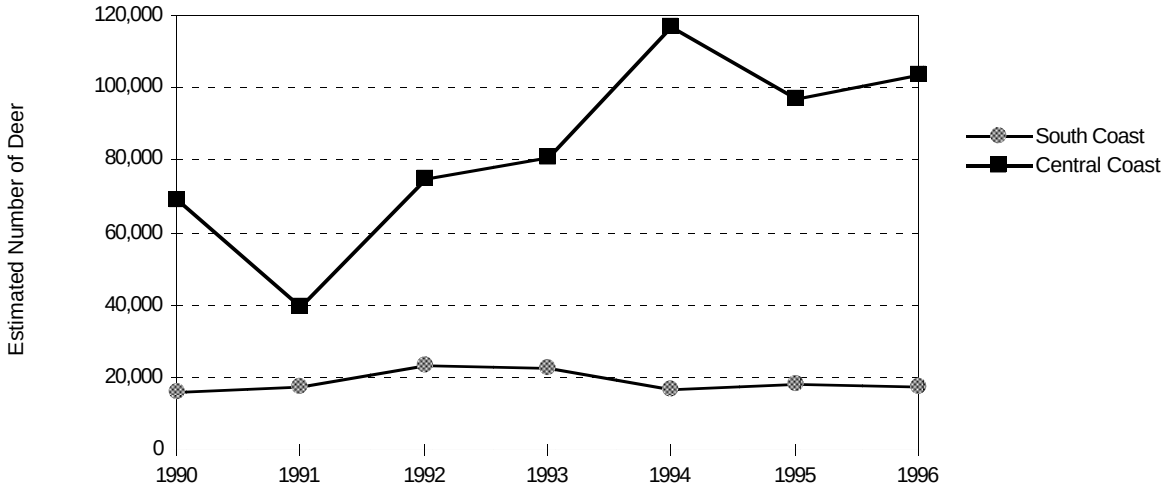
Recent harvest rates and CDFG population estimates (fig. 6.1) suggest that the deer population is relatively stable in the southern half of the assessment area and increasing in the northern half (Loft et al. 1998). CDFG estimates populations by geographic deer assessment units (DAUs). The northern half of the assessment area is in the "central coast (south)" unit or DAU #9, and the southern half is in the "south coast" unit or DAU #10 (Loft et al. 1998). The central coast (south) unit is the only one in the state that showed an increasing population trend from 1990 to 1996 (Loft et al. 1998). No explanation is given for this increasing trend.

The central coast unit is 15,600 square miles in size and the south coast unit encompasses 7,800 square miles. The central coast unit is twice the size of the south coast unit but reportedly has over four times as many deer (fig. 6.1) (Loft et al. 1998). Longhurst et al. (1952) estimated that there were 79,000 deer in the south coast unit in the late 1940s, but 1990s estimates range from 16,000 to 24,000 (Loft et al. 1998). This decline is attributed primarily to large-scale habitat loss on private lands as southern California's human population has grown.

Habitat: Characteristics of deer habitat use vary geographically. Deer are essentially nonmigratory in the low-elevation mountain ranges that lack extensive conifer forests (i.e., the Santa Ana Mountains, San Diego County's mountains, and most of the Los Padres National Forest). In these areas deer reach their highest densities in oak woodlands, riparian areas, and along the margins of meadows and grasslands. They occur in lower densities in open scrub and young chaparral but tend to avoid dense brushfields. In chaparral habitats, deer thrive on early successional vegetation that is prevalent for a period of one to ten years after a fire (Bowyer 1981).

Bowyer (1984, 1986) studied habitat use of mule deer in a low-elevation mountain

Figure 6.1. Deer population estimates for 1990–1996 by deer assessment unit (DAU)(from Loft et al. 1998). These units extend beyond our assessment area boundaries, but the Central Coast DAU encompasses the four northern mountain subareas (southern and northern Santa Lucia Ranges, southern Los Padres ranges, and Castaic Ranges) and the South Coast DAU encompasses the five southern subareas (San Gabriel, San Bernardino, San Jacinto and Santa Ana mountains, and San Diego ranges).



range—on 4,900-foot East Mesa in the Cuyamaca Mountains of San Diego County. He concluded that these southern mule deer are primarily a species of meadows, oaks, and pines. Meadows were found to be particularly important fawning habitat. Deer grass *(Muhlenbergia ridgens)*, a tall bunch grass, was used extensively by fawns for concealment cover. Adult deer typically bedded down in oak and pine stands.

The availability of free water during summer was also a major factor regulating the distribution of mule deer on East Mesa. Areas farther than 0.6 miles from free water received limited summer use. Areas without sources of summer water typically were devoid of fawns. Thus, habitat manipulations greater than 0.6 miles from summer water sources are unlikely to increase populations of mule deer (Bowyer 1996).

In the higher elevation mountain ranges (i.e., Mount Pinos and the San Gabriel, San Bernardino, and San Jacinto mountains), deer commonly undertake altitudinal migrations between summer and winter ranges. Nicholson (1995) and Nicholson et al. (1997) studied tradeoffs associated with migration in a mule deer population within the upper Santa Ana River watershed in the San Bernardino Mountains. In this area, deer exhibit a mixed pattern of migration—some migrate every year, others migrate in some years, and others never migrate.

Migratory deer move upslope for the summer months, into well-watered habitats on north-facing slopes. These areas are dominated by pine forest but also contain openings, meadows, and riparian habitats that the deer utilize. Nonmigratory deer spend the summer on lower slopes, primarily utilizing the limited pine forests that occur there as well as oak woodlands. In winter, deer congregate on lower, south-facing slopes where they heavily utilize oak woodlands. Use of chaparral and sagebrush also increases in winter (Nicholson et al. 1997).

Nicholson et al. (1997) suggest that migration presents a tradeoff between optimizing habitat quality and increasing risk of predation. The upper-elevation summer habitats were of higher quality, but moving to and from them each year increases the risk of predation. Monitoring of radio-collared deer found that migratory females did have higher mortality rates than nonmigratory females and the mortality occurred exclusively during migration (Nicholson et. al. 1997).

The partial deer migration pattern observed by Nicholson in the San Bernardino Mountains probably occurs in the other high-elevation mountains as well. Vaughn (1954) and Cronemiller and Bartholomew (1950) note the occurrence of upslope migrations in the San Gabriel Mountains.

Management Issues: During all seasons, Nicholson (1995) found that deer largely avoided areas regularly occupied by humans (e.g., campgrounds and summer cabins), to the extent that they did not utilize habitats that would otherwise be of high quality (e.g., riparian and meadows). He concluded that mule deer primarily avoid negative features of the environment and consequently often avoid potentially valuable resources at the same time.

