

## Greater Sandhill Crane (*Grus canadensis tabida*)

### Legal Status

**State:** Threatened/  
Fully Protected  
**Federal:** Bureau of Land  
Management Sensitive  
**Critical Habitat:** N/A  
**Recovery Planning:** N/A

### Taxonomy



Photo courtesy of Brock Ortega, Dudek.

Greater sandhill crane (*Grus canadensis tabida*) is one of three subspecies of sandhill crane by the last edition of the American Ornithologists' Union Check-list of North American Birds to include subspecies (5<sup>th</sup> ed.). More recently, three additional subspecies have been recognized (Johnsgard 1983; Archibald and Meine 1996; Clements et al. 2011). Of the six subspecies, three are migratory (including *G.c. tabida*) and three are non-migratory; each of the non-migratory subspecies is listed under the federal Endangered Species Act. Subspecies boundaries in sandhill crane are significant for conservation and legal status, as well as for game management.

The three migratory subspecies, including greater sandhill crane, are separated by morphology, especially size: greater sandhill crane is the largest; Canadian sandhill crane (*G.c. rowani*) is intermediate in size; and lesser sandhill crane (*G.c. canadensis*) is the smallest (Tacha et al. 1992). However, the greater and Canadian subspecies are not fully separated. They also intergrade and apparently pair randomly at the limits of their ranges (Tacha et al. 1992; Archibald and Meine 1996). Since the recognition of the intermediate-sized Canadian subspecies, there have been several studies with varying conclusions on the limits and validity of the three migratory subspecies (summarized in Rhymer et al. 2001), and the separation of *G.c. rowani* as a distinct subspecies may not be well-grounded (Rhymer et al. 2001).

Five populations of greater sandhill crane are recognized based on morphological and geographical differences, suggesting some genetic distinctness, but these differences do not merit recognition at the subspecies level. The majority of sandhill cranes that visit the Desert Renewable Energy Conservation Plan (DRECP) area belong to the Lower Colorado River Valley (LCRV) population, but some may also be some connection with the Central Valley population (Meine and Archibald 1996).

Illustrations and descriptions of the greater sandhill crane's physical characteristics can be found in Johnsgard (1983) and Archibald and Meine (1996).

## Distribution

### General

Greater sandhill crane formerly occupied a much larger breeding range than it does now, ranging across the western and mid-continent from the southern portions of the western and central provinces of Canada (British Columbia, Alberta, Saskatchewan, and Manitoba) to as far south as northern California, Nevada, and Arizona, and northwestern New Mexico in the west and northern Illinois and southern Ontario, Canada in the midwest (Rhymer et al. 2001). Its Hunting and habitat loss beginning in the 1930s greatly reduced the population size and range, but has expanded in recent years. Because of interbreeding with lesser sandhill crane, the northern limits of the population are difficult to define, but the current breeding range of the greater sandhill crane now generally includes contiguous areas of Canada from British Columbia in the west to Wisconsin, Michigan and southern Ontario in the east (Rhymer et al. 2001; Tacha et al. 1992). Disjunct breeding populations occur in four areas of the western U.S.: (1) the nexus of northeastern California, southeastern Oregon and northwestern Nevada; (2) northeastern Nevada; (3) along the border region of Idaho and Wyoming north to southern Montana and south to northern Utah; and (4) northwestern Colorado (Rhymer et al. 2001; Tacha et al. 1992). Sandhill cranes winter in the southern United States and northern Mexico (Tacha et al. 1991). Wintering locations in California include the lower Colorado River and Salton Sea area, and Imperial Valley and the Central Valley (Patton et al. 2003; Rosenberg

et al. 1991 Tacha et al. 1991) (Figure SP-B10). Sandhill cranes also historically wintered abundantly at the Colorado River delta at the head of the Gulf of California in Mexico, about 80 kilometers (50 miles) south of Yuma, Arizona, and was still wintering in Sonora, Mexico in moderate numbers in recent years (Russell and Monson 1998 p. 87, as cited by Campbell, pers. comm. 2012).

