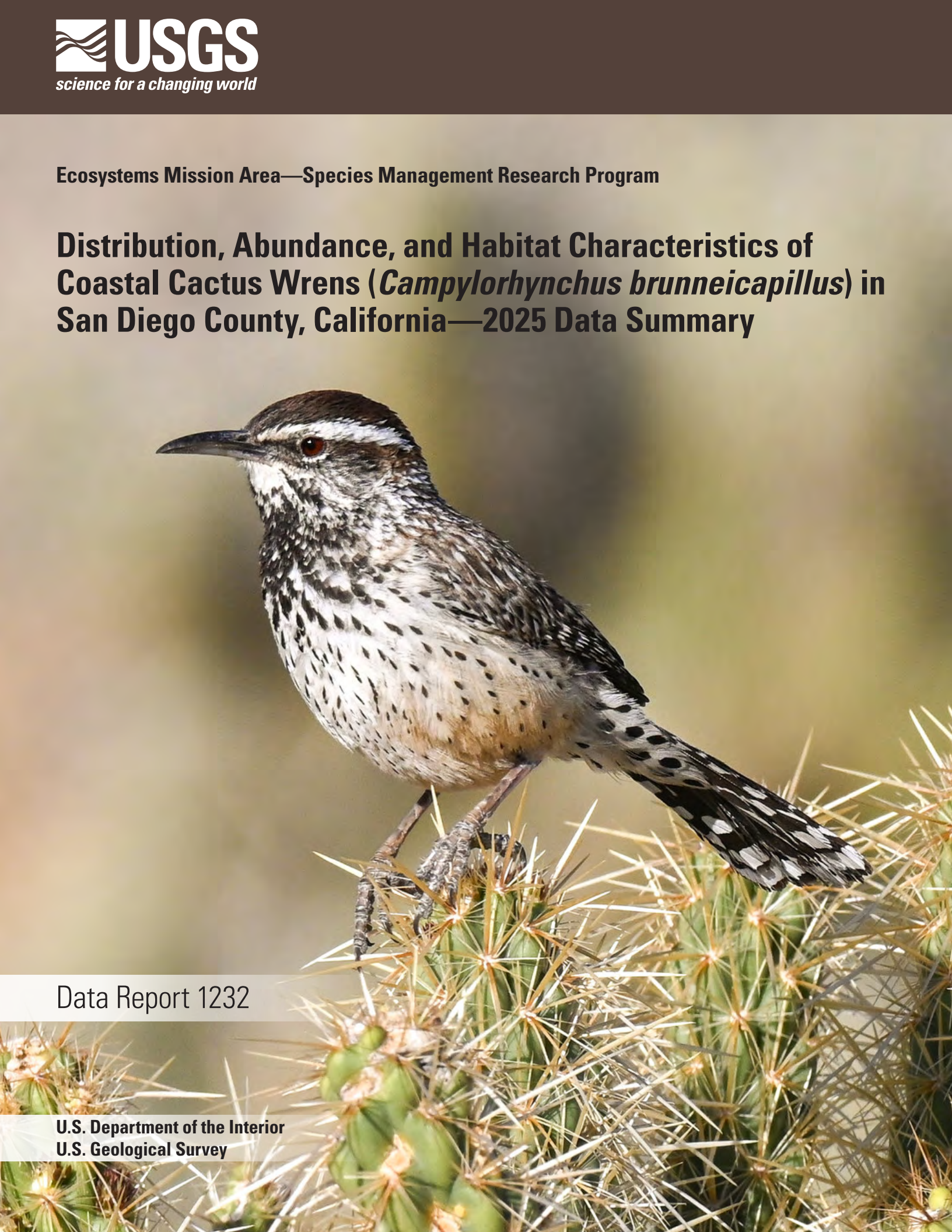
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Distribution, Abundance, and Habitat Characteristics of Coastal Cactus Wrens (*Campylorhynchus brunneicapillus*) in San Diego County, California—2025 Data Summary



Data Report 1232

U.S. Department of the Interior
U.S. Geological Survey

Cover. Coastal Cactus Wren (*Campylorhynchus brunneicapillus*). Photograph by Alexandra Houston, U.S. Geological Survey, April 6, 2025.

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By Alexandra Houston, Suellen Lynn, and Barbara E. Kus

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Conversion Factors

International System of Units to U.S. customary units

Multiply	By	To obtain
	Length	
centimeter (cm)	0.3937	inch (in.)
meter (m)	3.281	foot (ft)
meter (m)	1.094	yard (yd)

Datum

Horizontal coordinate information is referenced to the World Geodetic System of 1984 (WGS 84).

Distribution, Abundance, and Habitat Characteristics of Coastal Cactus Wrens (*Campylorhynchus brunneicapillus*) in San Diego County, California—2025 Data Summary

By Alexandra Houston, Suellen Lynn, and Barbara E. Kus

Executive Summary

We surveyed for coastal Cactus Wren (*Campylorhynchus brunneicapillus*) in 498 established plots in San Diego County, California, in 2025, encompassing 4 genetic clusters (Otay, Lake Jennings, Sweetwater/Encanto, and San Pasqual). Of the 498 plots, 372 have been surveyed every year starting in 2020. Two surveys were completed at each plot between March 1 and July 31. Cactus Wrens were detected in 220 plots (44 percent of plots). In plots that have been consistently surveyed since 2020, Cactus Wrens were detected in 35 percent of plots, similar to 2024 (34 percent), 2021 (35 percent), and 2020 (35 percent), and higher than in 2023 (26 percent) and 2022 (30 percent). Across all survey plots we detected 184 Cactus Wren territories in 2025. We documented 107 territories in plots that have been consistently surveyed since 2020, which is similar to the number of territories in 2024 (106) and 2020 (108), more than we documented in 2022 (93) and 2023 (85), but slightly less than the peak in 2021 (113). Across all survey plots the number of territories increased from 2024 to 2025 in the San Pasqual genetic cluster, increased slightly in the Lake Jennings cluster, decreased slightly in the Sweetwater/Encanto genetic cluster and remained the same in the Otay genetic cluster. At least 83 percent of Cactus Wren territories were occupied by pairs, and 100 fledglings were observed in 2025.

We observed three banded Cactus Wrens in 2025. Adult birds ranged from 6 to 9 years old and occupied the same territories as in previous years. Banding of Cactus Wrens ceased in 2019 and as a result we have a very low number of banded wrens remaining in the population, which makes it difficult to detect movement of wrens between genetic clusters. We detected no movement of banded Cactus Wrens between genetic clusters in 2025.

Vegetation at Cactus Wren survey plots was dominated by coastal sage scrub shrubs, such as California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), and lemonade berry (*Rhus integrifolia*). Cactus Wrens preferentially selected plots dominated by California buckwheat in the Otay genetic cluster and avoided plots dominated by lemonade berry and jojoba (*Simmondsia chinensis*). Cactus Wrens also appeared to prefer plots dominated by broom baccharis (*Baccharis sarothroides*) while avoiding plots dominated by California sagebrush in the Lake Jennings cluster. No definitive signs of fungal pathogens were observed on cactus within and around survey plots. Blue elderberry (*Sambucus mexicana*) was detected at 43 percent of plots, and Cactus Wrens preferentially occupied more plots with elderberry than were available. Very little dead or unhealthy cactus was observed within all survey plots, and Cactus Wrens preferentially occupied plots with less dead cactus while occupying plots with unhealthy cactus in proportion to its availability. Eighty-nine percent of plots had more than 5 percent of cactus crowded or overtopped by vines and shrubs, and Cactus Wren occupied plots in proportion to the degree of shrub and vine crowding or overtopping. Just over half of the plots had greater than 5 percent non-native annual cover, with Cactus Wrens preferentially occupying plots with less non-native cover.