The tendency of mule deer to avoid areas where there is frequent human use is a significant management issue. Of particular significance are meadow and riparian habitats that are preferred fawning areas and extremely limited in extent. Such habitats are also desirable locations for recreationists and, as the number of recreationists increase, it becomes more difficult to find areas that do not receive frequent human use. In the San Jacinto Mountains, Schaefer (1999) reported that deer reproductive rates in 1994 and 1995 were representative of a nutritionally stressed population. This could be because they are selecting remote areas that do not contain high-quality foraging habitat.

Bowyer and Bleich (1984) studied the effects of cattle grazing on mule deer in the mountains of San Diego County. They used spotlight transects and pellet group counts to compare deer abundance in two areas of similar meadow habitat, one which was grazed (Laguna Mountain) and one which was not

(Cuyamaca Rancho State Park). They found deer to be significantly more abundant in the ungrazed meadows, with mean densities of two deer per 100 hectares (240 acres) in the cattle grazed meadows and twenty-two deer per 100 hectares in the ungrazed meadows (Bowyer and Bleich 1984). The deer pellet group analysis had a similarly significant result.

Bowyer and Bleich (1984) attribute the reduced densities of deer in cattle-grazed areas to changes in habitat condition. Important forage plants for deer were either absent or reduced on the grazed range, and these areas also lacked dense stands of deer grass, which are known to provide valuable cover for does with fawns. Bowyer and Bleich (1980, 1984) used old photographs to determine that deer grass was also scarce in Cuyamaca's meadows when they were grazed by livestock prior to the state park's establishment. The deer grass recovered after cattle were removed. It should be noted that when this study was done in 1979, the intensity of grazing on Laguna Mountain was much higher than it is now. It would be useful to repeat this study to compare ungrazed conditions with the more moderate grazing regime that is in place today.

North of the assessment area, in the San Francisco Bay region, there is now considered to be a deer over-abundance problem in many suburban areas (McCullough et al. 1997). Evidently, deer in this area have become increasingly tolerant of human development and no longer avoid valuable resources in their vicinity. While this type of behavior has long been a management issue for white-tailed deer *(Odocoileus virginianus)* in the eastern United States, it is rarely reported for mule or black-tailed deer.

There are several reasons why it is unlikely that the tolerance of human disturbance exhibited by deer in the San Francisco Bay area will spread to more remote areas. First, the remaining wildland habitats in the bay area are highly productive for deer but very limited in size and surrounded by development. Thus, carrying capacity is easily exceeded and deer move outside natural habitats into developed areas to survive. If they had other options on where to go, they presumably would try to avoid developed areas. Nicholson's study indicates that in remote areas, where they have the ability to avoid developed areas, they tend to do so even if it means living in lower-quality habitat.

Second, the habitat reserves in the bay area are not open to hunting; thus, for many years now, deer in those areas have not been hunted. This undoubtedly increases their ability to habituate to nonthreatening human activities. Studies have shown that mule deer can habituate to predictable events such as highway traffic, which they learn is not dangerous (Yarmoloy et al. 1988). However, in remote areas where deer are annually hunted and they have choices on where to go, it is highly probable that they will continue to avoid areas where there is high human use.

Habitat Management: The most common habitat manipulation used to benefit deer is prescribed burning, usually in chaparral. Burning creates openings in the brush and temporarily increases the quality of deer forage (Dasmann and Dasmann 1963). After observing marked increases in deer harvested in San Diego County following the Laguna fire in 1970, Bowyer (1981) developed deer management guidelines that emphasize burning to rejuvenate browse.

Bowyer (1986) points out that the proximity of burned areas to other vegetative types preferred by mule deer may be a critical factor in determining the response of deer populations to alterations in old-growth chaparral. Short-lived increases in forage quality in areas with few deer will do little to promote population growth. Thus, chaparral burns will be most effective when they are conducted in areas that adjoin meadow, oak, or pine vegetation types that contain summer water sources.

Based on the aforementioned work of Nicholson et al. (1997) and Bowyer and Bleich (1984), additional consideration should probably be given to management of recreation facilities and livestock grazing in key deer fawning areas.

Nelson's bighorn sheep
(Ovis canadensis nelsoni)

Status and Distribution: The Nelson's bighorn sheep is an animal of high public interest and is considered both a viability concern and a game animal in various parts of its range. Southern California populations are concentrated in the eastern San Gabriel Mountains and eastern San Bernardino Mountains, with a small reintroduced population around San Rafael Peak and Cobblestone Mountain in the southern part of the Los Padres National Forest (fig. 6.2) (Torres et al. 1994).

The San Rafael Peak/Cobblestone Mountain population was established in the 1980s but is believed to be declining (Torres et al. 1994). Originally considered to be a population of twenty-five to fifty animals, it is now believed to support fewer than twenty-five animals (fig. 6.3) (Torres et al. 1996a). Sheep in the San Bernardino Mountains are considered to be two separate populations, the larger in the vicinity of San Gorgonio Mountain and the other on the northern edge of the range in desert-facing canyons such as Furnace, Bousic, Arctic, and Marble canyons.

The bighorn sheep population in the San Gabriel Mountains is, or at least was, considered the largest single sheep population in California (DeForge 1980; Torres et al. 1994).

Figure 6.2. The distribution of Nelson's bighorn sheep in the southern Los Padres, San Gabriel and San Bernardino mountains.

