California Condor (*Gymnogyps californianus*)

Photo by Dudek.

Legal Status

State: Endangered, Fully Protected
Federal: Endangered
Critical Habitat: Critical habitat was originally designated on September 24, 1976 (41 FR 41914–41916) and revised the following year on September 22, 1977 (42 FR 47840–47845).
Recovery Planning: The latest version of the recovery plan for this species has been completed (U.S. Fish and Wildlife Service 1996).
Notes: Spotlight Species Action Plan 2010–2014 has been completed (U.S. Fish and Wildlife Service 2009). The USFWS 5-year Review was completed in June 2013 (USFWS 2013a).

Taxonomy

The California condor is a member of the family Cathartidae, or New World vultures that consist of seven species ranging throughout most of North and South America (Houston 1994). Although similar to the 15 species of Old World vultures that occur in Africa, Europe, and Asia, Old World vultures belong to the family Accipitridae, which includes eagles, hawks, kites, and buzzards. These groups have evolved from different lineages and are a well-known example of convergent evolution (Sibley and Ahlquist 1990; Houston 1994). The California condor is a close relative of the Andean condor (*Vultur gryphus*) that inhabits western coastal and mountainous portions of South America.

Distribution

General

Knowledge of the prehistoric and historical range of the California condor comes from fossil records, Native American feather regalia, and written records. Archaeological evidence suggests that during the Pleistocene era condors existed on both coasts of North America, but primarily occupied the west coast (Snyder and Snyder 2000; D'Elia and

Haig 2013). Fossil evidence from New Mexico, Arizona, Utah, a single site in New York, sections of northern Mexico, and southern Canada support this hypothesis (Hansel-Kuehn 2003; Brasso and Emslie 2006). By 1800, California condors were restricted to their west coast range, which stretched from British Columbia, Canada, to Baja California, Mexico, with small inland populations in regions such as the Grand Canyon (Snyder and Snyder 2000; D'Elia and Haig 2013). Condors were in the Pacific Northwest until the beginning of the twentieth century and found in the southern segment (Baja California) until the 1930s (Koford 1953; Wilbur 1973). By the middle of the twentieth century, condors were confined to a small region in Southern California. (Figure SP-B06). From the late 1970s to 1987 when the last few condors were trapped for captive breeding purposes, condors foraged primarily in the foothills bordering the southern San Joaquin Valley and valleys in San Luis Obispo, Santa Barbara, Kern, and Tulare counties.

Currently, the condor is found in three disjunct populations: a reintroduced population in both Southern and central–coastal California, a reintroduced population in the Grand Canyon area of Arizona, and a reintroduced population in Baja, California, Mexico.

Distribution and Occurrences within the Plan Area

Historical

In California by the middle of the twentieth century, condors had declined to the extent that they only occurred in a wishbone-shaped area encompassing 10 counties north of Los Angeles, California, including San Benito, Monterey, San Luis Obispo, Santa Barbara, Kern, Ventura, Tulare, Fresno, Kings, and Los Angeles counties (Wilbur 1978). Historical sightings in the Plan Area were primarily in the northwestern portion of the Plan Area in the area around Tehachapi. Some historical sightings were east of the Piute Mountains, south and east of Bright Star and along the western edge of Red Rock Canyon. Farther south, there is a historical occurrence along the southwestern boundary of the Plan Area northeast of Acton and one southwest of Lancaster (Figure SP-B06).

Recent

By 1987, the last individuals were trapped out of the wild for captive breeding. Since 1992, releases of captive-bred individuals have

occurred in parts of California; Arizona; and Baja California, Mexico (San Pedro Martir Mountains). The California condor occurs principally along the western edges of the Desert Renewable Energy Conservation Plan (DRECP) area, specifically within the Tehachapi Mountains east of Interstate 5 and portions of the Los Padres National Forest west of Interstate 5 (USFWS 2010). Global Positioning System (GPS) data from the USFWS for 2003–2013 show 818 records for the Plan Area (Figure SP-B06). Most records are in and around Tehachapi. There are also records north of Hwy 14 and west of Red Rock Canyon. Along the southwestern boundary of the Plan Area there are records from the Northern Transverse Ranges, west and south of Quartz Hill, and east of Soledad Canyon (Figure SP-B06). It should be noted that as a rapidly expanding cumulative database, additional GPS records for the western edge of the Plan Area are expected. At this time, nesting has not been documented in the DRECP Plan Area; condor use of the Plan Area is currently limited to foraging and temporary roosting.