Introduction

The coastal Cactus Wren (*Campylorhynchus brunneicapillus*, also referred to as wren) is a fragmentation-sensitive resident species in southern California that requires thickets of cholla (*Cylindropuntia* spp.) or prickly pear cactus (*Opuntia* spp.) for nesting. Limited naturally by the patchy distribution of this habitat, wren populations have become further fragmented in recent decades by urbanization, habitat degradation, and stochastic events, such as wildfire (Solek and Szijj, 2004; Hamilton and others, 2020). As a result, wren populations have been diminished in size and distribution and occur largely as islands in a matrix of generally unsuitable habitat.

Among the consequences of habitat fragmentation on wren viability is genetic isolation, which can lead to loss of genetic variability and ability to adapt to changing environments (Barr and others, 2015). Although wrens, like other birds, are mobile and can presumably fly long distances between habitat patches (Barr and others 2012, 2013; Preston and Kamada, 2012; Kamada and Preston, 2013), movement of wrens between patches in southern California seems to be rare (Lynn and others, 2022). Juvenile dispersal, whereby young birds leave their natal territories and establish breeding territories of their own, is the primary process by which genetic connectivity is achieved (Vandergast and others, 2024). Few juveniles have been documented dispersing among cactus sites in San Diego County, California (Lynn and others, 2022).

In addition to isolation, population declines in part of the species' range have raised concerns regarding the capacity for long-term persistence of wrens in San Diego County. Cactus Wren populations have declined in southern California during the last three decades (Preston and Kamada, 2012); however, in San Diego County, particularly steep declines have been documented in the southern part of the county near Otay Valley. Wren territories on conserved lands in this region, which numbered 53 in 1992, declined to 14 in 2014 (Nature Conservancy and San Diego Management and Monitoring Program, 2015). Although the wren population in Otay increased to 43 territories by 2021 (Lynn and Kus, 2022), this population decreased to 34 territories by 2022 (Lynn and Kus, 2023), 37 territories in 2023 (Lynn and Kus, 2024), and 42 territories in 2024 (Lynn and Kus, 2025) remaining below the minimum effective population size of 50–100 individuals needed to prevent inbreeding depression (Frankham and others, 2014; Vandergast and others, 2022).

Although associated with declines beginning in the late 1980s (Rea and Weaver, 1990; Solek and Szijj, 2004, Hamilton and others, 2020), neither fire nor development seem to be the primary factor responsible for the more recent and localized Otay wren population decline. Recent multiple years of drought could have affected wren abundance by reducing arthropod food resources, which could lower fecundity and survival (Preston and Kamada, 2012; Lynn and others, 2022, Nell and others, 2023). Annual precipitation in San Diego County has been less than 75 percent (less than 18.0 centimeters [cm]) of the 1920–2025 average (24.0 cm) in more than half (13 years) of the last 25 years (2000–25); precipitation was less than 50 percent (less than 12.0 cm) of average in 8 of those years (5 years between 2000 and 2010; 3 years between 2011 and 2025; National Centers for Environmental Information, 2025). In 2014, an extreme drought year, productivity was exceptionally low, with only 3 fledglings observed during surveys of a population occupying 14 territories in the Otay region (Nature Conservancy and San Diego Management and Monitoring Program, 2015). In 2022, a less extreme drought year, more fledglings (33) were observed during surveys at 34 territories in the Otay region (Lynn and Kus, 2023).

Cactus Wrens are restricted to cactus scrub habitat, which is a rare vegetation community in San Diego County. Cactus scrub habitat is vulnerable to degradation by invasion of non-native annual plants and grasses and is slow to recover from wildfire (Mitrovich and Hamilton, 2007; Hamilton, 2009). Dense non-native annual plants and grasses within cactus scrub likely reduce the suitability of these areas for wrens, which primarily glean arthropod prey from bare ground and litter at the base of cactus and shrubs (Lynn and others, 2022).

Researchers in Orange County (adjacent to San Diego County to the northwest) identified blue elderberry (*Sambucus mexicana;* hereafter, elderberry) as a potentially important resource for Cactus Wrens. Elderberry was observed in many wren territories in Orange County, and researchers there suggested that it provided territorial advertising perches for adults, escape cover for fledglings, a food source from berries, and could be an important host for prey arthropods (K. Preston, U.S. Geological Survey, oral commun., 2015; Hamilton and others, 2020). This pattern appeared in San Diego County as well, where wrens were more likely to occupy plots with elderberry than plots without elderberry (Lynn and Kus, 2021, 2022, 2023, 2024; Winchell and others, 2021). Additionally, arthropod abundance was greater in elderberry than in other plant species in cactus scrub habitat in southern San Diego County (Lynn and others, 2022).

The Cactus Wren was selected as one of several indicator species by the San Diego Management and Monitoring Program to evaluate the state of the regional preserve system in San Diego County (Preston and others, 2022). The wren serves as an indicator for cactus scrub, a rare vegetation community, and is also a species of very high conservation priority within the regional preserve system (San Diego Management and Monitoring Program and The Nature Conservancy, 2017). The goals of the 2025 Cactus Wren effort were to perform surveys to assess the population status and to provide data to address two metrics used to evaluate the condition of the population in western San Diego County. To evaluate the overall status of the species, we calculated the proportion of cactus plots occupied by wrens and the quality of the cactus habitat. In addition, we collected data to better understand demographics within the wren population in western San Diego County, including resighting banded birds to determine age and movement of individuals, determining breeding status of wrens by observing paired behavior and documenting active nests and fledglings observed during surveys, and summarizing habitat attributes in occupied and available Cactus Wren survey plots.

Study Area and Methods

Survey plots were established throughout San Diego County by the U.S. Fish and Wildlife Service in 2011. We selected a subset of these plots that included four genetic clusters: (1) Otay, (2) Lake Jennings (also called "San Diego" genetic cluster in the data release [Kus and Lynn, 2022; ver. 6.0]), (3) Sweetwater/Encanto, and (4) San Pasqual (Barr and others, 2015; fig. 1). Plots in the Otay, Lake Jennings, and Sweetwater/Encanto genetic clusters were surveyed initially in 2015. Most plots have been surveyed annually from 2017 to 2025, with the exception of new plots added when wrens were found in new locations. A total of 512 plots have been surveyed at least once since 2015. We have surveyed 372 plots consistently from 2020 to 2025. In 2025, three of these consistently monitored plots were not surveyed because of access restrictions, and one was dropped from the study for lack of habitat (there is no longer cactus present sufficient to support Cactus Wrens). We surveyed plots in the San Pasqual genetic cluster in 2019, 2022, 2023, 2024, and 2025. In 2022–24, we surveyed 16 new plots in the northern part of the Lake Jennings genetic cluster to detect potential northward movement of wrens; however, 4 of these were dropped in 2025 because they lacked sufficient cactus scrub habitat.

We visited each survey plot twice during a survey year: once between March 1 and May 31 and once between June 1 and July 31. Upon arrival, surveyors scanned the plot for wrens and wren nests and if wrens were not immediately detected, the surveyor broadcasted a wren song for 15–30 seconds to elicit a response. If wrens were not detected, surveyors carefully traversed the plot for up to 20 minutes, looking for wrens or wren nests and periodically broadcasting the wren song. In addition to recording presence or absence of wrens, observers attempted to count all wrens within the plot, determine their age, resight leg bands to identify individuals by unique colored leg band combinations from banding in previous studies (Lynn and others, 2022), and record the presence of active nests. Surveyors used Samsung Galaxy XCover6 Pro mobile phones with Android operating systems that have a built-in Global Positioning System to collect geographic coordinates (World Geodetic System of 1984 [WGS 84]) where wrens and wren nests were located.

