SALT CREEK COASTAL CACTUS WREN HABITAT RESTORATION PROJECT
5TH ANNUAL MONITORING REPORT

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SALT CREEK COASTAL CACTUS WREN HABITAT RESTORATION PROJECT
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Merkel & Associates, Inc.

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SUMMARY

Merkel & Associates, Inc. (M&A) conducted the fifth annual monitoring assessment for the Salt Creek Coastal Cactus Wren Habitat Restoration Project. Quantitative monitoring was performed on May 8, 2014 (bird survey) and September 2, 2014 (vegetation survey). Information from qualitative assessments of the site was obtained in April, July, and October of 2014 and is provided with this report (Appendix 3).

Avian point counts and vegetation coverage/cactus height was acquired and analyzed for 6 pre-established monitoring stations. These monitoring stations include two restored areas (Stations 1 and 2), two areas that have had previous records of coastal cactus wren (*Campylorhynchus brunneicapillus*) occupation (Stations 3 and 4), and two areas that were assumed to be suitable for cactus wren occupation but no wrens had been observed prior to this study (Stations 5 and 6). The purpose of this report is to provide information in regards to changes in habitat and avian use over time (approximately 5 years) at each of the monitoring stations. This report serves as the final annual report of a 5-year monitoring program.

On September 2, 2014, the vegetation along six permanent 25-meter long transects was analyzed, and plant coverage was determined using a point-intercept method. In addition, the heights of 10 coast cholla (*Cylindropuntia prolifera*) were measured along each transect. Transects within restored (i.e., planted) areas revealed an average total native vegetative cover of 66.0 percent. This is an increase from 2013, which revealed an average total native cover of 62.0 percent. Native plant species included coast cholla, coastal sagebrush (*Artemisia californica*), San Diego sunflower (*Viguiera laciniata*), and flat-top buckwheat (*Eriogonum fasciculatum* var. *fasciculatum*). No non-native plants were intercepted by the transects. Bare ground averaged 34.0 percent cover. The average coast cholla cactus height within restored areas was 19.5 inches. This is an increase of 3.2 inches from 2013 when the average height was recorded as 16.3 inches. Transects in areas occupied by coastal cactus wren revealed an average total native vegetative cover of 64.0 percent, comprised of coast cholla and flat-top buckwheat (*Eriogonum fasciculatum*). This coverage was identical to that recorded last year. Non-native species were also absent from these transects. The average height of coast cholla within cactus wren occupied habitat was 45.7 inches.

Avian point counts were conducted on May 8, 2014. There were seven cactus wren detected at three stations (Stations 1, 3, and 4). This is an increase from the counts in 2013 (6 wrens) and 2012 (3 wrens) but a decrease from 2011 (9 wrens). In 2010, the first year of the monitoring effort, there were seven cactus wrens detected. In 2014, cactus wrens utilized the restoration area (i.e., 1.0-acre area) for the first time during the 5-year monitoring period. Four cactus wren nests were observed in the 1.0- acre restoration area near Station 2. Three nests appeared to be in the construction phase or were being used as a roosting nest and one had been lined with feathers and appeared to have been used for breeding purposes. In 2009, when the restoration of the site began, it was believed that the area was part of a cactus wren territory that extended mostly to the east of the restoration site. Until now, no cactus wrens had been detected at Station 2.

The coastal California gnatcatcher (*Polioptilla californica californica*), a sensitive bird species, has also been recorded within the study area throughout the five-year monitoring period. A total of 3 gnatcatcher at 2 stations were detected this year. This species reached its greatest numbers within the study area in 2012 when 5 birds at 4 stations were detected. The lowest number of gnatcatcher recorded during the five-year monitoring period was in 2013 when only one bird was detected.

Stations 1 and 2 (i.e., the restoration sites) and Station 3 had the highest diversity of bird species. Stations 1, 2 and 6 had the highest count of individual birds. Station 4 had the lowest diversity of bird species and Stations 4 and 5 had the lowest count of individual birds.

