

6.5 Coastal Cactus Wren (*Campylorhynchus brunneicapillus sandiegensis*) – Category SO

Management Units with Known Occurrences

Coastal cactus wrens are restricted to cactus-dominated coastal sage scrub habitats in Southern California, from Ventura south to San Diego County and inland to western San Bernardino and western Riverside Counties. These wrens differ ecologically from more common desert wrens in the southwestern United States and northern Mexico. Coastal cactus wrens began significantly declining in San Diego County in the early 1980s due to habitat loss to agriculture and urban development (Rea and Weaver 1990). By 1990 there was a 33% population decline from the previous decade as a result of the loss of coastal birds and smaller populations, and a decline in abundance of remaining populations.

Coastal cactus wren surveys and cactus mapping were implemented on Conserved Lands in the MSPA in 2009 and 2011 (USFWS 2011). Cactus wrens were documented on Conserved Lands in MUs 1, 2, 3, 4, 5, and 6 (see Occurrence Table and online map: <http://arcg.is/2kU1bka>). A range-wide genetics and banding study was conducted across occupied cactus scrub habitats in 2011–2013 by USGS to determine coastal cactus wren population genetic structure, connectivity, and genetic diversity in Southern California (Barr et al. 2015). The study found 3 main genetic clusters in San Diego County: Otay; San Diego/El Cajon (Sweetwater/Encanto/Lake Jennings); and San Pasqual. In the San Diego/El Cajon genetic cluster, wrens in the Sweetwater River watershed are connected to occurrences in Fletcher Hills and Lake Jennings to the northeast in MU4 and to occurrences in Encanto Canyon and other urban canyons to the west in MU2. The physical habitat connections between occurrences are tenuous due to development. Wrens in the Otay River and Tijuana River watersheds are within the Otay Genetic Cluster and are considered isolated from the San Diego/El Cajon Genetic Cluster (and potentially to occurrences in Mexico) even though the physical distance is close. Cactus wrens in MUs 5 and 6 are within the San Pasqual/Lake Hodges genetic cluster.

The USFWS (USFWS 2011) and USGS surveys (USGS 2011, 2012) found cactus wrens in south San Diego County in low numbers in the Tijuana Slough NWR and in the urban canyons of San Diego and Chula Vista, with larger concentrations at Otay

River Valley, the Sweetwater Reservoir, and Lake Jennings. The largest concentration of cactus wrens on Conserved Lands is in San Pasqual Valley with several additional pairs at Lake Hodges. Coastal cactus wrens were not detected on Conserved Lands in MUs 7 or 8 during the 2009–2011 USFWS surveys. However, during 2011–2012 USGS surveys, a few pairs were found on private lands in the Pauma Valley area of MU8. MCB Camp Pendleton and Naval Weapons Station Fallbrook have a large cluster of wrens largely isolated from populations on Conserved Lands within the MSPA.

More recently, the focus has been on south San Diego County with surveys in 2014 and 2015 and a study of cactus wren breeding, dispersal, survival, and foraging in 2015 and 2016. These surveys show that small and isolated occurrences of wrens have disappeared from the southern portion of San Diego County and the number of pairs has declined at larger occurrences (USGS 2011, 2012, 2013, 2014, 2015, 2016; TNC and SDMMP 2015). This decline is attributed in part to a prolonged drought from 2011–2016, with some signs of increase at still extant populations in 2016 (TNC and SDMMP 2015). In north San Diego County, the Lake Hodges population of wrens has declined significantly since the 2007 wildfires, and in 2016 was down to one pair with fledglings (Mahrtdt and Weaver 2016).

Management Categorization Rationale

Coastal cactus wrens should be managed as a Species Management Focus Category SO Species due to a high risk of loss of occurrences from Conserved Lands in the MSPA, particularly from the Tijuana, Otay, Encanto, Sweetwater, Lake Jennings, and Lake Hodges locations and because managing vegetation alone will not ensure persistence of the species (see Vol. 1, Table 2-4). Coastal cactus wren should be managed at a species-specific level due to the isolation of occurrences and small effective population sizes, low dispersal ability of individuals (Barr et al. 2015, and specific habitat requirements (i.e., large cacti) (TNC and SDMMP 2015).

While the primary management action is to increase and enhance suitable habitat at locations with cactus wrens and to improve connectivity, other potential species management actions may be necessary if populations continue to decline. These management actions include supplemental feeding during drought to enhance productivity and potentially survivorship, egg switching to increase genetic

diversity, predator management, and translocation of salvaged individuals from locations slated for development.