Figure 1 Range of the California Condor in the United States

Natural History

Nest Habitat Requirements

California condors were historically found in habitat with requisite populations of ungulates and other large vertebrates (Koford 1953; Snyder and Snyder 2000; Grantham 2007a).

California condors are primarily a cavity nesting species and typically nest in cavities located on steep rock formations or in the burned out hollows of old-growth conifers (coast redwood (*Sequoia sempervirens*) and giant sequoia trees (*Sequoiadendron giganteum*)) (Koford 1953; Snyder et al. 1986). Less typical nest sites include cliff ledges, cupped broken tops of old-growth conifers, and in several instances, nests of other species (Snyder et al. 1986; USFWS 1996). Key characteristics of a suitable nest site are that it is in a location at least partially sheltered from the weather and in a location easily approachable from the air, such as on a cliff, steep slope, or tall tree (Snyder et al 1986).

Foraging Habitat Requirements

California condors are obligate scavengers, feeding only on the carcasses of dead animals, primarily medium- to large-sized mammals, but also occasionally on reptiles and birds (Koford 1953, Wilbur 1978). Condor food items within interior California in prehistoric times probably included mule deer (*Odocoileus hemionus*), tule elk (*Cervus elaphus nannodes*), pronghorn antelope (*Antilocapra americana*), and smaller mammals. Along the Pacific shore, the diet also included whales, sea lions, and other marine species (Harris 1941; Koford 1953; Emslie 1987; FWS 1996). Koford (1953) estimated that 95% of the California condor diet consisted of cattle, domestic sheep, ground squirrels (*Spermophilus beecheyi*), mule deer, and horses. Recently, condors have been found to feed primarily on domestic animals (e.g., cattle), hunter-killed mule deer (*Odocoileus hemionus*) and wild pigs, shot or poisoned coyotes (*Canis latrans*), and ground squirrels (*Spermophilus* spp.).

Condors locate carcasses by eyesight, not olfaction, and may rely on watching other scavengers, especially turkey vultures (*Cathartes*

aura), golden eagles (*Aquila chrysaetos*), and common ravens (*Corvus corax*), to locate much of their food.

Most California condor foraging occurs in open terrain of foothill grassland and oak savanna habitats, and occasionally open scrub habitat. In the central coastal portion of the state, coastal plains and beaches are also suitable foraging habitat.

As large scavengers, California condors are evolutionarily adapted for feeding on the carcasses of deer, elk, whales, mastodons, and other large animals more prevalent in the Pleistocene (Emslie 1988). As such, the availability of large dead prey was often unpredictable, leading condors to develop a wide-ranging search behavior. Foraging flights occurred, and continue to occur, over vast areas encompassing hundreds of linear miles of travel each day (Meretsky and Snyder 1992). Condors tend to forage within 50 to 70 kilometers (km) (31 to 44 miles) of nests, but may travel up to 180 km (112 miles) in search of food. Core foraging areas for nesting birds range from about 2,500 to 2,800 km^2 (965 to 1,081 $miles^2$) (Meretsky and Snyder 1992). Non-breeding birds may have foraging ranges of 5,000 km^2 (1,930 $miles^2$) (USFWS 1996).

Like most scavenging birds, California condors are opportunistic. As such, individual birds may be expected to take advantage of local abundance of food almost anywhere within their normal range. Foraging behavior shifts may result from seasonal changes in climatic conditions (e.g., fog, thermal activity, wind intensities, rain) and from changes in food availability (Wilbur 1978).

Reproduction

Condors reach sexual maturity at the age of 5 to 8 years, and a captive male has successfully bred at age 5 (USFWS 1996). Pairs form in late fall and early winter, and remain together year-round and for multiple years. Nest prospecting generally occurs in January or February, several weeks before egg laying (Snyder and Schmitt 2002).