INTRODUCTION

PROJECT BACKGROUND

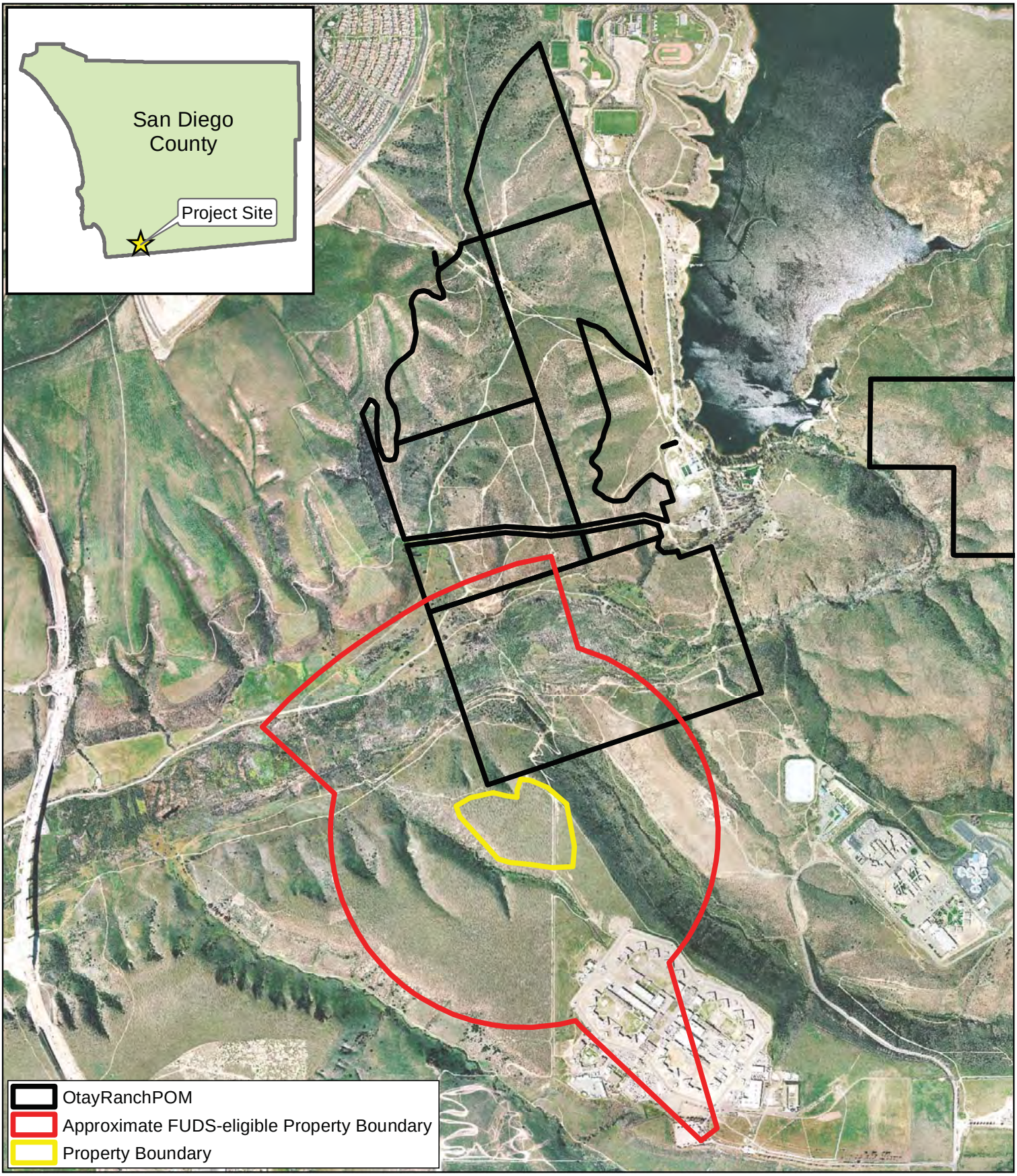
The southern portion of Salt Creek is managed jointly by the County of San Diego and the City of Chula Vista as the Otay Ranch Preserve Owner Manager (POM). Salt Creek has experienced the loss and degradation of coastal cactus wren habitat due to previous grazing, illegal off-road vehicle use, illegal dumping, an increase in invasive plants, drought, and direct competition with non-native plants for light and water. Salt Creek previously supported core regional populations of California gnatcatcher, coastal cactus wren, and coast barrel cactus (*Ferocactus viridescens* var. *viridescens*) as identified in the Multiple Species Conservation Program (MSCP) (Salt Creek Preserve Analysis, Ogden, 1999). In 1996, MSCP GIS data indicated 55 point observations of cactus wren. By 2001, wren locations had declined from 55 to 17 (Dudek and Associates 2001). The purpose of this restoration program is to enhance and expand extant coastal cactus wren habitat within the POM managed lands in the Salt Creek area outside of known formerly used defense (FUD) lands (Figure 1) referred to hereafter as the study area.

It should be noted that the San Diego Field Station of the USGS Western Ecological Research Center conducted field studies of the coastal cactus wren starting in the 2011 spring season in cooperation with the US Fish and Wildlife Service. The goal of this study was to 1) to evaluate the degree of genetic connectivity among cactus wren populations in San Diego County and 2) to study fledgling dispersal. The results will provide information on cactus wren dispersal capabilities, genetic variability, and gene flow among populations that can be used to inform decisions regarding current and future needs for maintaining viable cactus wren populations in coastal California.

In addition, the US Fish and Wildlife Service has been in the process of mapping cactus dominated habitat across San Diego County, after which they were expected to conduct presence/absence surveys for cactus wren. The work included informing USGS when they found an occupied patch so that USGS could monitor nesting activities, with the goal of banding the nestlings for their dispersal study and to collect genetic samples for their genetic connectivity study. Surveys were purportedly conducted between March 2011 and March 2012 by USGS employees and private volunteers. These surveys included walking around or through the scrub during the morning hours to search for birds and nests and to collect genetic samples. Their work was to be confined entirely to the upland scrub habitat within the preserve, and they were not to enter any other parts of the property.

CACTUS WREN BREEDING BIOLOGY

The coastal cactus wren is a federal Candidate 2 Species and a State Species of Special Concern. It occurs along the coastal slope in Ventura, San Bernardino, Los Angeles, Orange, and San Diego Counties as well as Baja California (Solek and Szijj, 2004). The San Diego cactus wren is a subspecies with a more limited range of southern Orange County, San Diego County, and Baja California. The San Diego cactus wren occurs on south and west facing slopes below 1,000 feet elevation. Their territory size ranges from 0.8 to 2.0 ha in size and occurs in cactus dominated coastal sage scrub where the cactus is greater than 1 meter (3.3 feet) in height. In San Diego County, the cactus wren nests in coast cholla and prickly pear (*Opuntia littoralis*). It is a year-round resident and will have multiple nests for both nesting and roosting. The presence of a nest is not evidence of a nesting pair as old nests are often rehabilitated and new nests can be built just for roosting.



Salt Creek Coastal Cactus Wren Habitat Restoration Project

Vicinity/Boundary Map

Figure 1

The cactus wren is an insectivore, gleening insects from the ground and from vegetation. Cactus wren breeding season is between February 15th and August 15th. The male normally maintains the territorial defense while the female incubates the nest. Juveniles will often remain in the territory even after a new nest is created and aid with territorial defense and feeding the nestlings.