Cactus Wren territories often included all or parts of multiple survey plots; therefore, occupancy of survey plots alone likely overestimated the actual number of wrens in the survey areas. To arrive at a more standard population count, we observed the behavior of wrens for up to 20 minutes during surveys to determine the actual number of wrens using a block of survey plots. We compiled data on population parameters, including number of wrens, age, breeding status (whether the wrens were paired or not), evidence of breeding (brood nests [containing eggs or nestlings] or fledglings observed), and color-band status by territory rather than by survey plot. Because Cactus Wrens do not show obvious sex- or age-distinguishing characteristics when observed under normal field conditions, typically we determined sex and age by specific behavioral cues or morphology when captured. Sex-related behavioral cues include position during copulation or incubation (females only). When in the hand, sex can be determined by the presence of a brood patch (females only) or cloacal protuberance (males only). If we did not observe sex-related behavioral cues, we assigned an adult as "male" if it sang or called more frequently or was more visually obvious than the other wren present (potentially advertising territory boundaries), although females also can have these behaviors. Juvenile behavior that helped distinguish age included begging from adults, rudimentary vocalizations, and sibling group behavior. Young juveniles had shorter bills and tails and a more diffuse throat patch than adults and generally appeared bright and clean compared to adults with worn and brownish plumage.

Cactus Wren Age and Movement

In 2025, we attempted to resight all wrens at survey plots to identify individuals based on color-band combinations. We used color-band resighting data to determine age and document movement from banding sites.

Vegetation Characteristics

During the first of the two annual surveys in 2025, observers noted habitat characteristics at each plot. These data included (a) dominant or co-dominant tree or shrub species, (b) presence or absence of elderberry, (c) the percentage of the plot that was covered by cactus, (d) the percentage of cactus that was dead, (e) the percentage of cactus that was unhealthy (gray, shriveled, with discolored patches typical of fungus or other diseases), (f) the percentage of cactus overtopped or crowded by vines or shrubs, and (g) the percentage of the plot that was covered by non-native annual plant species. We visually estimated cover of vegetation characteristics c–g and assigned them to 1 of 7 cover categories: (1) 0 percent, (2) greater than 0 but less than 1 percent, (3) 1 to 5 percent, (4) greater than 5 percent and up to 25 percent, (5) greater than 25 percent and up to 50 percent, (6) greater than 50 percent and up to 75 percent, and (7) greater than 75 percent. Surveyors also looked for signs of fungal pathogens on cactus (for example, *Fusarium brachygibbosum* and *Cladosporium cladosporioides*).

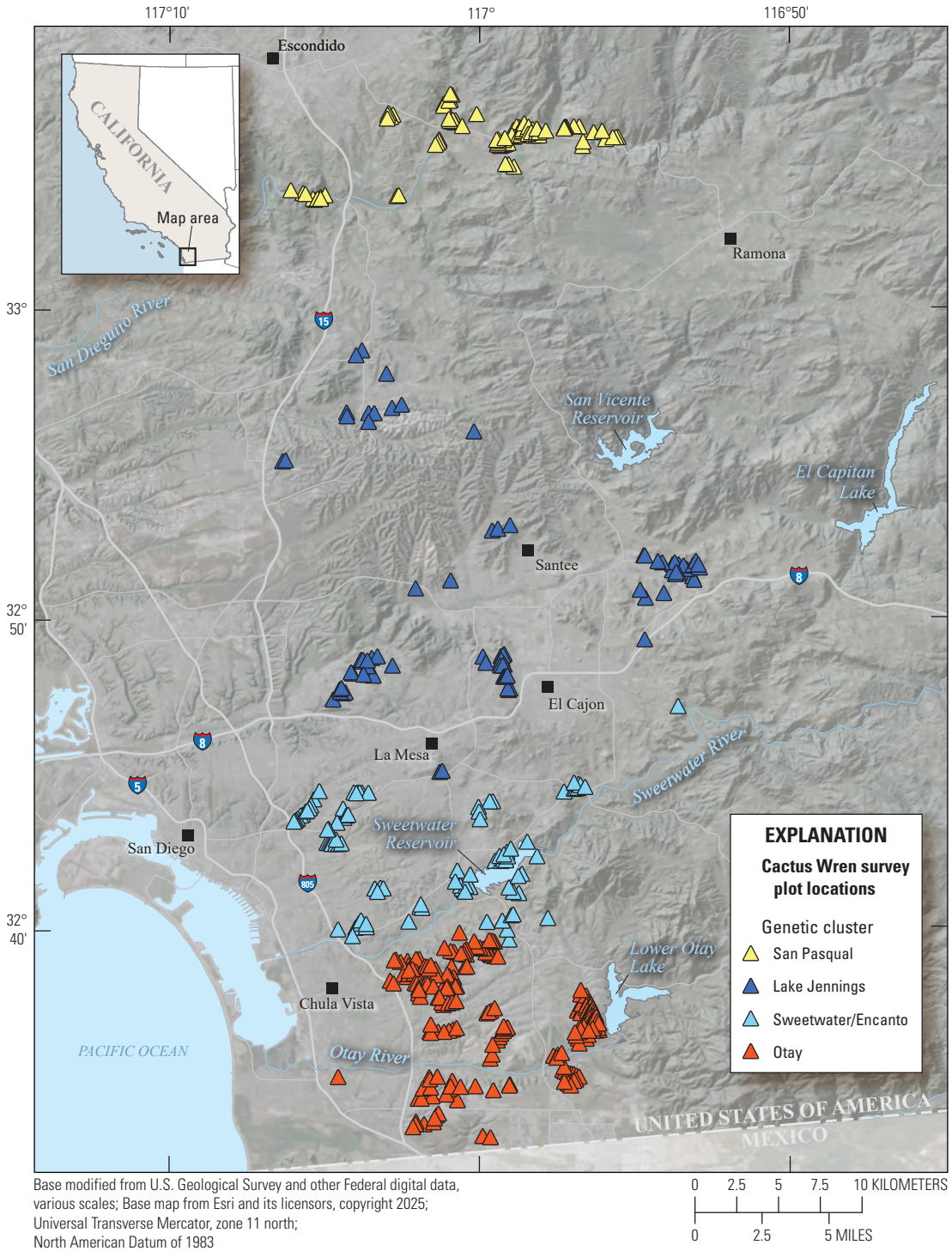


Figure 1. Cactus Wren survey plot locations by genetic cluster in San Diego County, California, 2025.

After examining the distribution of percentage cover for vegetation characteristics d–g, we combined category numbers 1–3 (0–5 percent cover) and category numbers 4–7 (greater than 5 percent cover). For percentage cover of cactus, we combined category numbers 1–4 (0–25 percent cover) and category numbers 5–7 (greater than 25 percent cover). We used chi-square goodness-of-fit analyses for each vegetation characteristic to determine if the proportion of occupied plots within the two cover categories differed from the proportion of all plots (available) in the two cover categories (R Core Team, 2026). We did not perform chi-square tests if sample sizes were small (if the expected number of plots in any category was less than 5). We also used chi-square analyses to determine if wrens occupied plots that contained elderberry in the same proportion as what was available in all plots, and if occupied plots within each genetic cluster were dominated or co-dominated by each shrub species in proportion to the dominant or co-dominant shrub species available across all survey plots. Given the sensitive status of coastal Cactus Wrens and small sample sizes, we assigned statistical significance as P less than or equal to ($\leq$) 0.10, which increases the likelihood of a type I error (incorrectly rejecting the null hypothesis) to avoid overlooking potentially meaningful relationships relevant to management of the species in San Diego County.