### **Distribution and Occurrences within the Plan Area**

Sandhill cranes are winter visitors to the Plan Area and have never been documented to breed in Southern California. Greater sandhill cranes that overwinter in the Plan Area belong to two populations: the Central Valley population and the LCRV population (Meine and Archibald 1996). The Central Valley population breeds in northeastern California and adjacent south-central and southeastern Oregon, and at scattered sites in southern British Columbia and on Vancouver Island. This population mainly overwinters in the Central Valley and perhaps in the Imperial Valley. The LCRV population breeds mainly in northeast Nevada and portions of adjacent states and winters in the LCRV and the Imperial Valley.

### ***Historical***

Historically, the LCRV population wintered south along the Colorado River Valley from eastern Nevada as far south as the delta in the Gulf of California (Kruse et al. 2011). Wintering greater sandhill cranes occurred “sparingly” south to the Imperial Valley, and lesser sandhill cranes also overwintered in Southern California, including the Colorado River Valley, the Imperial Valley, and the south end of the Salton Sea (Grinnell and Miller 1944).

Garrett and Dunn (1981) also stated that both greater and lesser sandhill crane subspecies overwintered in Southern California and noted that the relative abundance of the two forms is imperfectly known. They described greater sandhill crane as a regular winter visitor, with overwintering birds known from several scattered locations in the Plan Area: in the fields between Brawley and El Centro in Imperial County, in fields along the Colorado River north of Blythe and in the Cibola area in Riverside County, and in small numbers in the Needles/Topock area in San Bernardino County. Detailed

historical counts of wintering sandhill cranes in the lower Colorado River in California are provided in Appendix C of the Pacific Flyway Council's 1995 Management Plan.

There are no historical records for the greater sandhill crane in the California Natural Diversity Database (CNDDDB) for the Plan Area (CDFW2013; Dudek 2013).

### **Recent**

The current overwintering distribution in the Plan Area is similar to that described by Garrett and Dunn (1981), with several regularly used winter locations in both the Imperial Valley south of the Salton Sea and along the Colorado River. Patten et al. (2003) indicate that historically the great majority of wintering sandhill cranes in the Imperial Valley were lesser sandhill cranes and most wintering along the Colorado River were the greater subspecies, but both subspecies are known in both areas and recent relative numbers are unclear. Patten et al. (2003) also cite five records for the species at or near the north end of the Salton Sea; three in winter and one each in fall and spring.

There are no recent (i.e., since 1990) occurrence records in the CNDDDB (CDFW 2013; Dudek 2013) for greater sandhill crane, but there are 16 recent occurrence records contained in the eBird database for the Plan Area for the species (the database does not include subspecies information) (Dudek 2013). These observations are primarily located south of the Salton Sea and along the lower Colorado River, with one 2011 (January) observation from Silver Lake (in Galileo Park) in California City in the western Mojave Desert (Figure SP-B10) (Dudek 2013). This small number of database occurrences, however, does not clarify the common use of the Salton Sea, Imperial Valley and lower Colorado River areas by large numbers of greater sandhill cranes in overwintering congregations. Recently, approximately 250 to 300 overwintering greater sandhill cranes were estimated to forage in privately owned grain fields south of Brawley in the Imperial Valley (Cooper 2004; Schram 2006). A recent local report describes an overwintering group of about 400 cranes foraging during the day near the intersection of Keystone and Dogwood, and roosting at night at private duck clubs in the nearby Mesquite Lake area (Kalin 2005), and this area is known to be a reliable site for

overwintering sandhill cranes (Schram 2006). Several hundred sandhill cranes currently winter in Unit 1 of the Sonny Bono Salton Sea National Wildlife Refuge (NWR) (Kruse et al. 2011). Along the lower Colorado River, sandhill cranes have been observed west of the River south Earp and just north of Blythe.

Away from the Colorado River and Salton Sea/Imperial Valley area, in addition the 2011 California City observation noted above, there are 16 records in the Plan Area published in *North American Birds* magazine for the period from 1981 through 2005 (Campbell, pers. comm. 2012). Half are in the Owens Valley, from Bishop south to Owens Lake, with the others at Desert Center (2 records), Harper Dry Lake (2), Ridgecrest (2), Death Valley (1), and near Lancaster (1). Seasonally they extend from September 11 to May 20, with 10 records in fall, 2 in winter, and 3 in spring (Campbell, pers. comm. 2012).