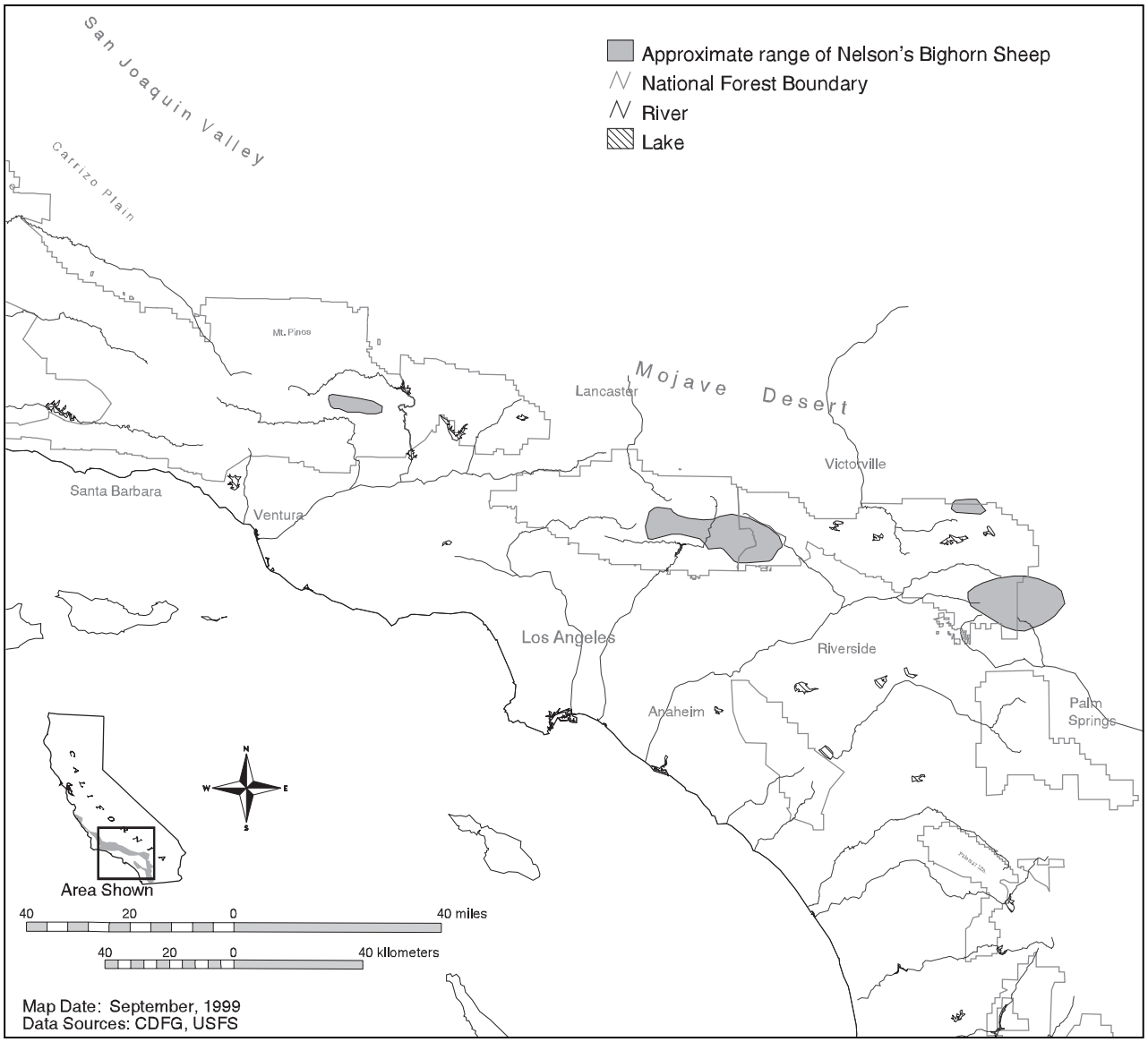


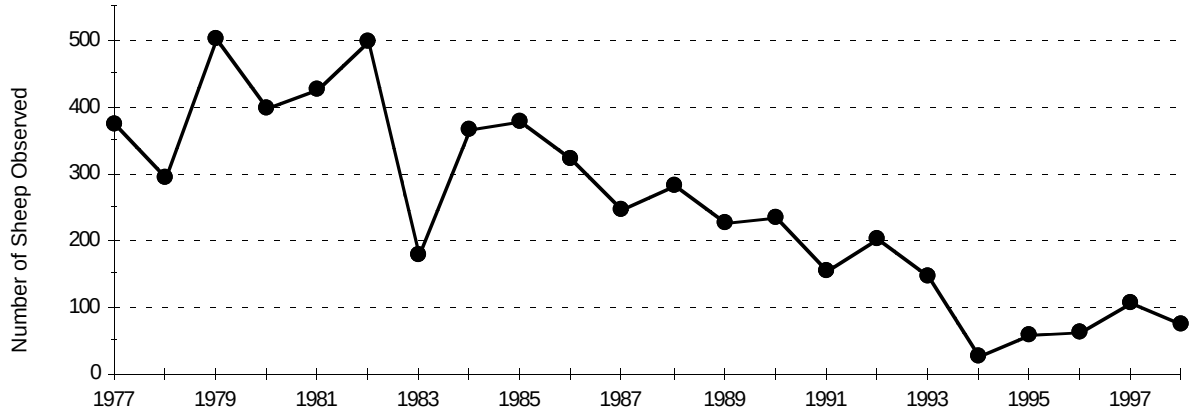
Figure 6.3. The estimated size of Nelson's bighorn sheep populations in the assessment area as reported by Torres et al. (1994, 1996).

Population	Status	Population Size Class 1993	1995
San Gabriel Mountains	Native	> 300 (400-600)	101-150
San Gorgonio (San Bernardino Mts.)	Native	101-150	101-150
Northern San Bernardino Mts.	Native	< 25	< 25
San Rafael Pk./Cobblestone Mtn.	Reintroduced	25-50	< 25

Several research projects in the 1970s and early 1980s generated detailed information on the distribution, abundance, and habitat relationships of sheep in this range (Weaver et al. 1972; Light and Weaver 1973; DeForge 1980; Harlacher 1980; Holl and Bleich 1983). Several distinct herds have been identified, with primary concentrations in the Bear Creek drainage (San Gabriel Wilderness), the upper East Fork of the San Gabriel River and Cattle Canyon (both in the Sheep Mountain Wilderness), San Antonio Canyon, Cucamonga Canyon, and the South and Middle Forks of Lytle Creek. Population estimates across this area ranged from 665 to 740 animals between 1976 and 1982 (Holl and Bleich 1983). These estimates were extrapolated from aerial census data. However, census data collected since the early 1980s suggest that the San Gabriel Mountains' bighorn sheep population has declined substantially over the last twenty years (fig. 6.4).

Habitat: For detailed analyses of bighorn sheep habitat utilization in the San Gabriel Mountains, see Light and Weaver (1973) and Holl and Bleich (1983). Escape terrain is identified as the single most important habitat component for sheep in these mountains. Escape terrain is defined as steep slopes (80 percent or greater) with abundant rock outcrops and sparse shrub cover (canopy cover of 30 percent or less) (Holl and Bleich 1983). Sheep in the San Gabriel Mountains range widely in elevation—from 3,000 to 10,064

Figure 6.4. Bighorn sheep census data collected from 1977 to 1998 in the eastern San Gabriel Mountains. These data come primarily from annual aerial surveys conducted by the California Department of Fish and Game, although they also include some ground survey results.



feet (i.e., the summit of Mount San Antonio). During winter and spring, they are primarily distributed in lower canyons between 3,000 and 6,000 feet, where they occupy escarpment chaparral, particularly ceanothus-mountain mahogany associations. In summer, bighorn sheep use all elevations. Their distribution within an area is dependent on escape terrain and open vegetation types.