Clutch size is one egg, and a second clutch may be laid if the first fails early in the nesting season. First eggs are laid between the last week of January and the first week of April. The incubation period lasts an

average of 57 days, ranging from 53 to 60 days. Both sexes incubate, with shifts lasting several days in length. Chicks hatch from the last week of March through the first week of June. Chick brooding is nearly constant for the first 2 weeks after hatching, after which it declines and ceases during the day at about 1 month of age. Chicks are known to leave the nest cavity and scramble around on foot before taking their first flight. Fledging flights take place when chicks are 5.5 to 6 months old (early September to mid-November). Young are fully dependent on adults for about 6 months after fledging, and partial dependency continues for another 6 months (Snyder and Schmitt 2002). It was formerly thought that pairs nested only every other year because of the long period of parental care, but this pattern seems to relate to timing of successful fledging the previous year; if a nestling fledges early in the year (e.g., late summer–early fall), the pair may attempt nesting the following year (USFWS 1996).

Table 1. Key Seasonal Periods for California Condor Reproduction

	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Nest prospecting	✓	✓										
Eggs	✓	✓	✓	✓	✓							
Nestlings			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dependent fledglings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Active year-round resident

Source: Snyder and Schmitt 2002

Spatial Behavior

Spatial behavior by condors includes distances between nest sites, daily movements, and temporary movements for foraging and habitat-use patterns (e.g., individual foraging ranges) (see Table 2).

California condors are not migratory, though they are known to travel long distances during foraging flights as described above. One California condor traveled 141 miles (mi) 225 kilometers (km) in a

single day, from the northeast corner of Tulare County south through the Sierra Nevada mountain range and Tehachapi Mountains to a roost just north of the Santa Barbara nesting area (Snyder and Snyder 2000). Telemetry data and GPS devices on some birds have documented other long-distance flights, including flights from southern Utah to Flaming Gorge, Wyoming (over 400 mi (643 km) and from Sierra de San Pedro Martir in Baja California to Imperial County, California (approximately 155 mi (250 km) (USFWS, unpubl. GPS telemetry data). Studies conducted during the 1980s, as summarized by Meretsky and Snyder (1992), showed that the last California condors remaining in the wild prior to 1987 comprised a single population of birds occupying an area of approximately 2 million ha. (4,942,000 ac.). Insofar as could be determined, every California condor in the wild used the entire area and was capable of soaring between any two points within the area in a single day.

California condors use topography and associated thermal weather patterns for flight. In Southern California, both short- and long-distance flights have been shown to follow routes over the foothills and mountains bordering the southern San Joaquin Valley, avoiding passing directly over the flat valley. As an example, a condor heading to Tulare County from the coastal mountains of Santa Barbara County would cross northern Ventura County, travel through the Tehachapi Mountains in southern Kern County, then turn north to pass by Breckenridge Mountain, and enter Tulare County between the Greenhorn Mountains and Blue Mountain. Condors have also been observed flying over areas with less extensive flat agricultural regions (Cuyama Valley in Santa Barbara and San Luis Obispo Counties) (USFWS 1996).

Condors are dependent on uplift created by thermal cells or topographic relief features for soaring flight. Consequently, most foraging flights tend to occur in mountainous areas where winds deflected by hills provide uplift (Snyder and Schmitt 2002).

Extended flight is achieved by soaring, either gliding in uplifts along topographic features or circling for altitude in thermals, then losing altitude in long glides. Typical flight speed averages about 31 miles per hour (mph), but can reach 43 mph in long extended flights, depending on wind conditions. Condors' high wing-loading (weight-

to-wing area ratio; 7.7 kilograms/meters^2), which reduces condors' maneuverability, may explain their reluctance to forage over the flat bottom of the San Joaquin Valley and their tendency to forage later in the morning and earlier in the evening (when they will have optimum visibility) (Snyder and Schmitt 2002). This may also have prevented them from occupying the Midwestern U.S. and large portions of the Intermountain Region.

A recent analysis of global positioning system (GPS) data for the period of 2004 through 2009 shows that condor ranges in the Southern California population are becoming increasingly multimodal, with 2009 use concentrated in the Hopper Mountain and Bitter Creek NWRs, Wind Wolves Preserve, and Tejon Ranch, the latter of which exhibits recolonization for foraging purposes (Johnson et al. 2010). These recent GPS movement data indicate that condors are re-establishing foraging ranges that are consistent with their ranges prior to extirpation/removal from the wild in 1987 (Johnson et al. 2010).