## Natural History

### Habitat Requirements

Greater sandhill cranes are found primarily in open freshwater wetlands, including shallow marshes and wet meadows (Tacha et al. 1992; Meine and Archibald 1996). They nest in moist areas at the margins of extensive wet meadows and marshes (Tacha et al. 1992). Migrating and wintering greater sandhill cranes often forage in agricultural fields, especially stubble or disked fields where grain crops have been harvested (Tacha et al. 1992). Overwintering birds in the Plan Area use irrigated pastures and croplands, grain fields, and dairy farms (Meine and Archibald 1996). Migrating and wintering birds typically use roost sites in shallow wetlands near foraging areas.

**Table 1.** Habitat Associations for Greater Sandhill Crane

Land Cover Type	Land Cover Use	Habitat Designation	Habitat Parameters	Supporting Information
Freshwater wetlands	Nesting, foraging, roosting, migration staging	Primary habitat	Open areas with minimal disturbance, no or few trees, shallow water, variety of marsh and	Direct observations and surveys

**Table 1.** Habitat Associations for Greater Sandhill Crane

Land Cover Type	Land Cover Use	Habitat Designation	Habitat Parameters	Supporting Information
			vegetation types, usually with short vegetation	
Agricultural fields	Foraging in winter	Secondary habitat	Harvested / flooded agricultural fields of grain or truck crops; also irrigated pasture	Direct observations and surveys

**Sources:** Johnsgard 1983; Tacha et al. 1992; Meine and Archibald 1996.

### Foraging Requirements

Sandhill cranes forage primarily in open, shallow freshwater wetland habitats and agricultural fields, such as irrigated pasture and harvested croplands with waste grain (Tacha et al. 1992). They are omnivorous, eating a variety of small animals and plant material that they glean from the surface or subsurface (Tacha et al. 1992). In addition, their diet varies widely depending on season and location; they are therefore able to adapt to changes in habitat and food availability to some extent. Typical native plant materials include tubers and seeds of aquatic plants. For overwintering birds, waste grain is a very important component of the diet. A wide variety of animal prey items is taken, including large invertebrates and small vertebrates such as mice, frogs, fish, and birds (summarized in Stone 2009). Cranes forage in vigilant groups in open areas where visibility is good; they are sensitive to disturbance and are easily flushed by approach, often leaving the area. For cranes foraging on agricultural fields, the level of disturbance from typical daily farm activities can be enough to disrupt foraging.

In the Plan Area, overwintering greater sandhill cranes predominantly forage in agricultural fields and irrigated pastures. Overwintering cranes near Brawley have been observed foraging in irrigated pastures of ryegrass, alfalfa, and Bermuda grass, as well as feeding on spilled grain

along railroad tracks near a grain unloading facility north of Keystone (Kalin 2005). Alfalfa and milo fields were readily used along the Colorado River (Rosenberg et al. 1991), as well as corn fields grown for waterbird forage at Cibola National Wildlife Refuge (NWR) (Oldham, pers. comm. 2012). Overwintering cranes in the Plan Area are heavily dependent for foraging throughout the winter on agricultural fields that are close to safe shallow-water wetlands for roosting at night.

### Reproduction

Sandhill cranes form pair bonds that last for life, and do not breed until they reach 2 to 7 years of age (Tacha et al. 1992). Each pair maintains a breeding territory, and both male and female build a large nest of plant material typically placed in shallow water or dry land at the margin of a wetland (Tacha et al. 1992). They produce a single clutch, almost always of two eggs, and eggs are incubated for about 30 days (Tacha et al. 1992). The chicks are ready to leave the nest soon after hatching and begin feeding after about 1 day. Both parents assist in feeding the chicks. If food is limited only one chick may survive, but if the food supply is adequate, both chicks may survive. Soon after their first flight, young birds depart with their parents on the southward migration to their wintering grounds, and remain with their parents throughout the winter until they are 9 or 10 months old (Tacha et al. 1992).