Management Issues: The primary factors affecting Nelson's bighorn sheep populations in the assessment area are human disturbance, vegetation condition, water availability, and predation. Bighorn sheep are considered sensitive to the presence of humans, particularly high levels of human activity in their line of sight, and may abandon habitat due to human encroachment (Light and Weaver 1973). The effects of human activity on sheep in the San Gabriel Mountains have been studied by Light and Weaver (1973), Hamilton (1983), and Holl and Bleich (1983) with varying findings and conclusions. Light and Weaver (1973) suggest that increased human use in the Baldy Notch area, particularly summer use concentrated around the Mount Baldy Ski Area base facility, has caused sheep to avoid areas that were previously utilized. Conversely, Holl and Bleich (1983) suggest the absence of sheep in that area may be more related to habitat condition. However, both agree that increased summer use on the north-facing side of Mount San Antonio would have a negative effect on bighorn sheep.

Torres et al. (1996a) attribute the pronounced decline of sheep in the San Gabriel Mountains to lack of recent fires, resulting in habitat succession that has altered the abundance of suitable sheep habitat and enhanced the vulnerability of sheep to mountain lion predation. The high sheep numbers observed in the late 1970s coincide with recent fires in those areas. As vegetation matures it becomes less palatable and there is a reduction in the amount of open, escape terrain. CDFG is currently conducting an analysis of factors that are potentially related to the population decline. These factors include changes in winter range, disease, human activity, and drought (Torres et al. 1996a).

The apparent stability of the bighorn population around Mount San Gorgonio may be related to the remoteness of the area. Most of the occupied sheep habitat is within the San Gorgonio Wilderness Area, and the surrounding area to the east and south is largely unroaded. This population is deemed stable enough to support an extremely limited annual hunt. Since 1997, CDFG has issued one tag per year to hunt bighorn sheep in the San Gorgonio area.

Tule elk *(Cervus elaphus nannodes)*

Status and Distribution: Tule elk were once abundant in California's Central Valley and adjacent valleys and foothills. However, the fertile valley habitats they preferred have been almost entirely converted to agricultural land, and the tule elk now occurs only in established reserves and in areas outside or on the fringe of its native range where introduced populations have persisted (e.g., the Owens Valley and Point Reyes) (McCullough et al. 1996). Approximately twenty-two tule elk populations can currently be found in scattered areas across California, three of which are in or near the assessment area in San Luis Obispo and Monterey counties (McCullough et al. 1996).

Tule elk herds occur (1) in valleys on both sides of the southern half of the La Panza Range, (2) on Camp Roberts along the Salinas River, and (3) within Fort Hunter Liggett on the eastern side of the northern Santa Lucia Range. (fig 6.5). Population estimates from 1994 indicate that the La Panza herd is the biggest in the state, with between 550 and 600 animals. There are an estimated 200 to 250 elk on Fort Hunter Liggett and 90 to 100 on Camp Roberts (McCullough et al. 1996). All three of these populations were established in the 1980s through relocation of elk from the Tupman Reserve, Owens Valley, and Potter Valley.

Habitat: Tule elk prefer open habitats and, where available, they tend to congregate in marshy or ephemerally flooded areas that provide high-quality forage. Historically, tule elk

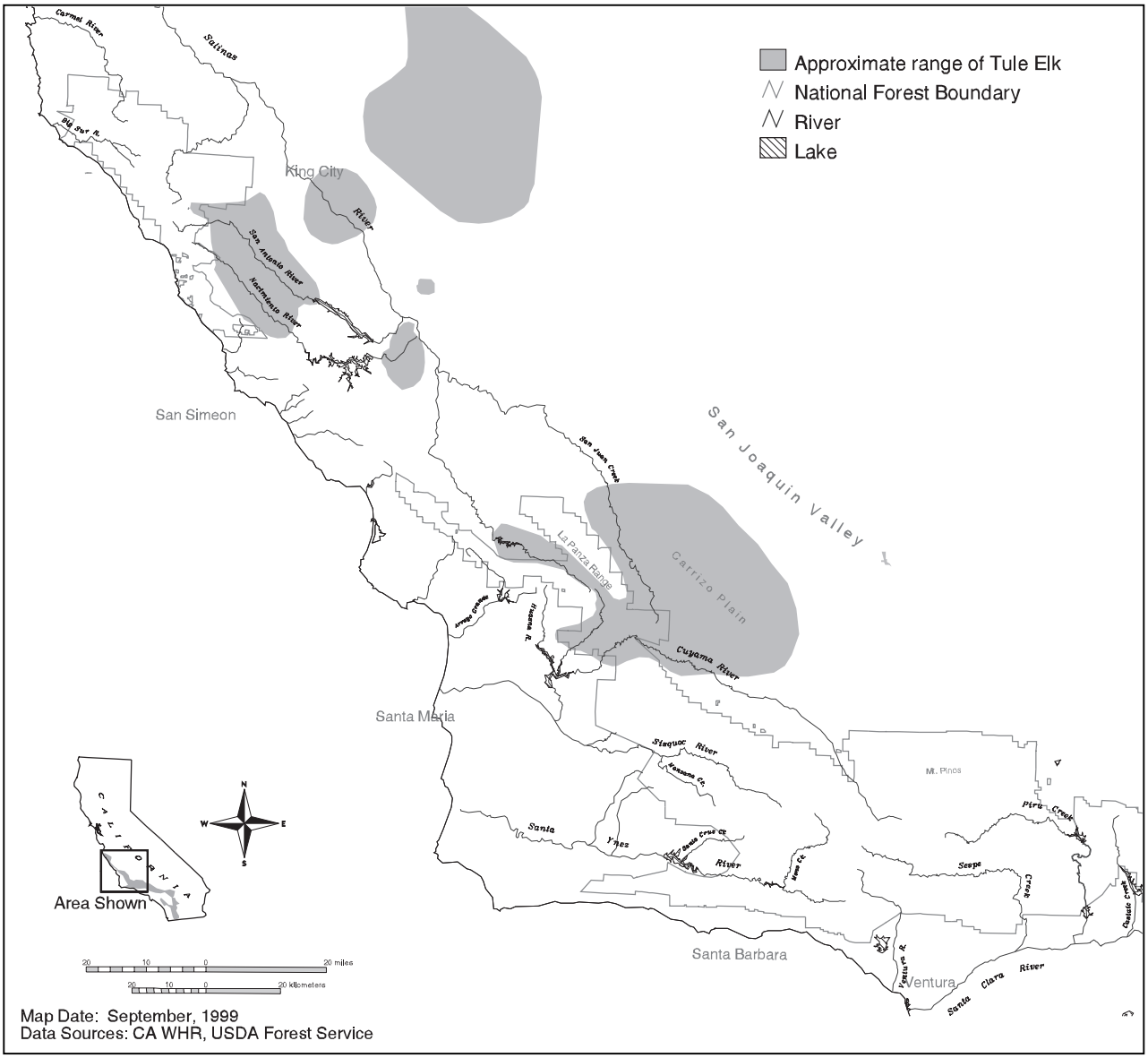


Figure 6.5. The general areas where tule elk occur in the central Coast Ranges.

used upland foothill areas during favorable plant-growth periods, and most calves were born in those areas in March and April. As the upland plants dried up, the elk returned to bottom lands where they remained for most of the year (McCullough et al. 1996). This pattern still occurs today in a few of the larger areas where elk can make seasonal movements. However, agricultural crops such as alfalfa are often utilized now in place of marshy bottom lands.