Table 2. Movement Distances for California Condor

Type	Distance/Area	Location of Study	Citation
Distance between active nest sites	Nest sites as close as 0.5 miles apart	California	USFWS 1996
Territory	Not territorial except at nest	Southern California	Snyder and Schmitt 2002
Foraging range, breeding	31–44 miles from nest	Southern California	Meretsky and Snyder 1992
Foraging range, non-breeding	Up to 141 miles in a day or 700,000 hectares	Southern California	Meretsky and Snyder 1992

Ecological Relationships

California condors are principally scavengers. They range over vast areas in search of carcasses to feed on. As such, they are in competition with other scavengers and opportunistic carnivores. Such species might include other birds of prey (e.g., eagles, hawks), turkey vultures, the common raven, and American crow (*Corvus brachyrhynchos*), as well as

mammalian scavengers such as coyotes (*Canis latrans*), American badgers (*Taxidea taxis*), and weasels and skunks.

Since condors reside at the top of the food web (tertiary consumers), adult condors are mostly free from predation. However, nests and eggs are subject to predation by other birds of prey. Should nests be insufficiently isolated, they may also be subject to predation by bears, coyotes, foxes, and other mammalian predators.

Population Status and Trends

Studies from the 1930s to 1950 gave a population estimate of 60 to 100 condors (Robinson 1939, 1940; Koford 1953), though other evidence and further analysis suggests a more likely population size in 1950 of 150 individuals (Snyder and Johnson 1985). Using Koford's estimate of population size (1953), Miller et al. (1965) estimated only 42 birds were left in the wild in the early 1960s. In 1978, the wild population was estimated at 30 individuals (Wilbur 1980). Comprehensive counts of California condors began in 1982, with the advent of photo-censusing efforts allowing reliable identification of individuals (Snyder and Johnson 1985). This effort confirmed that the wild population declined from an estimate of 21 individuals in 1982, to 19 individuals in 1983, 15 individuals in 1984, and 9 individuals in 1985. The decline in the wild during this period resulted partly from the removal of birds for captive breeding purposes. By the end of 1986, all but two wild California condors had been taken into captivity. On April 19, 1987, the last wild California condor was captured and taken to the San Diego Wild Animal Park. At that time, there were 27 individuals in the global population.

Beginning in 1992, captive condors began to be released back into the wild, with increasing numbers being released in succeeding years. As of August 31, 2013, there were 424 California condors in the world population, including 201 in captivity and 223 in the wild (USFWS 2013b). The wild population includes 123 in central and Southern California, of which approximately 56 (not including 6 young still in the nest) currently inhabit Southern California and have the potential to visit portions of the Plan Area. The remaining wild population includes 30 birds in Baja California and 70 in Arizona. Due to a

combination of captive breeding and release, and wild nest reproduction, this population is steadily increasing and is expected to continue to increase, barring stochastic catastrophes.

Table 3. Numbers of California Condors in the Wild in August 2013

Location	Type	Number
Southern California	Wild-fledged	10
	Released free-flying	56
Central California[1]	Wild-fledged	11
	Released free-flying	61
Arizona	Wild-fledged	7
	Released free-flying	66
Mexico	Wild-fledged	2
	Released free-flying	29
Total		**213**

[1] Central California includes Pinnacles National Monument and Central Coast.

Source: USFWS 2013b.

Threats and Environmental Stressors

Because California condors are characterized by high survival rates and low reproductive rates, low rates of adult mortality are important for population stability (Meretsky et al. 2000; Snyder and Schmitt 2002; Walters et al. 2008). Condors have a clutch size of one egg, a normal nest success rate of 40%–50%, and an age of first breeding from about 5 to 8 years (USFWS 1996). They may nest in successive years if nestlings successfully fledge early in the year, but they usually skip years (USFWS 1996).