**Table 2.** Key Seasonal Periods for Greater Sandhill Crane

	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Breeding/Fledging				X	X	X	X	X				
Migration		X	X	X					X	X		
Overwintering	X	X								X	X	X

**Sources:** Johnsgard 1983; Tacha et al. 1992; Meine and Archibald 1996; Schram 2006.

### Spatial Activity

For the species as a whole, overwintering sandhill cranes typically arrive in Southern California during October and depart from

February through March (Schram 2006, p. 389). Spring migration for the LCRV population may begin as early as the first week of February (Pacific Flyway Council 1995; Kruse et al. 2011). Cranes depart northward and at least some stage at Lund in Nevada, where they spend a few weeks before continuing north to the breeding grounds by mid-March (Pacific Flyway Council 1995). In fall, cranes move to pre-migratory staging areas in Ruby and Lamoille Valleys in Elko County, Nevada and assemble before heading south at the end of October along the White River to their wintering grounds (Pacific Flyway Council 1995). The majority of the population overwinters at the Cibola NWR on the Arizona side of the Colorado River, with several hundred birds along the California side of the valley and in the Imperial Valley (Kruse et al. 2011). The migration route of the LCRV population is one of the shortest among the migratory sandhill cranes.

A survey of wintering birds at the major concentrations in the LCRV area in 1986 showed that 61% of cranes that had been captured and marked in the summer breeding range in Nevada were observed in the LCRV population winter range; in contrast, only 30% of the LCRV winter population has been located in the Nevada summer range (Pacific Flyway Council 1995).

### Ecological Relationships

Most of the foraging and roosting sites for greater sandhill crane are on private lands used for farming and by duck clubs, and the cranes are subject to disturbance from farm activities and hunting. Collision with power lines that traverse the agricultural areas is a potential cause of injury or death for cranes flying between foraging areas. Losses to predators are rare because the birds forage in groups in open areas where visibility is good.

### Population Status and Trends

**Global:** Increasing (Tacha et al. 1992; Meine and Archibald 1996)

**State:** Increasing (Central Valley population); some western populations may be declining (Meine and Archibald 1996)

**Within Plan Area:** Increasing (LCRV population, Kruse et al. 2011; group wintering in Imperial Valley, Kalin 2005)

The LCRV population is currently the least numerous of the migratory crane populations (Kruse et al. 2011). Aerial surveys of the major overwintering concentrations of the LCRV populations (lesser and greater) have been conducted since 1998 (at two sites in Arizona and the Sonny Bono Salton Sea NWR and Gila River), and suggest that the overall numbers are increasing at a rate of about 3% per year, from an estimated 1,900 in 1998 to 2,415 counted in 2011 (Kruse et al. 2011). However, the relative numbers of greater and lesser sandhill cranes across time is poorly known, casting uncertainty on trends for the greater sandhill crane population here.

The portion of the Plan Area total numbers overwintering at the Salton Sea NWR increased in parallel with the overall increase, from 351 in 1998 to 899 in 2011 (Kruse et al. 2011). The recruitment rate of this population is one of the lowest for sandhill cranes (Drewien et al. 1995) at 4.8% with a mean brood size of 1.14 for the periods 1973–1975 and 1989–1992 (Drewien et al. 1995). However, the most recent recruitment survey, conducted in early spring 2011, indicated a much higher rate of 9.36% (Rabe undated, cited in Kruse et al. 2011).

### Threats and Environmental Stressors

The most significant current threat to the greater sandhill crane subspecies appears to be habitat loss and degradation, especially on the wintering grounds in California and Florida, the nesting areas in the Midwest, and migration stopovers, especially the Platte River (Meine and Archibald 1996).

Several specific habitat issues of concern for the LCRV population winter grounds have been identified: (1) a shortage of good roosting sites near foraging areas with grain fields; (2) lack of management and control over agricultural crops that provide winter foraging; (3) destruction of roost sites by past and proposed dredging and channelization projects along the Lower Colorado River; and (4) conversion of croplands from grain to crops that do not provide good foraging for cranes, such as alfalfa and cotton (Pacific Flyway Council 1995). In addition, potential impacts of water transfers and fallowing of agricultural areas in both Imperial Valley and lower Colorado River Valley could have critical impacts on winter grounds (Campbell, pers. comm. 2012).