Data Availability

Data presented in this report can be found in a data release (Kus and Lynn, 2022; ver. 6.0 at https://doi.org/10.5066/F76H4FK5). This report is the annual update to surveys that have been performed since 2015 (2015 and 2017 to 2024; Lynn and Kus, 2021, 2022, 2023, 2024, 2025; Kus and Lynn, 2022; Lynn and others, 2022). The study background, objectives, and methods were originally presented in Lynn and Kus (2021) and are updated in this report.

Results

We surveyed 498 plots for Cactus Wrens in 2025 (table 1). Wrens were detected at 44 percent of all plots (220/498), 26 percent of Otay plots (54/209), 43 percent of Lake Jennings plots (35/81), 45 percent of Sweetwater/Encanto plots (44/97), and 78 percent of San Pasqual plots (87/111; table 1). Wrens were detected in 35 percent of plots (130/372) that have been surveyed annually since 2020. We observed 184 wren territories throughout all survey plots (table 2). We determined that wrens in 152 territories (83 percent) were paired. We could not determine the breeding status of wrens in the remaining 32 territories. We detected active brood nests or fledglings in 72 territories, and we observed 100 fledglings during the surveys (table 2).

Table 1. Number of plots surveyed and number occupied by Cactus Wrens by genetic cluster in 2025, San Diego County, California.

[Survey 1, April 1 through May 31, 2025; Survey 2, June 1 through July 31, 2025]

Genetic cluster	Number of plots				Percentage occupied
	Total surveyed	Occupied survey 1	Occupied survey 2	Total occupied	
Otay	209	42	46	54	26
Lake Jennings	81	28	29	35	43
Sweetwater/Encanto	97	37	38	44	45
San Pasqual	111	77	76	87	78
Total	**498**	**184**	**189**	**220**	**[1]44**

[1]Calculated as total occupied divided by total surveyed.

Table 2. Number and breeding status of Cactus Wren territories by genetic cluster in 2025, San Diego County, California.

Genetic cluster	Breeding status		Total territories	Number of territories with active nests	Number of fledglings
	Paired	Unknown			
Otay	38	4	42	22	33
Lake Jennings	21	8	29	10	11
Sweetwater/Encanto	31	8	39	17	27
San Pasqual	62	12	74	23	29
Total	**152**	**32**	**184**	**72**	**100**

Cactus Wren Age and Movement

During surveys in 2025, we observed 309 adult wrens well enough to determine banding status. Banding status was determined for 181 males (98 percent of all males) and 128 females (84 percent of all females). We detected three banded adult wrens in 2025 (table 3). Although two wrens were missing at least one color band, they occupied the same territories where wrens with consistent color-band combinations had been identified in 2023 or 2024; hence, we assumed that they were the same individuals in 2025. Adult birds ranged from 6 to 9 years old.

Resighting banded birds allowed us to identify individuals that either remained in the same territory they used in the previous year or moved to a different location. All three banded wrens occupied the same territory in 2025 that they occupied in 2024 (within 100 meters). We did not detect adult movement between genetic clusters from 2024 to 2025.

Vegetation Characteristics

Vegetation characteristics were recorded at all 498 Cactus Wren survey plots in 2025 with one exception—the percentage cover of non-native vegetation was not collected at one Sweetwater/Encanto plot. Common coastal sage scrub species were the dominant shrub species at most of the plots, including California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), and lemonade berry (*Rhus integrifolia*; table 4). California sagebrush and California buckwheat were the dominant or co-dominant shrub species at most of the plots that were occupied by wrens. In general, Cactus Wrens occupied plots with dominant or co-dominant plant species in proportion to their availability. However, in the Otay genetic cluster, wrens preferentially occupied more plots that were dominated by California buckwheat and occupied fewer plots dominated with lemonade berry and jojoba (*Simmondsia chinensis*) than were available (fig. 2). Wrens in the Lake Jennings genetic cluster avoided plots dominated by California sagebrush while preferring plots dominated by broom baccharis (*Baccharis sarothroides*). No definitive signs of fungal pathogens were observed on cactus within and around survey plots in 2025.

Of the 498 plots, 213 (43 percent) contained elderberry. Of the 220 plots that were occupied by wrens, 137 (62 percent) contained elderberry, a significantly higher percentage than was available (chi-square=33.3, P less than [<] 0.001; fig. 3).

Table 3. Age, location, and number of banded Cactus Wrens by genetic cluster in 2025, San Diego County, California.

[yrs, years; ≥, greater than or equal to]

Age in 2025	Otay genetic cluster	Lake Jennings genetic cluster	Sweetwater/Encanto genetic cluster	San Pasqual genetic cluster	Total
9 yrs	0	0	1	0	1
≥8 yrs	0	1	0	0	1
6 yrs	1	0	0	0	1
Total	**1**	**1**	**1**	**0**	**3**

Table 4. Shrub species that were dominant or co-dominant at all Cactus Wren survey plots, and the number of plots with those dominant or co-dominant shrub species that were used by Cactus Wrens (in parentheses) in 2025, San Diego County, California.

[—, not present]

Dominant or co-dominant shrub species	Number of plots				Total
	Otay genetic cluster	Lake Jennings genetic cluster	Sweetwater/ Encanto genetic cluster	San Pasqual genetic cluster	
California sagebrush	135 (30)	49 (13)	58 (29)	77 (58)	319 (130)
California buckwheat	50 (31)	19 (12)	23 (15)	93 (72)	185 (130)
Lemonade berry	51 (6)	13 (3)	17 (8)	—	81 (17)
Jojoba	56 (6)	—	12 (2)	—	68 (8)
Laurel sumac (*Malosma laurina*)	3 (0)	20 (6)	7 (0)	15 (10)	45 (16)
Broom baccharis	5 (3)	22 (15)	12 (8)	—	39 (26)
San Diego sunflower (*Bahiopsis laciniata*)	16 (2)	6 (4)	11 (3)	—	33 (9)
Bush sunflower (*Encelia californica*)	4 (0)	3 (3)	5 (1)	5 (4)	17 (8)
Black sage (*Salvia mellifera*)	—	4 (1)	4 (2)	1 (1)	9 (4)
Western ragweed (*Ambrosia psilostachya*)	4 (0)	—	—	—	4 (0)
Coyote brush (*Baccharis pilularis*)	—	—	—	1 (1)	1 (1)
Monkeyflower species (*Diplacus* spp.)	—	1 (0)	—	—	1 (0)
Peruvian pepper tree (*Schinus molle*)	—	—	1 (1)	—	1 (1)