The decline of the condor population during the early 1900s has not been definitively linked to any particular cause; however, it was likely the result of high mortality rates due to direct persecution, collection of specimens, and secondary poisoning from varmint control efforts and 1,1,1-trichloro-2,2-bis(pchloro-phenylethane (DDT) (Snyder and Snyder 2005; D'Elia and Haig 2013). Lead poisoning may have been a contributing factor, but was not recognized as such until after 1980, at

which time it became identified as a major cause of mortality that resulted in the recent decline (Janssen et al. 1986; Bloom et al. 1989; Pattee et al. 1990; Cade 2007; Grantham 2007b; Hall et al. 2007), particularly since the development of lead ammunition that fragments upon impact in living tissue. In both California and Arizona, many reintroduced birds have been exposed to high levels of lead (Fry, 2003 and 2004; Cade 2007; Grantham 2007b; Hall et al. 2007; Hunt et al. 2007; Sullivan et al. 2007; Woods et al. 2007). Other recent documented sources of mortality include predation, powerline collision, micro-trash, fire, and shooting (USFWS 2013a).

The latest version of the Condor Recovery Plan (FWS 1996) suggests that habitat loss is not an important factor in the recovery of the condor. Similarly, Snyder (2007) did not identify habitat loss as a limiting factor for wild California condors. Although historical condor habitat, especially foraging areas, has been modified, condors are opportunistic scavengers and have switched from natural carrion to feeding on domestic livestock carrion with the conversion of native grasslands to pasture (Wilbur 1972; Studer1983). In addition, current condor populations may be too low to be affected by low habitat availability (Snyder and Schmitt 2002). However, as the wild condor population increases and expands its current foraging range, and potentially nesting site distribution, secure foraging habitat availability and safe food sources could become limiting factors for recovery of the species. Providing foraging habitat for the condor is one of the recovery objectives for the species (USFWS 1996).

Conservation and Management Activities

Since the 1980s, there has been an extensive series of conservation and management activities for the California condor, which are briefly summarized here. The reader is directed to the Recovery Plan for the California Condor (USFWS 1996) for an in-depth discussion of conservation actions prior to 1996.

In 1973, a California condor recovery team, involving the U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG), National Audubon Society, U.S. Forest Service, Bureau of Land Management, Zoological Society of San Diego, and Los Angeles Zoo, was created and the Condor Recovery Program was initiated (USFWS 1996).

The team produced the first California Condor Recovery Plan, which was approved in 1975, with subsequent revisions in 1979, 1984, and 1996. While earlier plans focused on reducing mortality factors through habitat preservation and conservation and the initiation of a captive breeding program for California condors, the 1996 version of the plan shifted the conservation emphasis to the existing captive breeding program and reestablishment of the species in the wild (USFWS 1996).

As part of the program, all remaining individuals left in the wild were captured between 1982 and 1987 for an intensive captive bird breeding program. By 1987, a captive population of 27 individuals had been established. Captive breeding operations resulted in a substantial production in young, which prompted the initiation of a condor release program to the wild in 1992. An intensive management program, including monitoring, captive breeding, and supplemental feeding, continues to be implemented because it is needed to maintain wild populations (USFWS 2010).

Data Characterization

The California condor is one of the most thoroughly studied species in the United States. Free-flying condors have been outfitted with radiotelemetry and GPS units, and hundreds of thousands of data points have been collected. For example, the U.S. Geological Survey (USGS) 2010 study of the Southern California condor population alone analyzed 127,931 GPS locations for 21 individuals for the period of 2004 through 2009. A wealth of information and data are available for this species, and the continuing efforts at captive breeding and release ensure that this data flow will continue.

Management and Monitoring Considerations

The California condor has been one of the most managed species in the United States. As a result of this intense management, including the ongoing captive breeding program, condors have been pulled back from the brink of extinction.

Specific measures identified in the USFWS spotlight species action plan [for] 2010–2014 (2009) to reach the identified target goal of maintaining the status of the condor include the following:

1. Maintain captive reproductive rate of no less than 20 chicks per year.
2. Increase the wild populations to 280 individuals.
3. Increase yearly active breeding attempts to 35 pairs.
4. Improve annual wild nest success rates to 52%.
5. Continue monitoring for lead exposure in free-flying California condors and surrogate species and lead in the environment using carcass collection concurrent with regulation changes.
6. Continue chelation therapy treatment for all California condors with measured lead blood levels higher than 40 micrograms per deciliter.
7. Complete and publish research reports on topics related to California condor natural history, ecology, and management to be applied toward adaptive management.
8. Maintain outreach and education programs to provide information on California condor biology, ecology, and management actions.
9. Maintain outreach and education programs to provide information on non-lead alternative ammunition.