### Conservation and Management Activities

The greater sandhill cranes overwintering in Southern California (the LCRV population) have not been hunted since 1918; however, in 2007 the U.S. Fish and Wildlife Service completed an Environmental Assessment on proposed hunting regulations for this population, and in 2008 proposed a small allowable harvest of 30 birds in years when the wintering population numbers exceeded 2,500; the proposed harvest is guided by a cooperative management plan (Pacific Flyway Council 1995). No cranes have been harvested yet because the population remains below the 2,500-bird threshold (Kruse et al. 2011).

The exact breeding location of about 70% of the wintering LCRV population is uncertain, and the Arizona Game and Fish Department is currently investigating movement patterns and breeding locations by placing satellite transmitters and alphanumeric bands on wintering birds so their movements can be tracked (Ingraldi and Frary 2010).

The Pacific Flyway Management Plan for the LCRV population of greater sandhill crane (Pacific Flyway Council 1995) provided a series of management recommendations grouped into several categories: habitat, environmental education and law enforcement, inventories, and research. The habitat recommendations were focused on the nesting and stopover sites, in addition to the wintering grounds. Winter roost sites were identified for protection and acquisition, including two key sites southeast of Brawley: the D & K Duck Club and Osterkamp Farms.

To address the shortage of foraging habitat close to suitable roost sites, at Cibola NWR on the Arizona side of the Colorado River, where the largest concentration of the LCRV population spends the winter, additional foraging has been provided by planting corn crops near suitable roost sites, and this has proved successful in maintaining and increasing the crane numbers there.

### Data Characterization

There are three important areas of information uncertainty at this time. First, the uncertainty over the breeding range of about 70% of the LCRV wintering population has implications for the overall

management of this population and adjacent populations. However, despite the uncertainty over their summer range, the LCRV population consistently winters in the Plan Area, and, assuming the population is not limited entirely by factors away from the winter grounds, conservation measures implemented under the DRECP would benefit the population wintering in the Plan Area.

Second, there is ongoing uncertainty about the relative proportions of the lesser and greater sandhill crane subspecies, both in the Imperial Valley and along the lower Colorado River, masking population trends in the LCRV population of greater sandhill crane. Depending on limiting factors present in the two populations, it is also possible that competition with lesser sandhill crane could pose some degree of threat to the LCRV greater sandhill crane population (Campbell, pers. comm. 2012).

Third, there is uncertainty regarding the effect on habitat of changes in agricultural practices as a result of changes in water availability on wintering grounds. Specific issues include political developments, such as water transfers, the effect of climate change, and the potential interaction of these two issues (Campbell, pers. comm. 2012).

## Management and Monitoring Considerations

Monitoring sandhill crane numbers is relatively straightforward because the cranes are large, diurnal, gregarious birds that forage in open habitats. For at least the early part of the winter, young birds can be distinguished from adults, allowing annual recruitment to be quantified and monitored. Annual surveys using consistent methods are ongoing and provide a reasonably accurate tracking of species numbers and trends.

Though not critical within a single year, it will be important over time to adequately distinguish the LCRV population of greater sandhill cranes from the lesser sandhill cranes wintering in the Plan Area. This will prevent masking of changes in the numbers of greater sandhill cranes by data for the other subspecies (Campbell, pers. comm. 2012). Potential techniques include monitoring the cranes vocalizations (Jones and Witt 2012) or more traditional trapping of cranes or training of observers.

## Species Modeled Habitat Distribution

This section provides the results of habitat modeling for greater sandhill crane, using available spatial information and occurrence information, as appropriate. For this reason, the term “modeled suitable habitat” is used in this section to distinguish modeled habitat from the habitat information provided in Habitat Requirements, which may include additional habitat and/or microhabitat factors that are important for species occupation, but for which information is not available for habitat modeling.

There are 638,431 acres of modeled suitable habitat for greater sandhill crane in the Plan Area. Appendix C includes a figure showing the modeled suitable habitat in the Plan Area.