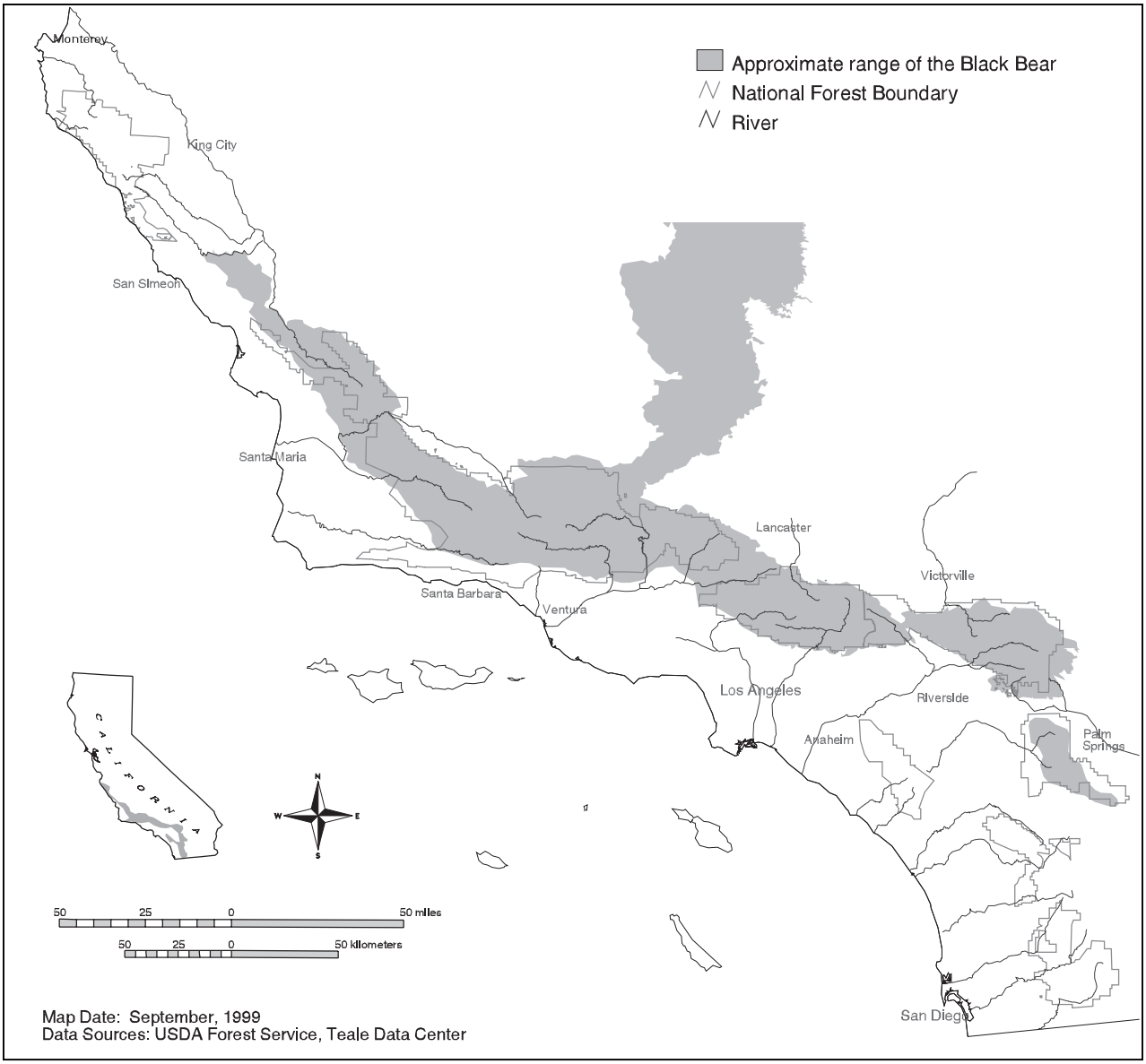
Management Issues: The primary management issues for tule elk are (1) ensuring the long-term availability of large enough blocks of suitable habitat, (2) managing herd sizes in those areas to minimize habitat degradation and damage to agricultural products, and (3) maintaining genetic diversity in the remaining populations, which are relatively small and isolated (McCullough et al. 1996). The La Panza herd utilizes valley habitats that are on private lands. Carefully regulated fall hunts are held at La Panza and Fort Hunter Liggett to maintain herd sizes at levels the available habitat can support.

Black bear *(Ursus americanus)*

Status and Distribution: Black bears reportedly did not occur in the assessment area when the California grizzly bear still inhabited the region (Storer and Tevis 1978). After the grizzly was extirpated around the turn of the century, black bears started to appear in Ventura and Santa Barbara counties (Grinnell et al. 1937). The Department of Fish and Game supplemented this natural range expansion by moving twenty-eight black bears from the Sierra Nevada into the San Gabriel and San Bernardino mountains during the early 1930s (Burgduff 1935; Vaughan 1954). The current black bear population in the San Gabriel and San Bernardino mountains is believed to be primarily descended from those supplemental introductions. Black bears apparently migrated across San Gorgonio Pass into the San Jacinto Mountains, where a small bear population remains.

Black bears now occur throughout the assessment area with the exception of the Santa Ana Mountains and the mountains in San Diego County (fig. 6.6). They are most common in montane conifer forests in the San Bernardino Mountains, San Gabriel Mountains, and the Mount Pinos/Pine Mountain region. Black bear populations are reported to be increasing statewide (CDFG 1998), and

Figure 6.6. Distribution of black bears in the coastal mountains of southern California.



hunter take figures from southern California suggest they are either stable or increasing in most of the assessment area (fig. 6.7) (CDFG 1998). Some recent bear sightings in the mountains of San Diego County suggest that they may be dispersing south from the San Jacinto Mountains.