RESTORATION IMPLEMENTATION

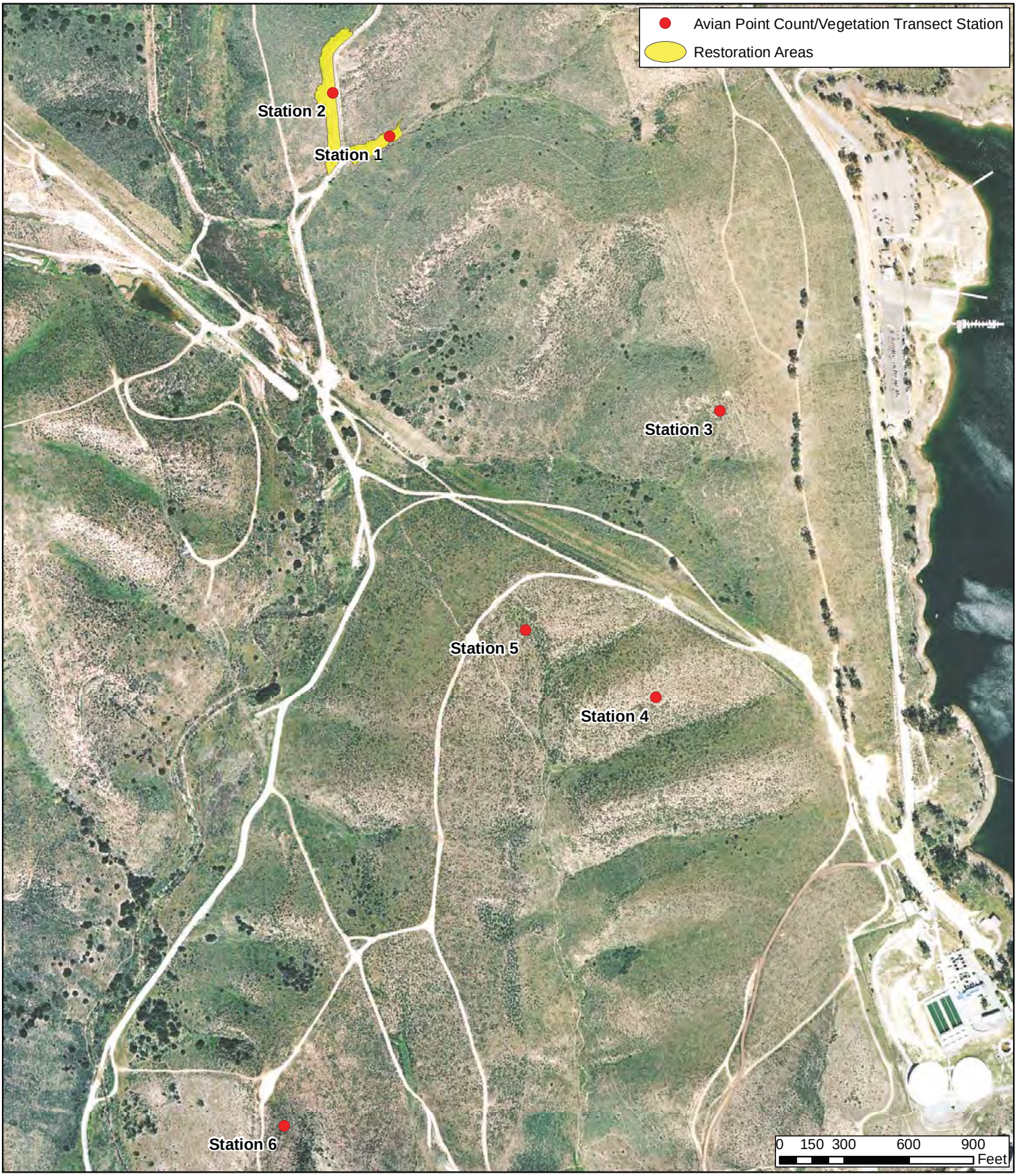
During the late summer of 2009, Merkel & Associates biologists reviewed the study area to determine potential areas for cactus salvage and restoration activities. Several potential restoration areas were identified and then presented to Cheryl Goddard and Megan Hamilton of the County's Department of Parks and Recreation during a site meeting on August 13, 2009. Of the sites reviewed, three were mapped and forwarded by the County to the City of Chula Vista (City) for review and comment. Of these three, the City approved a 1.0-acre area, which occurs on land that was previously disturbed for the construction of a lateral sewer line leading from the Arco Olympic Training Center (Figure 2). Merkel & Associates restoration crews salvaged cactus cuttings/plants from November 30, 2009 through December 11, 2009. Cuttings and plants were obtained throughout the POM managed salt creek area within locations that were recorded to be outside occupied cactus wren habitat. An effort was made to obtain cuttings from outside lateral branches in order to avoid reducing the height of affected plants and reduce the potential for nesting by cactus wren. An attempt was also made to reduce each plant by no more than 5 percent of its total cover. The cactus cuttings/plants were stockpiled in small groupings throughout the 1.0-acre planting area and were left to callus from December 12, 2009 to January 6, 2010. Planting occurred from January 6 through January 14, 2010. Plantings were installed on 2 to 3-foot centers throughout the restoration site. An estimated seven to ten thousand cactus plantings were installed. Native seed collected from the nearby area (i.e., southeast Chula Vista) was hand broadcasted over the site on January 14, 2010, just prior to a significant rainstorm event. Seed included approximately 15.0 lbs. of flat-top buckwheat and 10.0 lbs. of a mixture of coastal sagebrush, San Diego sunflower, coastal deerweed (*Lotus scoparius*), and San Diego bursage (*Ambrosia chenopodiifolia*).

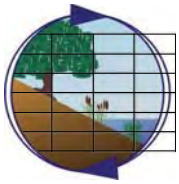
Following this planting effort, Merkel & Associates discovered a similar but smaller nearby area, which had also been disturbed by the aforementioned sewer construction project (i.e., staging area and access road). Subsequent to approval from the County of San Diego and the City of Chula Vista, planting at this 0.4-acre disturbed area commenced on April 29, 2010. Approximately 500 cuttings were obtained from unoccupied habitat within the area. Cuttings were allowed to callus for a period of two weeks and were then planted in mid-May. All planting (and salvaging) ceased when a cactus wren established a nest immediately adjacent to this planting area. Cactus wren nestlings were observed during a previous (early June) monitoring visit. The nestlings were not present during a July 26, 2010 visit of the site, and were presumed to have fledged.

Restoration activities resumed from August 16 to August 18, 2010 with the salvage of an estimated 1,300 to 1,500 cuttings from unoccupied habitat throughout the study area. Cuttings were allowed to callus and then were planted within the 0.4-acre area from September 8 through September 10, 2010. Cacti were planted on approximately 3-foot centers. An estimated total of 1,500 to 2,000 cacti were planted within the 0.4 acre planting area.