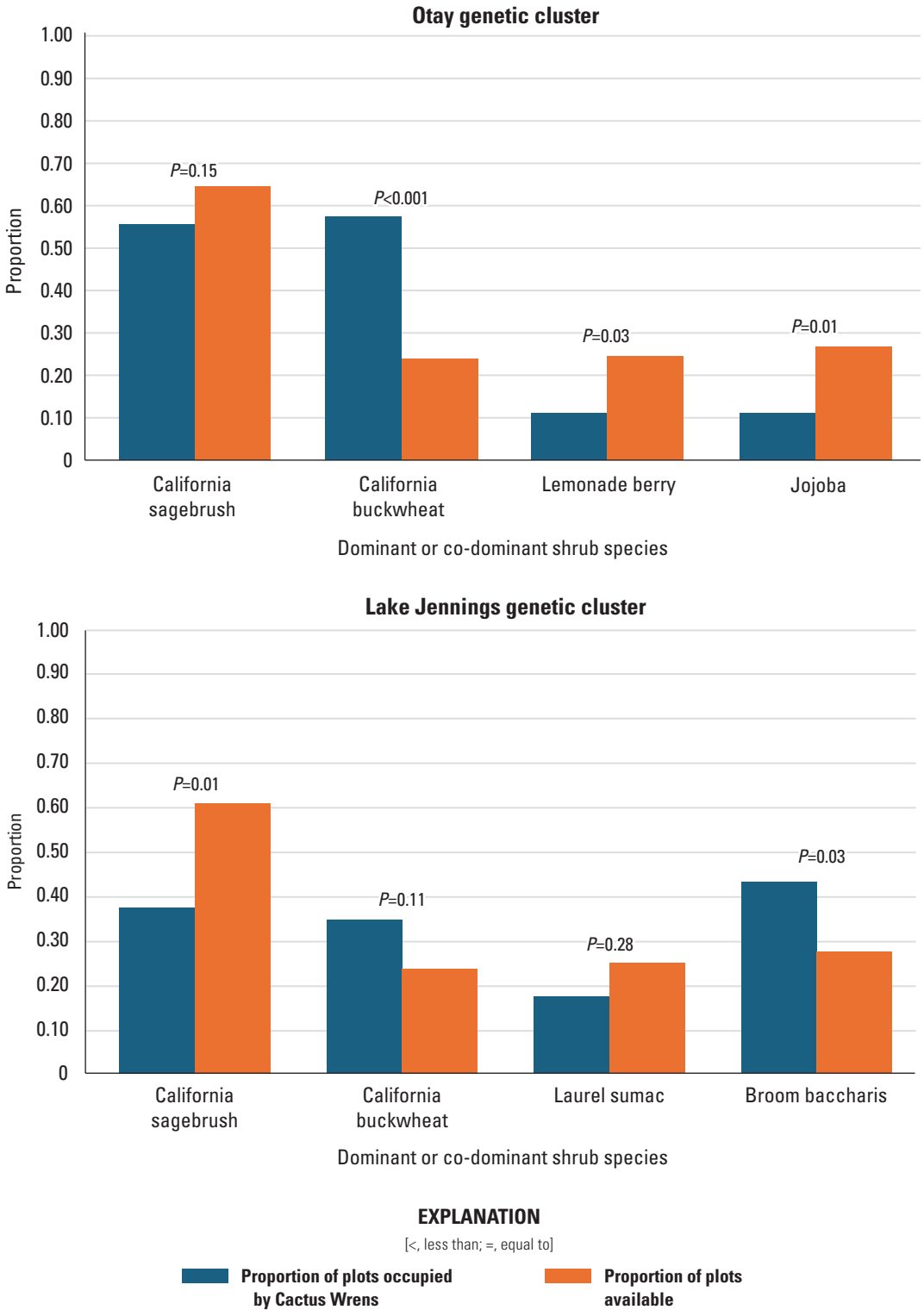


Figure 2. Proportion of occupied Cactus Wren survey plots dominated by each shrub species compared to the proportion of available survey plots dominated by that shrub species, by genetic cluster, San Diego County, California, 2025. *P*-values presented for chi-square goodness-of-fit test results. Shrub species comparisons are only presented if sample sizes were sufficient to analyze using chi-square goodness-of-fit tests. A plot may have more than one co-dominant shrub species so proportions do not add to 1.