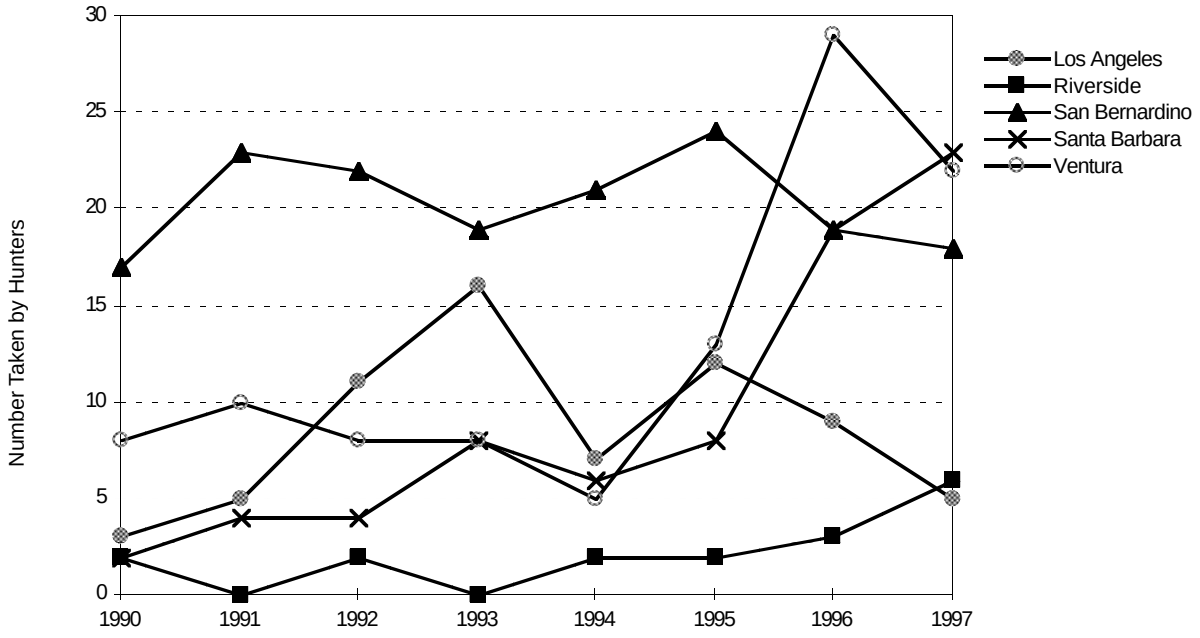
Habitat: Black bears occupy a variety of habitats, but populations are densest in montane forests with a wide variety of seral stages (CDFG 1998). In the southern California mountains, black bears will also follow riparian corridors down into low-elevation habitats. Habitat diversity is important to bears, which eat herbaceous vegetation in the spring, carrion and invertebrates in down woody material in the summer, and mast from shrubs and oaks in the fall.

A number of studies of black bear habitat utilization have been done in the assessment area, all by graduate students at California State Polytechnic University, Pomona. Moss (1972) and Stubblefield (1992) studied black bear ecology in the San Gabriel Mountains. Novick investigated habitat preferences and denning characteristics of black bears in the San Bernardino Mountains (Novick 1979; Novick et al. 1981), and Boyer (1976) studied food habitats of black bears in the Banning Canyon area of the San Bernardino Mountains.

Management Issues: Black bears have become a management problem in some recreation areas (e.g., Forest Falls and Barton Flats in the San Bernardino Mountains). Individual bears become habituated to feeding in these areas, particularly where food and trash are not properly managed and kept in bear-proof containers. This has led to increased human-bear encounters and even several well-publicized "attacks" where people were threatened or injured by bears who were exhibiting aggressive behavior or entering occupied tents in search of food.

Black bears also periodically wander into residential areas at the base of the mountains, particularly along the front of the San Gabriel Mountains. These incidents generate a lot of media attention and are potentially dangerous, particularly if a disoriented bear becomes cornered and reacts aggressively. However, the incidents which have occurred to date have not resulted in human injuries and Fish and Game wardens are usually able to scare the bear back up into the mountains.

Figure 6.7. Hunter take of black bear from 1990 to 1997 in southern California counties (data from CDFG 1998).



Mountain lion *(Puma concolor)*

Status and Distribution: Mountain lions occur in all of the mountain ranges within the assessment area. Circumstantial evidence suggests that lions have become more numerous in California in the past several decades (Torres et al. 1996b). This widely suspected, but poorly documented, population increase has been linked to increased predation of bighorn sheep and deer and increases in human-lion encounters. On the other hand, mountain lions are considered imperiled in some of southern California's highly fragmented wildlands. Beier (1993) conducted a radio-tracking study of mountain lions in the Santa Ana Mountains and Chino Hills. He found that the cougar population in this area consists of only about twenty adults and is in danger of dying out if movement corridors are not sustained to allow immigration from Palomar Mountain. Termed the "Pechanga Corridor," this habitat linkage between mountain ranges is primarily private land.

Habitat: Mountain lions are habitat generalists. They tend to be most common in the habitat types preferred by their primary prey—mule deer. Within these habitat types, lions tend to prefer rocky cliffs, ledges, and other areas that provide cover (Dixon 1982). They have extremely large area requirements; in the Santa Ana Mountains, only about twenty adult lions occupy over 800 square miles of wildland habitat (Beier 1993).

Management Issues: Management of mountain lions in California has become a controversial and politicized issue. Much of the controversy centers on whether regulated mountain lion hunts should be allowed. Mountain lion hunting has not occurred in California since 1972 (Torres et al. 1996b). In 1990, a state ballot initiative (Proposition 117) was passed into law designating the mountain lion as a "specially protected mammal." This designation allows for the issuance of depredation permits but does not permit a hunting season.

There has recently been an increase in depredation incidents and in the number of mountain lion attacks on humans (Torres et al. 1996b). From 1910 through 1985, there were no verified mountain lion attacks on humans in California. Since 1986, there have been nine verified attacks on humans, with two fatal attacks on adult women in 1994 (Torres et al. 1996b). At the same time, there is legitimate concern about the long-term viability of some mountain lion populations (e.g., in the Santa Ana Mountains) that are being isolated by urban encroachment (Beier 1993).

Nowhere is the management dilemma better exemplified than in the mountains and foothills of southern California. While their continued existence is threatened in some parts of the region, lions are also causing some serious problems. In 1986, two nonfatal lion attacks on small children in Caspers Wilderness Regional Park (Santa Ana Mountains) resulted in the closure of that park to children for several years. In 1994, a woman was attacked and killed by a mountain lion while hiking in Cuyamaca Rancho State Park (San Diego County). In 1995, a man was attacked but escaped injury while mountain biking in the Angeles National Forest (San Gabriel Mountains). Pet depredations have also increased along the wildland-urban interface (Torres et al. 1996b) and there is evidence that lion predation is having a negative impact on Peninsular Ranges' bighorn sheep populations (USDI Bureau of Land Management et. al. 1996).