METHODS

In 2010, a total of 6 monitoring stations were established within the study area; one was established at each of the two restoration sites (Station 1 and 2), two were established in areas that have had





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Salt Creek Coastal Cactus Wren Habitat Restoration Project

Point Count Stations and Restoration Areas

Figure 2

previous records of cactus wren occupation (Station 3 and 4), and two were established in areas that were presumed to be suitable for coastal cactus wren occupation but did not support cactus wrens prior to the study (Station 5 and 6) (Figure 2). Each station location was staked with a metal t-post and then mapped using a GPS unit with sub-meter accuracy to assist with relocation in subsequent years.

VEGETATION

A total of six transects, each 25 meters in length, were established at each of the monitoring stations. The beginning of each transect coincided with the staked station location mentioned above. An additional t-post stake was placed to mark the end of each 25-meter vegetation transect. A GPS unit was used to record the locations of each transect. M&A biologist, Kyle L. Ince, conducted the fifth year vegetation monitoring survey on September 2, 2014 (Table 1).

Table 1. Summary of Survey Dates, Times, Conditions, and Biologists

Dates	Time	Conditions (start-end)	Biologist	Task
8 May 2014	0600-1047	Weather: 100%-20% cc Wind: 0 –1 BS Temperature: 57°-62° F	Bonnie L. Peterson	Avian Point Count Monitoring
2 September 2014	0915-1330	Weather: 10% cc Wind: 0-1 BS Temperature: 72°-78 ° F	Kyle L. Ince	Vegetation Monitoring

cc=cloud cover; BS=Beaufort Scale; F = Fahrenheit

A point-intercept method was used to determine total plant cover, percent cover of each species, and percent cover of bare ground for each of the six transects (Appendix 1). Plant cover was recorded at intervals of one meter along the tape, providing a total of 25 point intercepts per transect. Because the point-intercept method includes species overlap (absolute cover), percent cover may exceed one hundred percent. Total vegetative cover without overlap (relative cover) was also calculated. In addition, the height of 10 randomly selected coast cholla within and immediately adjacent to each transect was measured using a tape measure. Photographs were taken from the beginning of each transect (Appendix 2).

AVIAN POINT COUNTS

M&A biologist, Bonnie L. Peterson, collected point count information on May 8, 2014 between sunrise and 1000 hours, when the majority of avian species are most vocal. Methods for obtaining, and recording information followed a standardized format for point counts (Ralph et al 1995). Data collected included all birds heard or observed between 0-3 minutes, 3-5 minutes and those heard or observed between 5-10 minutes for a total of 10 minutes per point count station. Bird distance estimates of less than or equal to 50 meters, greater than 50 meters, and flyovers were also recorded for each observation. Two complete counts were done at each station. Following each point count period, Ms. Peterson remained in the area for 5 to 10 minutes to record any additional avian information as well as any information on the cactus wren including the number of pairs, location for nests, etc. The following table provides dates, survey times, and weather conditions recorded during the avian monitoring events.

RESULTS

VEGETATION

Restoration Areas

The 1.0-acre restoration site exhibited 72.0 percent vegetative cover (without overlap). Native species provided all of the cover, which included coast cholla, coastal sagebrush (*Artemisia californica*), flat-top buckwheat (*Eriogonum fasciculatum* var. *fasciculatum*), lemonadeberry (*Rhus integrifolia*), and San Diego sunflower (*Bahiopsis laciniata*), with cover values of 36.0, 24.0, 4.0, 4.0, and 4.0 percent, respectively. No non-native species were intercepted by the transect. Bare ground comprised 34.0 percent of the transect. The average height of coast cholla along the transect was 18.7 inches (1.6 feet).

The 0.4-acre restoration site exhibited 64.0 percent vegetative cover (without overlap). Native species comprised all of the recorded vegetation for the transect and included coastal sagebrush, coast cholla, flat-top buckwheat, fascicled tarplant, and matchweed (*Guiterrezia sarothrae*) with cover values of 32.0, 12.0, 8.0, 8.0, and 4.0 percent, respectively. No non-native species were recorded. Bare ground comprised 40.0 percent of the transect. The average height of coast cholla along this transect was 20.3 inches (1.7 feet).

Occupied Cactus Wren Habitat

Average vegetative cover for occupied cactus wren habitat was 64.0 percent (without overlap). Native species provided 64.0 percent cover and included coast cholla and flat-top buckwheat with average cover values of 44.0 and 30.0 percent, respectively. No non-native species were intercepted by the transects. The average bare ground cover for these two transects was 36.0 percent. The average height of coast cholla was 45.7 inches (3.8 feet).

Suitable but Non-occupied Cactus Wren Habitat

Average vegetative cover for suitable but non-occupied cactus wren habitat was 82.0 percent (without overlap). Native species provided all 82.0 percent of the cover, which included flat-top buckwheat, coast cholla, and manroot (*Marah macrocarpus*) with average cover values of 52.0, 30.0, and 2.0 percent, respectively. No non-native species were intercepted by the transects. The average bare ground cover for these two transects was 18.0 percent. The average height of coast cholla was 39.1 inches (3.3 feet).

AVIAN POINT COUNTS

All results from the point count survey in 2014 are recorded in Table 2. In general, there were seven coastal cactus wren observed during the point counts in 2014. These were observed on three stations including Station 1, 3, and 4. This year there were only three individual California gnatcatchers observed; two individuals at Station 1, which is a restoration site, and one individual at Station 5.