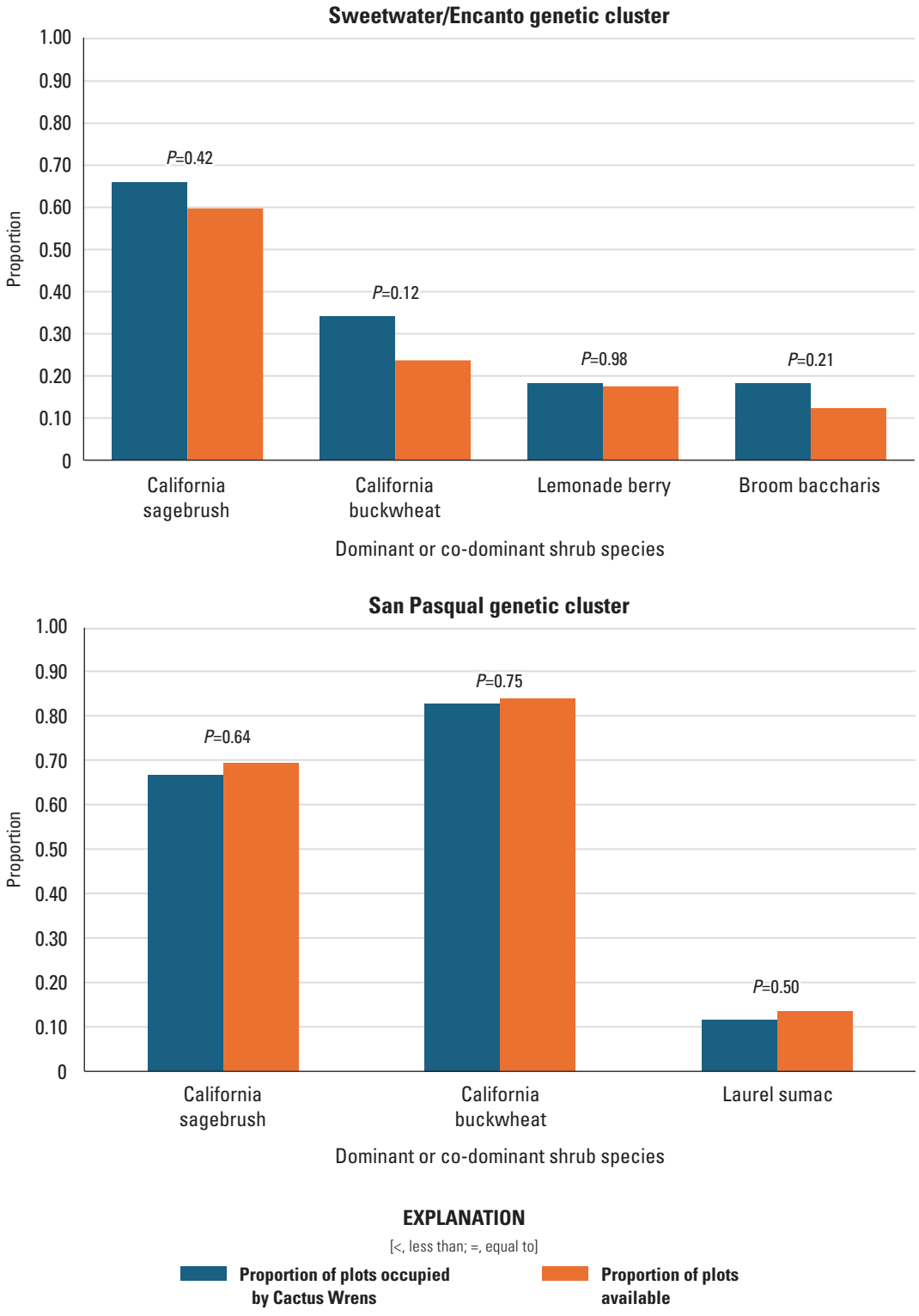


Figure 2.—Continued

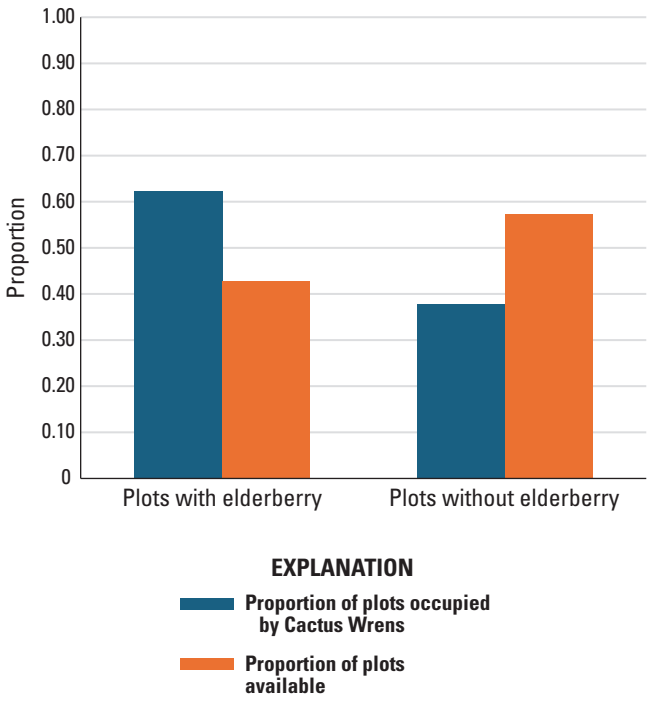


Figure 3. Proportion of occupied and available Cactus Wren survey plots that contained and did not contain elderberry, San Diego County, California, 2025.

Most Cactus Wren plots had at least 25 percent cactus cover (fig. 4); however, there were 26 plots (5 percent of plots) that contained 5 percent of cactus or less (table 5). Cactus cover was between 5 and 25 percent at 173 plots (35 percent of plots), between 25 and 50 percent at 170 plots (34 percent of plots), between 50 and 75 percent at 119 plots (24 percent of plots) and greater than 75 percent at 10 plots (2 percent of plots). Of the 220 occupied plots, 82 percent had 25 percent cover of cactus or more, which was a significantly higher percentage than what was available (chi-square=45.5, P<0.001; fig. 4).

In most wren survey plots in 2025 (465 plots, 93 percent of plots), 5 percent or less of the cactus was dead (table 6; fig. 5). Between 5 and 25 percent of the cactus was dead in 27 plots (5 percent of plots), and more than 25 percent of the cactus was dead in 6 plots (1 percent of plots). Of the 220 plots that were occupied by wrens, 211 (96 percent) contained 5 percent or less dead cactus, a significantly higher percentage than what was available (chi-square=2.9, P=0.09; fig. 5).

At most wren plots (381 plots, 77 percent of plots), 5 percent or less of the cactus was unhealthy (table 7; fig. 6). Between 5 and 25 percent of cactus was unhealthy at 107 plots (21 percent of plots). Ten plots (2 percent of the plots) contained more than 25 percent of cactus that was unhealthy. Of the 220 plots that were occupied by wrens, 168 (76 percent) contained 5 percent or less unhealthy cactus, which was not significantly different from what was available (chi-square=3.8, P=0.82; fig. 6).

Shrubs and vines crowded or overtopped 5 percent or less of cactus at 57 plots (11 percent of plots; table 8; fig. 7). Between 5 and 25 percent of cactus was overtopped by shrubs and vines at 137 plots (28 percent of plots). Shrubs and vines crowded or overtopped more than 25 percent of cactus at 304 plots (61 percent of plots). Of the 220 plots that were occupied by wrens, 28 (13 percent) contained 5 percent or less cactus that was overtopped by shrubs and vines, which is not significantly different than what was available (chi-square=0.7, P=0.41; fig. 7).

Non-native annual cover (grasses and forbs) covered 5 percent or less of 230 wren survey plots (46 percent of plots; table 9; fig. 8). Between 5 and 25 percent of the plot was covered by non-native annual cover at 166 plots (33 percent of plots). There was more than 25 percent non-native annual cover at 101 plots (20 percent of the plots). Of the 219 plots that were occupied by wrens and had data collected, 114 (52 percent) contained 5 percent or less non-native annual cover, a significantly higher percentage than what was available (chi-square=3.2, P=0.07; fig. 8).

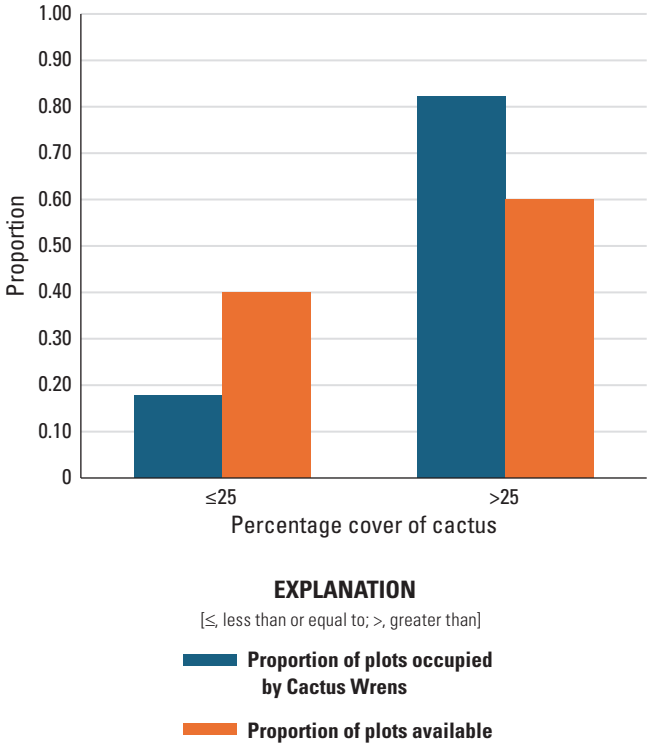


Figure 4. Proportion of survey plots that were occupied by Cactus Wrens and proportion of survey plots that were available by the percentage of cactus cover, San Diego County, California, 2025.

Table 5. Number of Cactus Wren survey plots by percentage cactus cover in 2025, San Diego County, California.

[Parentheses contain the number of these survey plots that were occupied by Cactus Wrens. **Abbreviations**: <, less than; >, greater than]

Percentage cover	Proportion of plots				Total
	Otay genetic cluster	Lake Jennings genetic cluster	Sweetwater/Encanto genetic cluster	San Pasqual genetic cluster	
0	1 (0)	1 (0)	0 (0)	0 (0)	2 (0)
>0 to <1	1 (0)	3 (0)	0 (0)	0 (0)	4 (0)
1 to 5	9 (0)	6 (0)	2 (0)	3 (0)	20 (0)
>5 to 25	77 (10)	35 (10)	51 (15)	10 (4)	173 (39)
>25 to 50	76 (21)	30 (20)	30 (19)	34 (27)	170 (87)
>50 to 75	42 (22)	6 (5)	14 (10)	57 (49)	119 (86)
>75	3 (1)	0 (0)	0 (0)	7 (7)	10 (8)
Total number of plots	**209 (54)**	**81 (35)**	**97 (44)**	**111 (87)**	**498 (220)**

Table 6. Number of Cactus Wren survey plots with dead cactus in 2025, San Diego County, California.