Cactus wren occurrences face many threats in Southern California (see species profile at https://portal.sdmmp.com/species_profile.php?taxaid=917698). The loss and fragmentation of cactus scrub from urban development is a primary factor in the decline of coastal cactus wren since the 1980s (Rea and Weaver 1990; Solek and Szijj 2004; Hamilton et al. 2011). Based on the USGS genetics study of coastal cactus wrens, wrens are poor dispersers especially in fragmented habitats, with most movements less than 1 kilometer, although the least fragmented population had some individuals dispersing up to 8 kilometers (Barr and Vandergast 2014; Barr et al. 2015). Two field studies in Orange and Los Angeles Counties found similar results with the majority of color-banded juvenile wrens dispersing less than 1 kilometer from their natal territories (Atwood et al. 1998; Preston and Kamada 2012; Kamada and Preston 2013).

Habitat loss and fragmentation and an overall poor dispersal ability of coastal cactus wrens have led to genetic differentiation between clusters of wrens and loss of genetic diversity over the last 100 years (Barr and Vandergast 2014; Barr et al. 2015). The number of individuals contributing to offspring in the next generation is known as the effective population size (N_e) and is small for coastal cactus wren populations (Barr et al. 2015). Geographic isolation and small population size lead to loss of genetic diversity through genetic drift and can result in inbreeding depression. Populations with N_e of <50 , such as the Otay and San Diego/El Cajon (=Sweetwater/Encanto/Lake Jennings) genetic clusters, can face inbreeding depression over five generations in the wild and are at immediate risk of extinction because inbreeding depression and demographic stochasticity can result in an extinction vortex (Franklin 1980; Frankham et al. 2014). $N_e \geq 100$ is recommended as a short-term recovery target to limit loss of fitness to $\leq 10\%$ (Frankham et al. 2014), although other authors recommend $N_e > 50$ as sufficient (Franklin et al. 2014). The San Pasqual cluster has a N_e between 50 and 100. A long-term recovery target is to retain evolutionary potential or the ability of species to adapt to changing conditions, for which a N_e of at least 1,000 is recommended (Frankham et al. 2014).

As a result of their limited dispersal abilities and increasing habitat fragmentation, small cactus wren occurrences are more vulnerable to extinction (TNC and SDMMP

2015) from demographic and environmental stochasticity or from threats such as wildfire, changing climate, and habitat degradation.

A major threat to coastal cactus wrens over the last 25 years is an altered fire regime that causes direct mortality of birds and destroys cactus scrub, which can take many years to recover (Bontrager et al. 1995; Mitrovich and Hamilton 2007; Hamilton 2008; Leatherman BioConsulting 2009). In San Diego County, wildfires in 2003 and 2007 impacted wrens in 3 areas. The 2003 Cedar Fire burned through the Lake Jennings occurrence. The 2007 Witch Creek fire burned through the largest concentration of wrens in the San Pasqual Valley/Lake Hodges area, with lower fire intensity and damage to habitat in the valley compared with Lake Hodges (Hamilton 2008; Conlisk et al. 2014; Mahrtdt and Weaver 2015, 2016). The 2007 Harris wildfire impacted cactus wren occurrences at Sweetwater Reservoir and San Miguel Mountain (REGS 1998; USFWS 2011; USGS 2011, 2012, 2013, 2014, 2015, 2016; CNDDDB 2015).

Under climate change, a warming and drying climate, with more frequent, intense and prolonged droughts, is predicted for Southern California (Diffenbaugh et al. 2015), which could be a threat to wrens in the future. The amount and timing of rainfall affects primary productivity and insect abundance in semi-arid systems and food availability with limited food availability in low rainfall years, and has been linked to the productivity of several shrubland bird species in Southern California (Morrison and Bolger 2002; Bolger et al. 2005; Preston and Rotenberry 2006). A 5-year study of coastal cactus wrens in Orange County found the most important predictors for number of fledglings produced each year were higher January through April precipitation and January through February temperatures, and earlier dates of first egg laying (Preston, unpublished data). In San Diego County, there was very low productivity in 2014, a severe drought year (USGS 2014). In 2015 and 2016, rainfall was below normal, but early rains and warm winter temperatures in January and February led to very early egg laying in February while spring rains extended breeding into August. Despite high rates of nest predation, wren pairs were able to re-nest multiple times in 2015 and 2016, and both years ended with average productivity (USGS 2015, 2016).

Other threats include habitat degradation from invasive plant species potentially reducing open habitat for foraging and affecting food availability by altering arthropod community composition and abundance (Preston and Kamada 2012;

Kamada and Preston 2013). In areas with an absence of fire, such as urban canyons, shrubs can overgrow and crowd cactus patches with wrens disappearing from these areas (TNC and SDMMP 2015). Adult, juvenile, and nestling wrens are vulnerable to predation by domestic cats, roadrunners, snakes, loggerhead shrikes, and especially Cooper's hawks (Solek and Szijj 2004; Preston and Kamada 2012). They may be especially vulnerable in urban areas, where there are more human subsidized predators that concentrate hunting in natural habitat fragments.