Table 2. Birds Observed During May 2014 Avian Point Counts at Salt Creek

SPECIES		Station 1	Station 2	Station 3	Station 4	Station 5	Station 6
Anna's Hummingbird	*Calypte anna*	1				1	2
Bewick's Wren	*Thryomanes bewickii*			1			
Black-headed Grosbeak	*Pheucticus melanocephalus*		1				
Cactus Wren	***Campylorhynchus brunneicapillus***	**2**		**3**	**2**		
California Gnatcatcher	***Polioptila californica californica***	**2**				**1**	
California Towhee	*Pipilo crissalis*	1		1	1	1	1
California Quail	*Callipepla californica*	2	1	1			
California Thrasher	*Toxostoma redivivum*	1					
Cassin's Kingbird	*Tyrannus vociferans*	1	1				
Costa's Hummingbird	*Calypte costae*	1					
Common Raven	*Corvus corax*			1			
Greater Roadrunner	*Geococcyx californianus*	1		1			
Hooded Oriole	*Icterus cucullatus*	1					
House Finch	*Carpodacus mexicanus*	1	5	2			4
Killdeer	*Charadrius vociferous*		1				
Least Bell's Vireo	*Vireo bellii pusillus*		1				
Lark Sparrow	*Chondestes grammacus*					2	
Lesser Goldfinch	*Spinus psaltria*	3	3		1		
Mourning Dove	*Zenaida macroura*		3	2	2		1
Northern Mockingbird	*Mimus polyglottos*	1	1	1			1
Red-winged Blackbird	*Agelaius phoeniceus*	2	4				
Spotted Towhee	*Pipilo maculates*	1					
Western Meadowlark	*Sturnella neglecta*		2				
Wrentit	*Chamaea fasciata*		1	1			
Total Number of Birds		**21**	**24**	**14**	**6**	**5**	**9**
Total Number of Species		**15**	**12**	**10**	**4**	**4**	**5**
Additional Species (includes flyovers)							
American Crow	*Corvus brachyrhynchos*	1					
Brewer's Blackbird	*Euphagus cyanocephalus*		2				
Common Raven	*Corvus corax*				2	1	3
California Thrasher	*Toxostoma redivivum*		1				
Cooper's Hawk	*Accipiter cooperii*		1				
Greater Roadrunner	*Geococcyx californianus*				1		
House Finch	*Carpodacus mexicanus*		2				4
Lesser Goldfinch	*Spinus psaltria*	4					
Lesser Nighthawk	*Chordeiles acutipennis*				1		
Mourning Dove	*Zenaida macroura*		2			1	
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*		2			2	
Red-tailed Hawk	*Buteo jamaicensis*						1
Western Gull	*Larus occidentalis*	7					
Total Number of Birds		**33**	**34**	**14**	**10**	**9**	**17**
Total Number of Species		**17**	**16**	**10**	**6**	**7**	**7**

Stations 1 & 2 – Restoration Areas
Stations 3 & 4 – Recorded as Occupied Cactus Wren Habitat
Stations 5 & 6 –Suitable but Historically Non-occupied Cactus Wren Habitat
* observed on nest

Restoration Areas

This year there were two cactus wrens recorded at Station 1 but they were at a distance of greater than 50 meters and the calls came from the direction of Station 2 which is close by (Figure 2). Four cactus wren nests were located at Station 2, which has not been used as a territory since the start of the restoration project in 2009. Three nests appeared to be in the construction phase or were being used as a roosting nest and one had been lined with feathers and appeared to have been used but no longer active. The used nest was found in the tallest cactus, which was probably on-site prior to the restoration. The other nests were in planted cacti. There were also two coastal California gnatcatchers recorded at Station 1.

In 2014, Stations 1 and 2 had the highest diversity and abundance of species. This has been consistent over the entire 5 years of the survey (Figure 3). Station 2 had a high number of individuals (24 birds) along with a fairly high number of species (12). Station 1 had the highest number of species (15). Part of the diversity at Station 1 and 2 is due to birds heard from a nearby wetland. One male least Bell's vireo (*Vireo bellii pusillus*), a black-headed grosbeak (*Pheucticus melanocephalus*), and one red-winged blackbird (*Agelaius phoeniceus*) were all heard singing in the riparian habitat.

Over the past 5 years, Stations 1 and 2 have been highest in species diversity and along with Station 3 the highest in species abundance.

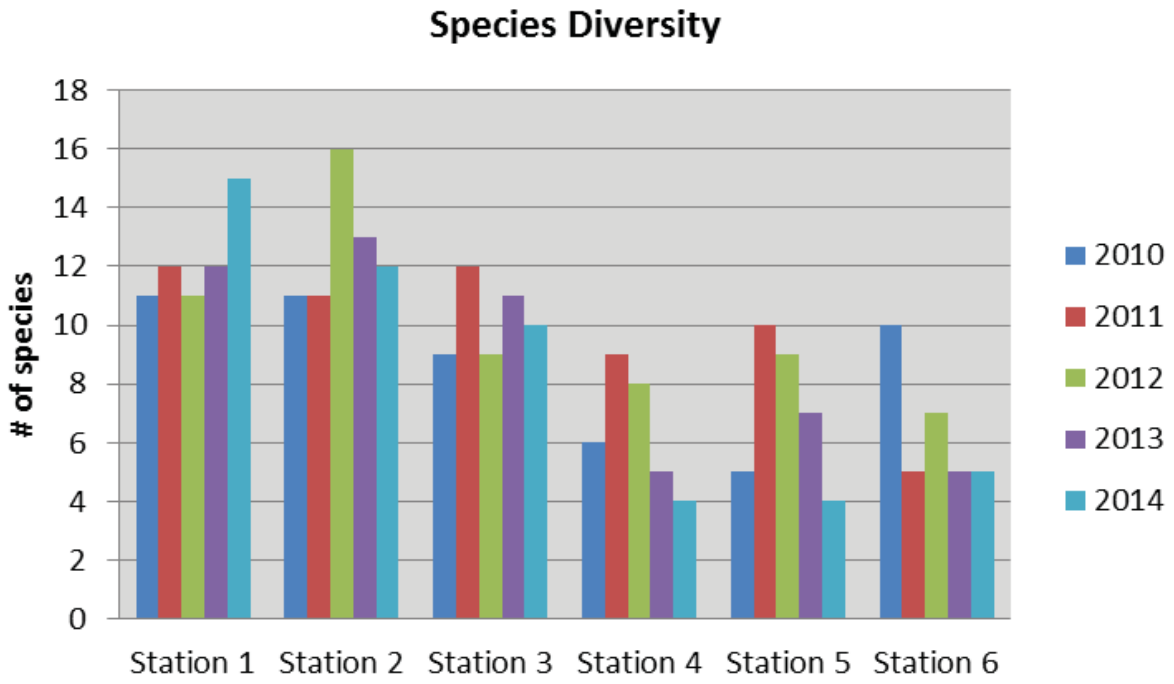

Figure 3. Avian Species Diversity at Each Station Over 5 Years. *Station 1 and 2 = Restoration Areas, Station 3 and 4 = Areas Recorded as Occupied by Cactus Wren, Stations 5 and 6 = Areas Suitable but Not Occupied by Cactus Wren.*