[Parentheses contain the number of these survey plots that were occupied by Cactus Wrens. **Abbreviations**: —, not present; <, less than; >, greater than]

Percentage cover	Proportion of plots				Total[1]
	Otay genetic cluster	Lake Jennings genetic cluster	Sweetwater/Encanto genetic cluster	San Pasqual genetic cluster	
0	4 (0)	3 (1)	—	—	7 (1)
>0 to <1	116 (41)	52 (24)	68 (31)	30 (26)	266 (122)
1 to 5	74 (13)	23 (10)	22 (11)	73 (54)	192 (88)
>5 to 25	10 (0)	3 (0)	7 (2)	7 (7)	27 (9)
>25 to 50	4 (0)	—	—	—	4 (0)
>50 to 75	1 (0)	—	—	1 (0)	2 (0)
Total number of plots	**209 (54)**	**81 (35)**	**97 (44)**	**111 (87)**	**498 (220)**

[1]No cactus was observed in two plots.

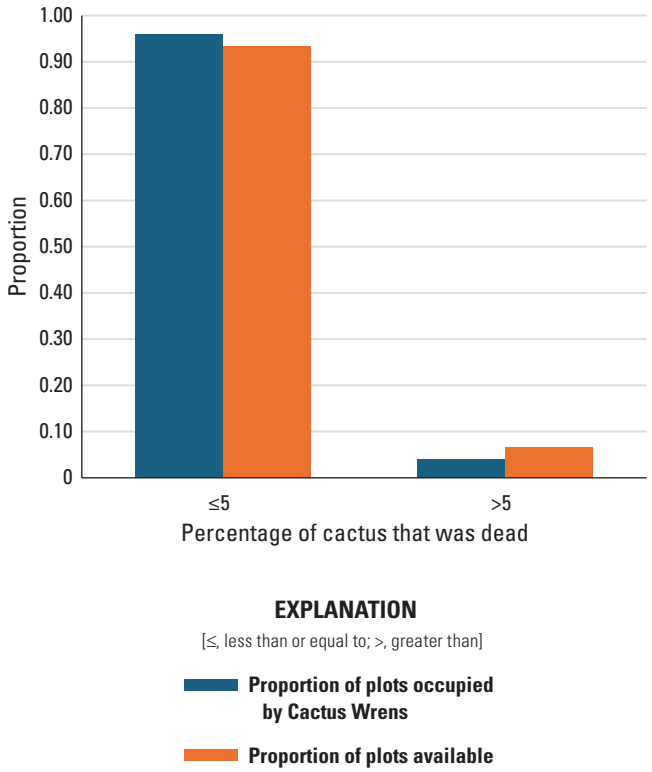


Figure 5. Proportion of survey plots that were occupied by Cactus Wrens and proportion of survey plots that were available by the percentage of cactus present that was dead, San Diego County, California, 2025.

Table 7. Number of Cactus Wren survey plots with unhealthy cactus in 2025, San Diego County, California.

[Parentheses contain the number of these survey plots that were occupied by Cactus Wrens. **Abbreviations**: —, not present; <, less than; >, greater than]

Percentage cover	Proportion of plots				Total[1]
	Otay genetic cluster	Lake Jennings genetic cluster	Sweetwater/Encanto genetic cluster	San Pasqual genetic cluster	
0	1 (0)	1 (0)	—	—	2 (0)
>0 to <1	76 (21)	37 (22)	22 (5)	20 (18)	155 (66)
1 to 5	85 (21)	33 (10)	51 (27)	55 (44)	224 (102)
>5 to 25	40 (12)	8 (3)	24 (12)	35 (25)	107 (52)
>25 to 50	4 (0)	1 (0)	—	—	5 (0)
>50 to 75	2 (0)	1 (0)	—	—	3 (0)
>75	1 (0)	—	—	1 (0)	2 (0)
Total number of plots	**209 (54)**	**81 (35)**	**97 (44)**	**111 (87)**	**498 (220)**

[1]No cactus was observed in two plots.

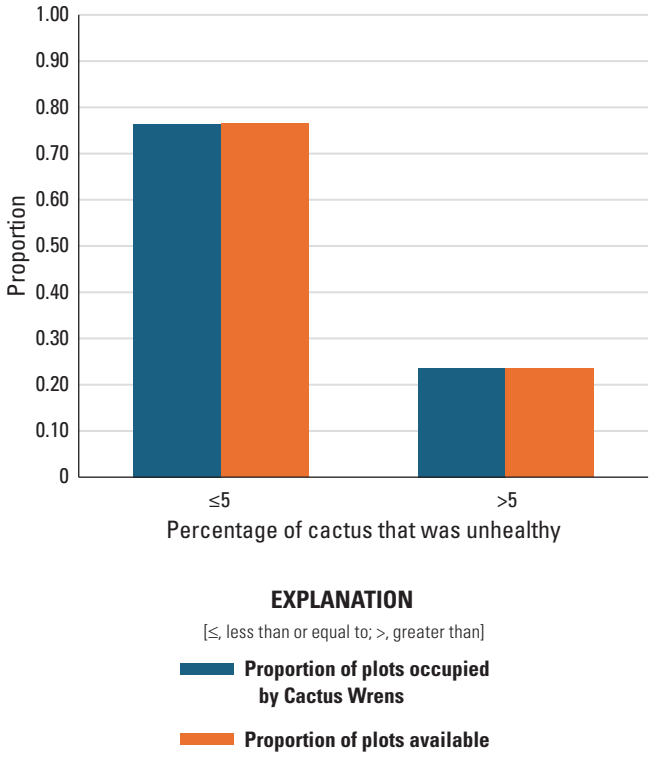


Figure 6. Proportion of survey plots that were occupied by Cactus Wrens and proportion of survey plots that were available by the percentage of cactus present that was unhealthy, San Diego County, California, 2025.

Table 8. Number of Cactus Wren survey plots with cactus that was crowded or overtopped by shrubs and vines in 2025, San Diego County, California.

[Parentheses contain the number of these survey plots that were occupied by Cactus Wrens. **Abbreviations**: —, not present; <, less than; >, greater than]

Percentage cover	Proportion of plots				Total[1]
	Otay genetic cluster	Lake Jennings genetic cluster	Sweetwater/Encanto genetic cluster	San Pasqual genetic cluster	
0	2 (0)	1 (0)	—	—	3 (0)
>0 to <1	4 (0)	1 (1)	—	1 (1)	6 (2)
1 to 5	14 (3)	10 (6)	7 (2)	17 (15)	48 (26)
>5 to 25	53 (23)	10 (4)	35 (21)	39 (30)	137 (78)
>25 to 50	75 (21)	36 (19)	36 (16)	48 (38)	195 (94)
>50 to 75	57 (7)	21 (5)	14 (4)	6 (3)	98 (19)
>75	4 (0)	2 (0)	5 (1)	—	11 (1)
Total number of plots	**209 (54)**	**81 (35)**	**97 (44)**	**111 (87)**	**498 (220)**

[1]No cactus was observed in two plots.