Wild pig *(Sus scrofa)*

Status and Distribution: The wild pig is an introduced species that has become well established in Monterey, San Luis Obispo, and Santa Barbara counties (fig. 6.8). In Monterey County, wild pigs have been reported at densities of 1.3 to 2.1 per square mile (Pine and Gerdes 1973). Increases in hunter take over the past six years (fig. 6.9) suggest that the pig population may be gradually increasing.

Habitat: Wild pigs occur in riparian areas, oak woodlands, grasslands, and mixed hardwood-conifer forests. Mast crops

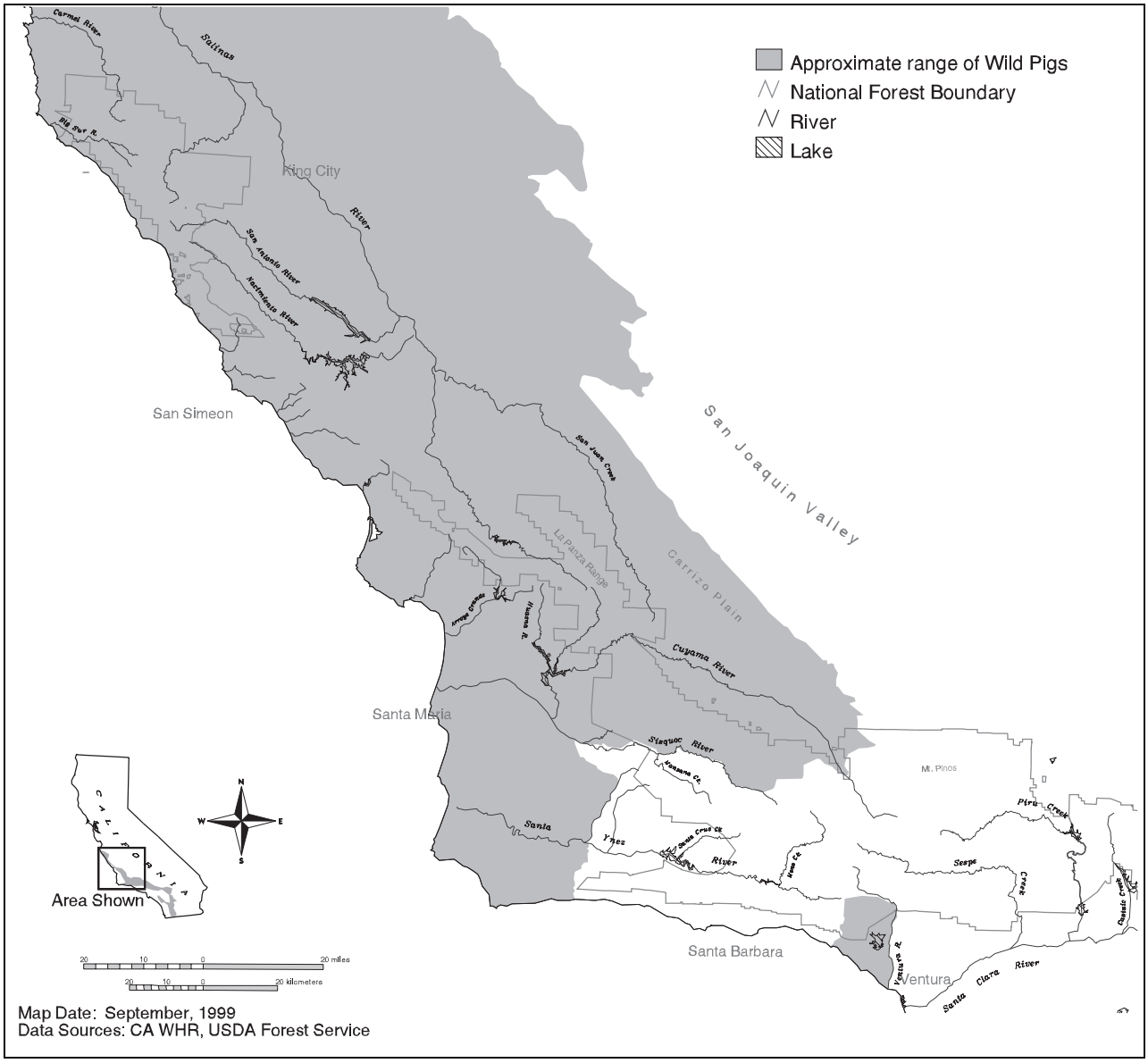


Figure 6.8. Distribution of wild pigs in and around the assessment area.

particularly acorns, are an important food (Zeiner et al. 1990).

Management Issues: Wild pigs are a fairly popular game animal, but there is also concern about the habitat damage they cause in some areas. Pigs can become abundant in some habitats. Where they occur in high numbers, their tendency to dig up the ground in search of food can cause major disturbance to soil and vegetation. They also compete with native wildlife for food, particularly for mast crops such as acorns. Wild pigs can become difficult to manage in areas where they have become abundant. A year-round hunting season, with no limits on the number that can be taken, typically has little effect on the population size.

Wild horse *(Equus caballos)*

Status and Distribution: A wild horse population exists in the interior valleys on the east side of the southern Santa Lucia Range (fig. 6.10). Referred to as the Black Mountain herd, in 1996 it reportedly consisted of eighty-one horses (BLM 1996).

Habitat: Wild horses can occur in a variety of habitats, but they typically prefer open grasslands.

Management Issues: The Wild Horse and Burro Protection Act of 1971 provides

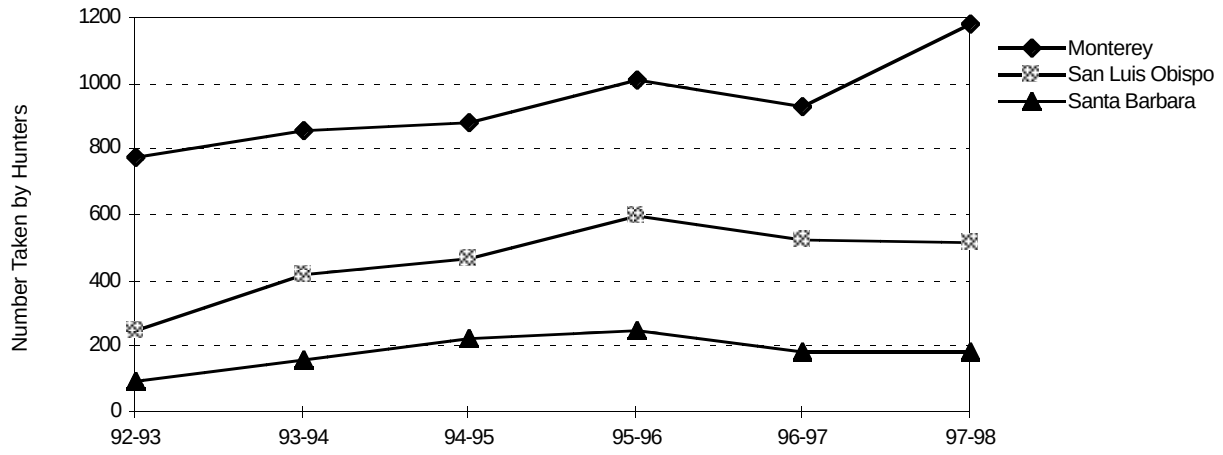


Figure 6.9. Hunter take of wild pigs from 1992 to 1998 in southern California counties (data from CDFG 1999b).

direction for managing wild horse populations. This legislation directs federal land management agencies to maintain herd sizes at sustainable levels while minimizing resource and property damage. When herds become too large, animals are captured, transported to holding facilities, and ultimately sold at public auctions. The Bureau of Land Management (BLM) is in charge of the wild horse and burro adoption program.