Occupied Cactus Wren Habitat

Station 3 exhibits excellent cactus wren habitat with several 4.5 to 5 foot tall coast cholla and Mexican elderberry (*Sambucus mexicana*) occurring nearby. Three coastal cactus wrens were observed at this station during the point counts and two were within 50 meters of the point count station. One active cactus wren nest was observed at Station 3. There were two cactus wrens observed at Station 4 at a distance greater than 50 meters from the point count station. Station 4 also had a cactus wren nest that was currently unoccupied but showed signs of use. The results of our monitoring effort show that the habitat at Station 3 is well suited for cactus wren as it has supported the highest number of individuals during the 5-year survey (Figure 4).

In 2014, Station 3 was only slightly lower than Stations 1 and 2 in both number of species (10) and number of individuals (14). Station 4 had the lowest number of species (4) and the lowest number of individuals (6) of all the point count stations with the exception of Station 5 which tied for diversity of species and had an even lower count of individuals. This is consistent with the results over the past 5 years (Figure 3). No California gnatcatchers were observed at these point count stations.

Of interest near Station 4 was a lesser nighthawk (*Chordeiles acutipennis*) that was disturbed prior to the point count. It was in an area of rocky soil that would be suitable for nighthawk nesting.

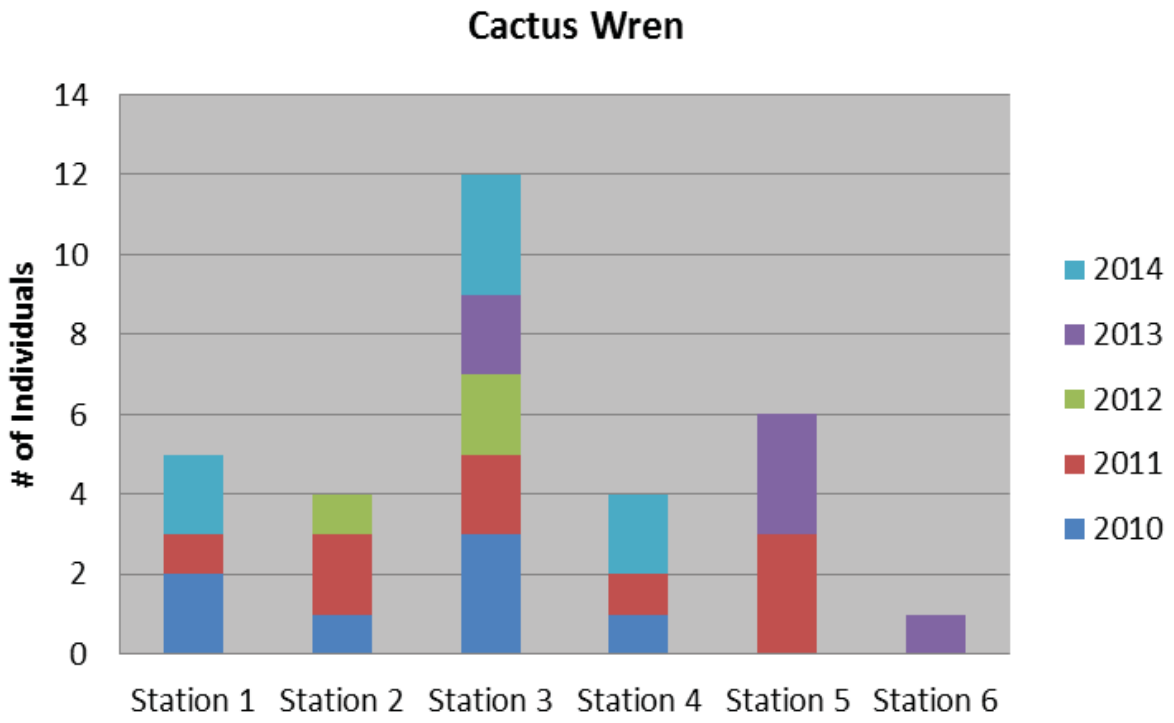

Figure 4. Occurrence of Cactus Wren at Each Station Over 5 Years. *Station 1 and 2 = Restoration Areas, Station 3 and 4 = Areas Recorded as Occupied by Cactus Wren, Stations 5 and 6 = Areas Suitable but Not Occupied by Cactus Wren.*

Suitable but Non-occupied Cactus Wren Habitat

No cactus wren were detected at Station 5 or Station 6, however, Station 5 did have a cactus wren nest that was approximately 5 feet off the ground. It did not appear to be occupied and the bottom was pulled down and may have been torn out. Another nest was found in this vicinity that was used but currently inactive. This demonstrates that cactus wren have been using the area but were not on-site or observed during the point counts. Station 6 showed no sign of activity by the coastal cactus wren. This is consistent with observations in past years (Figure 4) although one cactus wren was observed in 2013. One California gnatcatcher was detected on Station 5 (Table 2).

In 2014, both Station 5 and 6 had a low number of species detected (4 and 5 respectively) during the point counts and the number of individuals counted was extremely low (5) at Station 5. Station 6 had a larger number of individuals but many of them were flyovers including brewer's blackbird (*Euphagus cyanocephalus*), house finch (*Carpodacus mexicanus*), and red-tailed hawk (*Buteo jamaicensis*).

Quantitative and Qualitative Analysis

The average native vegetative growth for both restoration sites has increased from 26.0 percent in 2010 to 42.0 percent in 2011, to 56.0 percent in 2012, to 62.0 percent in 2013 and finally to 66.0 percent in 2014. Cacti coverage has slightly decreased from 26.0 percent in 2013 to 24.0 percent in 2014 but has increased in height from 16.3 inches in 2013 to 19.6 inches in 2014. It should be noted that the region has been experiencing record drought conditions for the past three years. The cacti in the restoration areas were watered periodically throughout the maintenance and monitoring period to assist with expediting growth. The last watering event occurred in July of 2013. Most areas, other than the restoration areas, have shown little or no increase in cover, likely due to the drought conditions. Annual plants including native species such as fascicled tarplant and non-native species such as tocalote (*Centaurea melitensis*) are dependant upon rainfall for seed germination. These species have been mostly absent from the transects for the past 2 years.