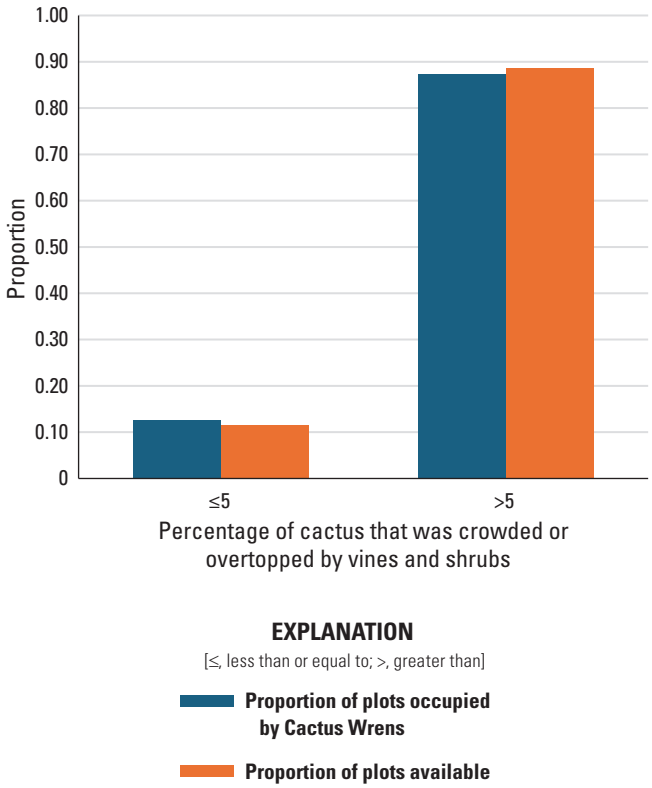


Figure 7. Proportion of survey plots that were occupied by Cactus Wrens and proportion of survey plots that were available by the percentage of cactus present that was crowded or overtopped by shrubs or vines, San Diego County, California, 2025.

Table 9. Number of Cactus Wren survey plots with non-native annual cover in 2025, San Diego County, California.

[Parentheses contain the number of these survey plots that were occupied by Cactus Wrens. **Abbreviations**: —, not present; <, less than; >, greater than]

Percentage cover	Proportion of plots				Total[1]
	Otay genetic cluster	Lake Jennings genetic cluster	Sweetwater/Encanto genetic cluster	San Pasqual genetic cluster	
0	1 (0)	—	—	—	1 (0)
>0 to <1	15 (2)	9 (5)	3 (0)	19 (16)	46 (23)
1 to 5	66 (13)	18 (9)	45 (24)	54 (45)	183 (91)
>5 to 25	83 (30)	22 (11)	32 (15)	29 (21)	166 (77)
>25 to 50	27 (4)	24 (10)	10 (3)	5 (3)	66 (20)
>50 to 75	14 (4)	8 (0)	5 (1)	4 (2)	31 (7)
>75	3 (1)	—	1 (0)	—	4 (1)
Total number of plots	**209 (54)**	**81 (35)**	**96 (43)**	**111 (87)**	**497 (219)**

[1]No data were collected for one plot.

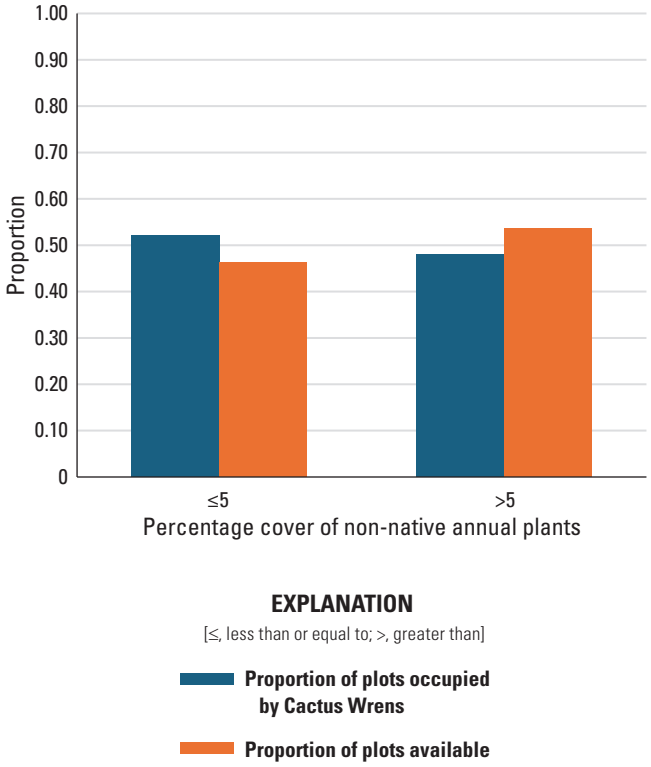


Figure 8. Proportion of survey plots that were occupied by Cactus Wrens and proportion of survey plots that were available by the percentage cover of non-native annual plants, San Diego County, California, 2025.

Summary

Cactus Wrens were detected in 44 percent of all survey plots in 2025. Excluding plots that were not surveyed in 2020 and 2021 (San Pasqual genetic cluster and other plots in the Lake Jennings genetic cluster that were not surveyed consistently), 35 percent of plots were occupied in 2025, similar to 2024 (34 percent), 2021 (35 percent) and 2020 (35 percent), and greater than 26 percent occupied in 2023 and 30 percent occupied in 2022 (Lynn and Kus, 2021, 2022, 2023, 2024, 2025). The number of wren territories in plots that were surveyed consistently from 2020 through 2025 increased by 1 percent (from 106 to 107 territories) between 2024 and 2025. This followed a 5-percent increase from 2020 to 2021, an 18-percent decrease from 2021 to 2022, a 9-percent decrease from 2022 to 2023, and a 25-percent increase between 2023 and 2024. The number of territories detected (in plots that were consistently surveyed from 2020 through 2025) did not change in the Otay or Sweetwater/Encanto clusters between 2024 and 2025 and decreased by 1 (4 percent) in the Lake Jennings cluster.

We did not detect any movement of wrens between genetic clusters from 2024 to 2025, but in 2025 very few banded birds remained in the population. Between 2024 and 2025, the number of known banded birds in the population dropped from six adults to three. We have not detected movement of wrens between genetic clusters since 2020, and since 2020, the number of banded birds in the population has dropped by approximately 50 percent each year. The three banded wrens that were detected in 2025 were between 6 and 9 years old.

Wren habitat mostly was characterized by typical coastal sage scrub plant species with a component of taller woody shrubs, such as lemonade berry and laurel sumac. The composition of small shrubs in survey plots was consistent across genetic clusters, with California sagebrush and California buckwheat the dominant species in most plots. Less common dominant shrub species showed some variation in the degree and direction of selection among genetic clusters; however, those relationships were typically not statistically significant. We found that wrens in the Otay genetic cluster preferred plots dominated by California buckwheat and appeared to avoid plots with lemonade berry and jojoba. Cactus Wrens in the Lake Jennings cluster showed a preference for plots dominated by broom baccharis and an avoidance of plots dominated by California sagebrush. There was also some evidence for wrens selecting plots with more California buckwheat cover in the Lake Jennings and Sweetwater/Encanto clusters, which is consistent with the trend observed in the Otay cluster; however, the relationship was not statistically significant.

Although most survey plots did not contain elderberry, wrens preferentially occupied plots with elderberry in 2020 and 2022–24. In 2021, however, wrens occupied plots containing elderberry in proportion to their availability. Most survey plots had less than 5 percent cover of dead cactus, and the cactus that was present was healthy. As in previous years with a few exceptions, wrens preferred survey plots with less dead cactus. Over 80 percent of survey plots continued to have more than 5 percent of cactus crowded or overtopped by vines and shrubs in 2025 but as in all previous years except 2022, wrens did not preferentially select plots with less shrub and vine crowding and overtopping. Plots in 2025 were similar to 2024 with regard to the cover of non-native annuals. In both years 54 percent of plots had more than 5 percent non-native annual cover, less than in 2023 (82 percent of plots with more than 5 percent non-native annual cover). Also similar to 2024, and in contrast to 2020 through 2023, wrens preferentially occupied plots with less non-native cover in 2025.

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