Because of the limited amount of suitable habitat at Black Mountain, roundups are held approximately every two years to keep the herd size at or below twenty animals. About two to four horses are rounded up each time and transferred to BLM facilities for adoption. This management strategy appears to be working well, since the habitat on Black Mountain is not being degraded by the current level of use (K. Cooper, Santa Lucia Ranger district, pers. comm.).

Wild burro (*Equus asinus*)

Status and Distribution: A burro population of approximately fifty to sixty animals currently exists in the eastern San Bernardino Mountains (fig. 6.10). This population is organized into multiple loose herds that stay primarily in wildland habitats east of Baldwin Lake. Prior to a roundup in 1997, several large burro herds had become habituated to humans and taken up residence in housing tracts on the east side of the Big Bear Valley. In August and September of 1997, seventy-seven of these "town burros" were rounded up and taken out of the area.

Habitat: Burros are primarily found in arid desert-montane habitats. They are pportunistic herbivores that roam across large areas in search of food resources.

Management Issues: The Wild Horse and Burro Protection Act of 1971 provides direction for managing wild burro populations. This legislation directs that burros removed from the wild are to be cared for and put up for adoption at public auctions.

Wild burros roaming residential areas in the Big Bear Valley have been a management problem for many years. These burros have been adored and fed by some residents and disliked by others, primarily because of their habit of knocking over trash cans and dispersing the contents. Their presence along highly traveled roads also created a dangerous safety problem for both burros and people; on average, thirteen burros a year were hit and killed by vehicles in the Big Bear area (USDA, Forest Service 1998). Fortunately no people have been killed in these accidents, but the potential is clearly there.

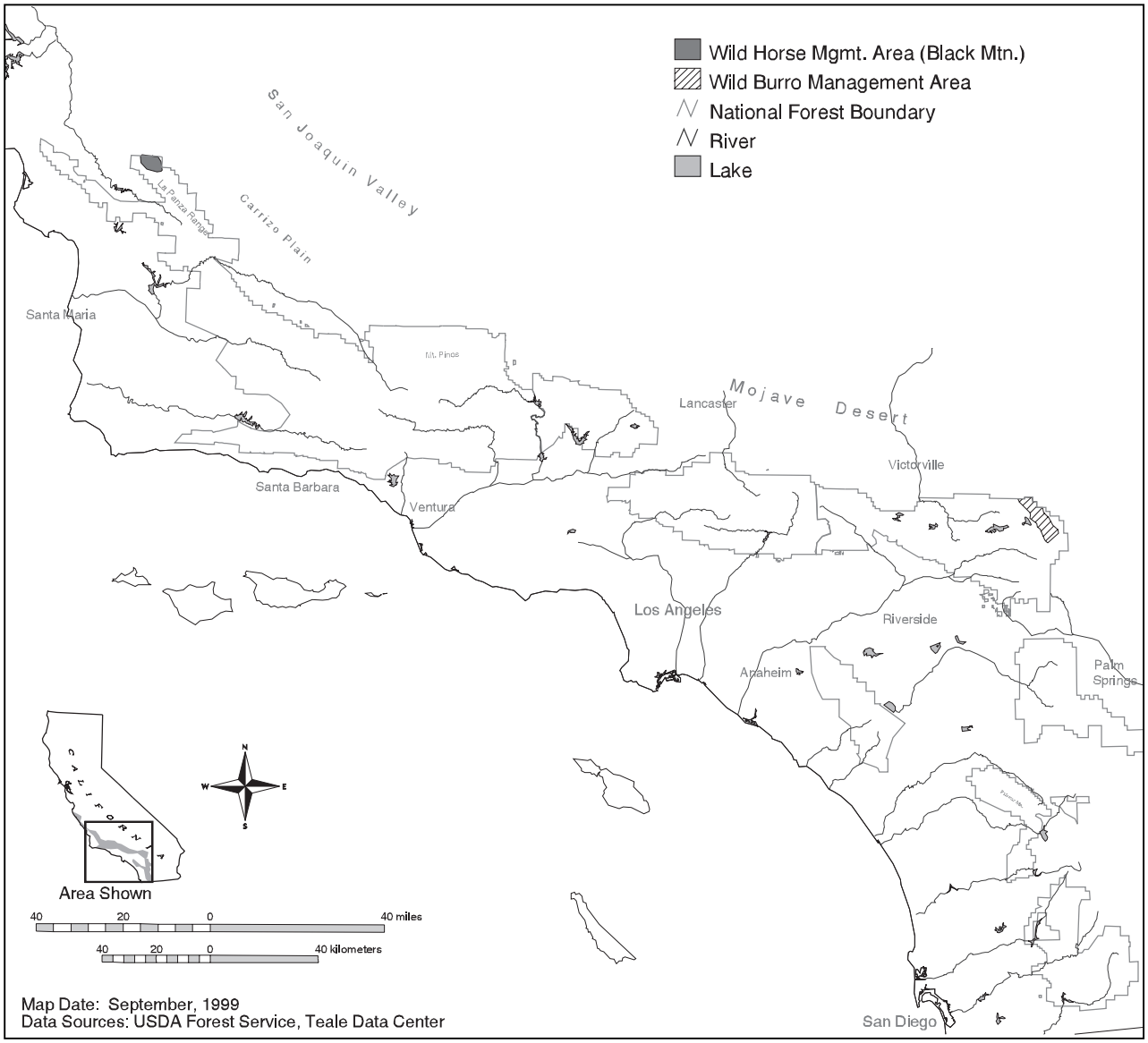


Figure 6.10. The general areas where wild horses and wild burros occur in the coastal mountains of southern California.

After a lengthy environmental review and public involvement period, the Forest Service conducted an extensive roundup of the town-habituated burros in 1997. The animals were taken to BLM holding facilities and subequently put up for adoption. This action has greatly reduced the number of burros hit by vehicles; only one has been hit since the roundup.