Figures 5 and 6 depict the change in native plant coverage and cactus height, respectively, throughout the monitoring period for each of the studied site conditions.

During the 5-year study, Stations 1, 2, and 3 have consistently had the highest avian species diversity and the highest counts of individuals of all the point count stations. These sites also appear to have less coverage from flat-top buckwheat than Stations 4, 5, and 6. Although it is unknown if cover from buckwheat has any correlation with species abundance and diversity, the data suggests this possibility, and further study would be required. Stations 4, 5, and 6 have consistently had the lowest number of individuals and the lowest number of species although the counts have fluctuated somewhat during the five years (Figure 3). Stations 5 and 6 have a high percent cover of flat-top buckwheat along the transects. At Station 4, there is only slightly more buckwheat than the higher diversity stations, but this station exhibited a considerable amount of bare ground. Flat-top buckwheat is a known dominant species in cactus wren habitat; however, there have been no studies that show the ideal percent cover for nesting habitat.

This study has shown that Station 3 has the most ideal habitat for cactus wren (Figure 4) and has exhibited the highest species diversity compared to the other studied stations (Figure 3). The dominant habitat features at this point count station are: an average cactus height of 58.4 inches (4.9

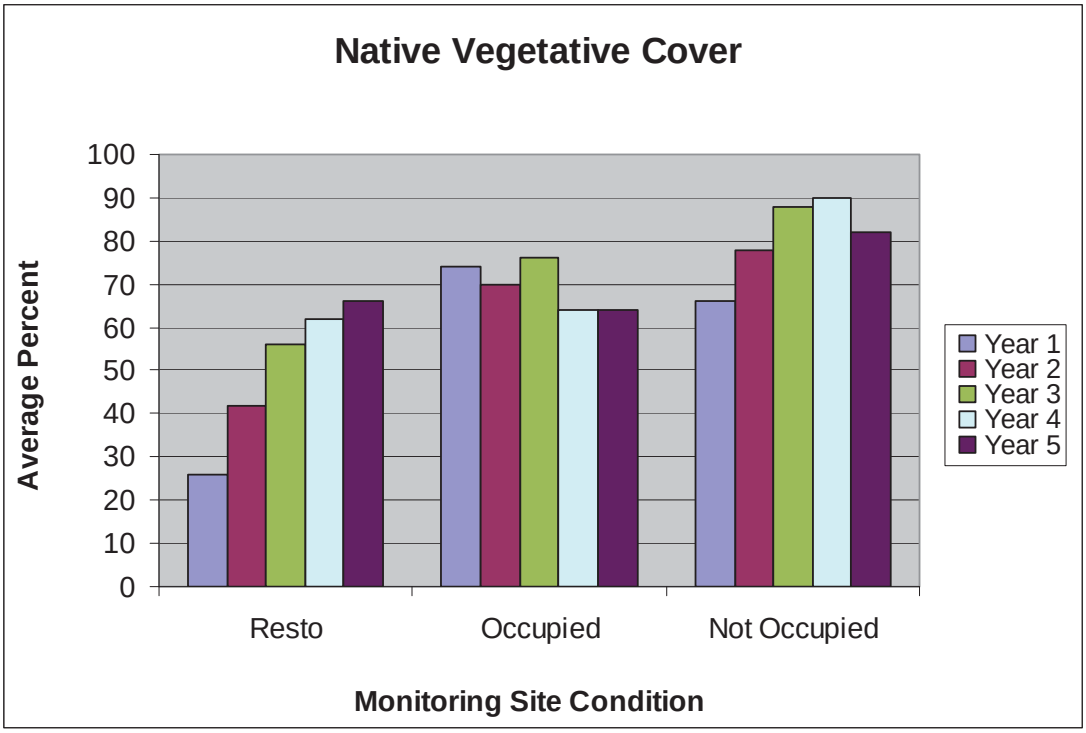

Figure 5. Average Percent Cover of Native Vegetation for Three Studied Site Conditions Over 5 Years. *Site Condition 1 = Restoration Areas, Site Condition 2 = Areas Recorded as Occupied by Cactus Wren, Site Condition 3 = Areas Suitable but Not Occupied by Cactus Wren.*