In addition, the USFWS 5-year Review included specific management and research recommendations over the next 5 years within specific programs including: priority needs, captive breeding program, field restoration activities, data analysis and management, outreach and education, and research.

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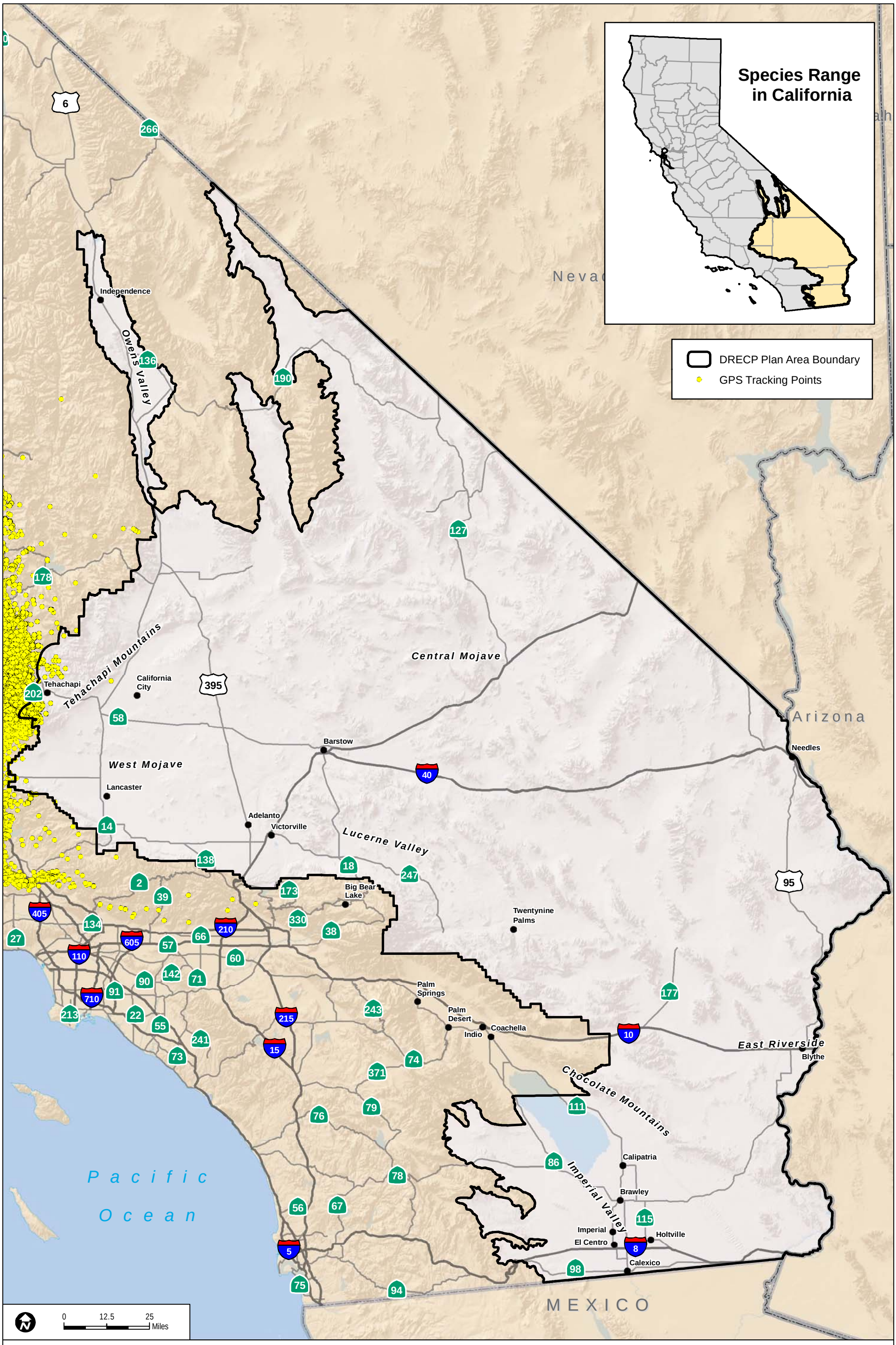

Sources: ESRI (2014); USFWS (2013), CWHR (2008)

FIGURE SP-B05

California Condor Occurrences in the Plan Area