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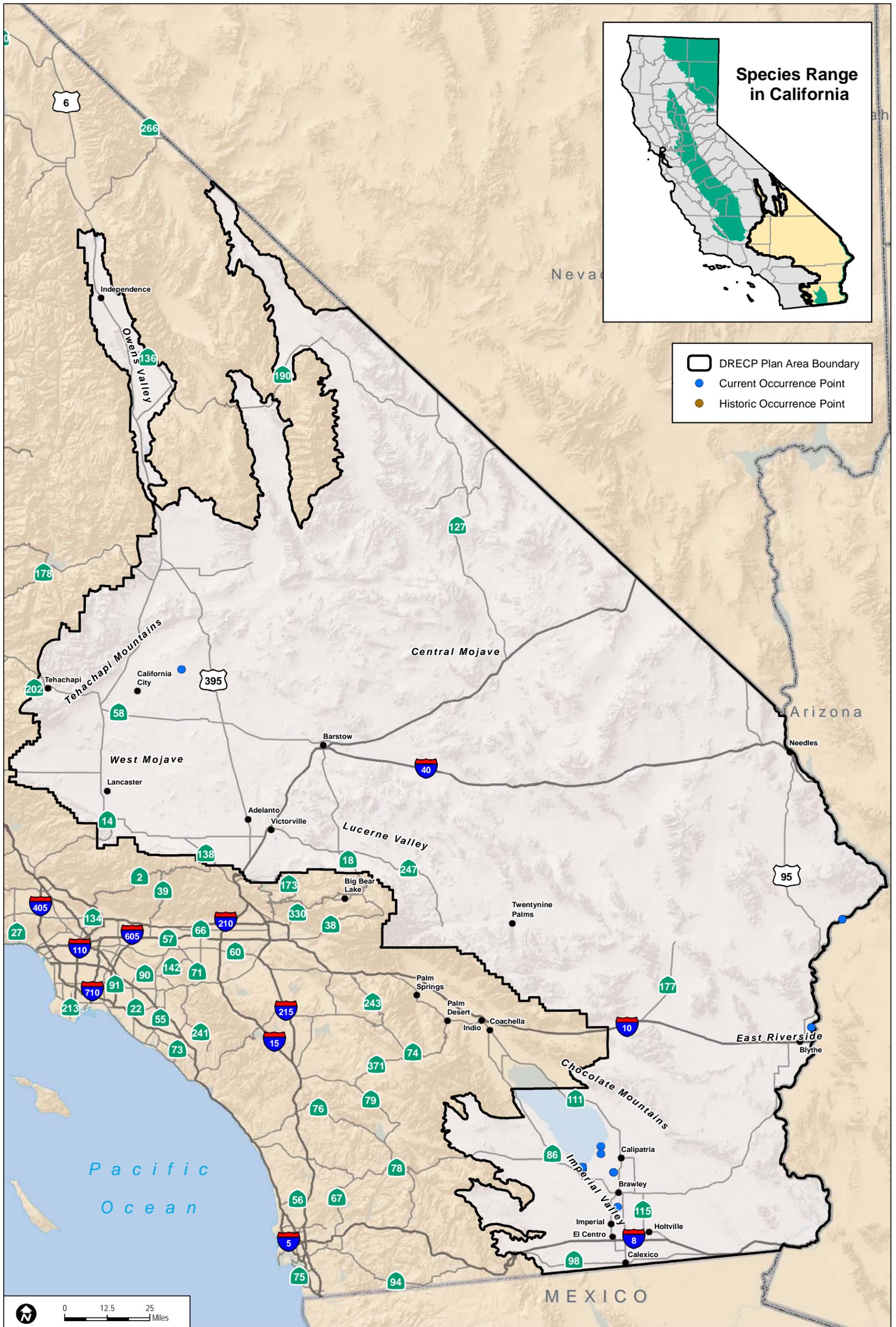
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Sources: ESRI (2014); DRECP Species Occurrence Database (2013), CWHR (2008)

**FIGURE SP-B08**  
**Greater Sandhill Crane Occurrences in the Plan Area**