Management and Monitoring Approach

The overarching goal for coastal cactus wren is to protect, enhance, and restore suitable cactus scrub habitat for coastal cactus wrens to increase effective population size in each genetic cluster at a short-term sustainable level (e.g., 50–100 wrens), rehabilitate habitat destroyed by wildfire, improve habitat quality to maintain populations during drought, enhance connectivity within and between genetic clusters to increase genetic diversity and rescue small populations, and manage anthropogenic predation risk to ensure long-term persistence (>100 years) of cactus wrens on Conserved Lands in the MSPA.

For the planning cycle of 2017–2021, the management and monitoring approach is to:

- (1) Continue to expand local populations and to improve genetic connectivity between remaining populations in order to increase population resilience to environmental and demographic stochasticity and to increase genetic diversity.
- (2) In south San Diego County, restore ≥ 70 acres of high-quality habitat and increase the population to ≥ 75 territories on Conserved Lands in MUs 2, 3, and 4. The focus is to restore cactus scrub habitat to expand existing populations and to connect occurrences within the San Diego/El Cajon and Otay genetic clusters.
- (3) For the San Pasqual genetic cluster, restore ≥ 75 acres of high-quality habitat and expand to > 90 territories in MU6 by increasing habitat at sites with small numbers of wrens or sites in close vicinity and connect Lake Hodges birds to those in the San Pasqual Valley (Barr and Vandergast 2014; Barr et al. 2015). Cactus wren projects are prioritized based on the

recommendations and strategies of the South San Diego County Coastal Cactus Wren Habitat Conservation and Management Plan (TNC and SDMMP 2015) and Institute for Conservation Research's (ICR) Restoration Analyses for the San Pasqual Valley/Lake Hodges genetic cluster (Conlisk et al. 2014).

- (4) To support cactus scrub restoration projects and to ensure a supply of cacti after wildfires, an important objective is to establish and maintain 2 cactus nurseries that would focus on growing cacti, with cholla emphasized in the south county and prickly pear in the north county.
- (5) Monitor the success of cactus restoration projects in north and south San Diego County by collecting vegetation data over time and analyzing it across projects to determine if adjustments should be made to management techniques and strategies.
- (6) Continue the 5-year Coastal Cactus Wren Demography, Vegetation and Arthropod Study initiated in 2015 (CAMBRU-4) to document cactus wren productivity, dispersal, and survival in the Otay and San Diego/El Cajon genetic clusters. This study also investigates habitat quality by measuring vegetation at the territory level and conducting a study of arthropod community composition in relation to specific plant species and relating this to nestling diets. It is comparable to a similar study conducted in the Coastal Reserve in Orange County (Pratt 2013) and combined results will be important in developing management recommendations on planting palettes that support diverse and abundant arthropod communities to increase wren food availability for wrens, especially during drought. The study will also provide information to assess the status of wrens and factors associated with reproduction and survival and to inform next steps in management.
- (7) Cactus wren populations will be surveyed annually until 2021 using a standardized protocol and established plots in the south county to fully document dispersal and survival of banded birds from the demography study and to determine the number of occupied territories at each site over time. Habitat assessments will be conducted each year using a standardized protocol to determine management needs. The San Pasqual genetic cluster will also be surveyed in 2018 and 2021 to gather data on current status and dispersion of territories at sites and habitat conditions. The survey plots

were established in 2009 and 2011 at sites across the MSPA with mapped cacti and were monitored in subsequent years to help document changes in the number, location, and characteristics of territories over time. Data will be analyzed and management recommendations provided to inform future management.

- (8) The genetic study will be repeated for south San Diego County to determine if N_e has increased or decreased in the genetic clusters and whether there is any change in genetic diversity and connectivity since 2011 and 2012. A focus of the study is to determine if inbreeding threatens the long-term persistence of populations in the genetic cluster and to determine whether more active management is needed (e.g., egg switching) to enhance population persistence. The genetic study is planned to be conducted in collaboration with the Natural Community Coalition in Orange County's Coastal Subregion to provide greater insight into patterns of genetic change related to management actions and to changes in environmental conditions.
- (9) Pre-fire management consists of identifying sites where a lot of shrub crowding exists as well as invasive nonnative grasses that could increase severity and impacts from wildfire. These sites will be prioritized and managed to reduce fire risk through vegetation trimming/removal and invasive species control.
- (10) Following a wildfire, wren and habitat recovery should be monitored for at least 3 years with standardized protocols, and the results should be used to inform annual management to enhance post-fire recovery. Management should be implemented as needed for at least 3 years. If cactus wren recovery and/or habitat recovery is poor, then additional years of monitoring and management may be required.

For details and the most up-to-date goals, objectives, and actions, go to the MSP Portal Coastal Cactus Wren summary page: https://portal.sdmmp.com/view_species.php?taxaid=917698.

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