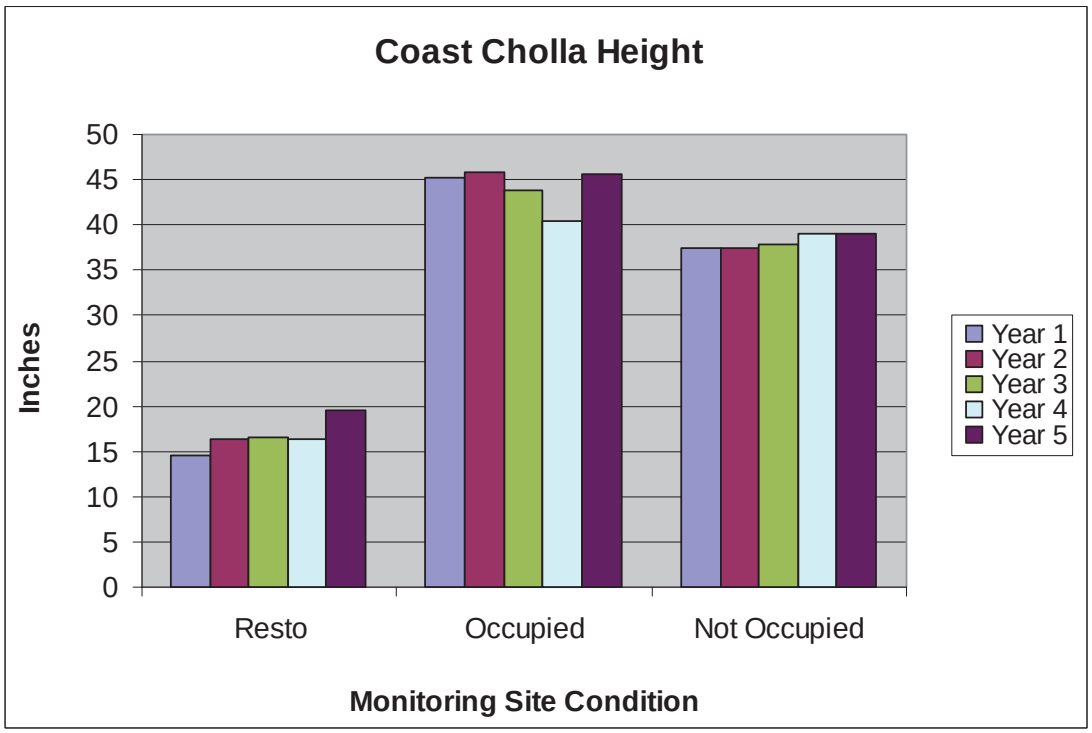

Figure 6. Coast Cholla Height for Three Studied Site Conditions Over a Period of 5 Years. *Site Condition 1 = Restoration Areas, Site Condition 2 = Occupied Cactus Wren Area, Site Condition 3 = Suitable but Not Occupied Cactus Wren Area.*

feet), 68.0% cover of cactus, 20.0% cover of flat-top buckwheat, and 28.0% cover of bare ground. Stations 4, 5, and 6 all have an average cactus height that is below 40 inches (32.9 to 39.3 inches). Cover from cactus at these stations ranges from 12.0% (Station 6) to 48.0% (Station 5), which is considerably less than the 68.0% cover found at Station 3. Other habitat components vary among Stations 4, 5, and 6. The average cactus height at the restoration sites was 19.5 inches, which is approximately one third the height of the average cactus height at Station 3. If the growth rate is consistent with the past 5 years of monitoring, it will take approximately 38 years for the cacti at the restoration sites to reach the height and 22 years to meet the cover exhibited at Site 3. It should be noted that growth was enhanced with hand watering during the first four years and drought conditions have been severe for the last two years of the monitoring effort. It should also be noted that the cacti stand at Site 3 appears unusually tall and dense compared to most stands in the region.

As mentioned previously, the 1.0-acre restoration area has begun to attract cactus wren. Four cactus wren nests were observed in Year 5 of the monitoring period. Three nests appeared to be in the construction phase or were being used as a roosting nests and one had been lined with feathers and appeared to have been used for breeding purposes. Although the current average heights of the cactus are only about one third of the height (19.5 inches compared to 58.4 inches) of that in the high quality cactus wren habitat (i.e., Station 3), there are some taller cactus present on the site and the newly planted cactus offers some protection from predators. Any future monitoring of the site (not associated with this monitoring program), is expected to reveal greater use of the restoration areas by cactus wren.

REFERENCES

Ralph, C. J., J. R. Sauer, S. Droege, technical editors. 1995. Monitoring Bird Populations by Point Counts. Gen. Tech. Rep. PSW-GTR-149. Albany, CA. Pacific Southwest Research Station, U.S. Forest Service, Department of Agriculture. 187 pp.

Solek, C. and L. Szijj. 2004. Cactus Wren (*Campylorhynchus brunneicapillus*). *In* The Coastal Scrub and Chaparral Bird Conservation Plan: a strategy for protecting and managing coastal scrub and chaparral habitats and associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/htmldocs/scrub.html

APPENDIX 1. TRANSECT SAMPLING DATA

Monitoring Results

Plant Species	Percent Cover					
	Transect 1	**Transect 2**	**Transect 3**	**Transect 4**	**Transect 5**	**Transect 6**
Coastal Sagebrush (*Artemisia californica*)	32.0	24.0				
Laciniate Spineflower (*Chorizanthe fimbriata* var. *laciniata)*						
Nievitas Cryptantha (*Cryptantha intermedia*)						
Coast Cholla (*Cylindropuntia prolifera*)	12.0	36.0	68.0	20.0	48.0	12.0
Fascicled Tarplant (*Deinandra fasciculatum*)	8.0					
Flat-top Buckwheat (*Eriogonum fasciculatum* var. *fasciculatum*)	8.0	4.0	20.0	40.0	20.0	84.0
Matchweed (*Guiterrezia sarothrae*)	4.0					
Manroot (*Marah macarupus var. marcrocarpus*)					4.0	
Lemonadeberry *(Rhus integrifolia)*		4.0				
San Diego Sunflower (*Viguiera laciniata*)		4.0				
**Red Brome (*Bromus madritensis* ssp. *rubens*)*						
Tocalote (*Centaurea melitensis*)*						
Bare Ground	40.0	28.0	28.0	44.0	28.0	8.0
Total Percent Vegetative Cover (with overlap)	64.0	72.0	88.0	60.0	72.0	96.0
Total Percent Vegetative Cover (without overlap)	60.0	72.0	72.0	56.0	72.0	92.0
Total Percent Native Vegetative Cover (with overlap)	64.0	72.0	88.0	60.0	72.0	96.0
Total Percent Native Vegetative Cover (without overlap)	60.0	72.0	72.0	56.0	72.0	92.0
Total Percent Non-native Vegetative Cover (without overlap)	0.0	0.0	0.0	0.0	0.0	0.0

* Non-native Species

** May be mixed with other species of grass (very dry and difficult to identify)

	Restoration Sites no previous known CAWR nesting
	Previous records of CAWR nesting
	Suitable habitat for CAWR but not a recorded nesting site

APPENDIX 2. TRANSECT PHOTOGRAPHS

Photo Point 1. Viewing north from the southern end of the 1.0-acre restoration site prior to planting.

Photo Point 2. Viewing south at the southern half of the 1.0-acre restoration site prior to planting.

Photo Point 3. Viewing south at the southern portion of the 1.0-acre restoration site following planting.

Photo Point 4. Viewing south near the northern end of the 1.0-acre restoration site following planting.

Photo Point 5. Habitat restoration crews planting cactus at the 1.0-acre restoration site.

Photo Point 6. Viewing southwest at the northern portion of the 1.0-acre restoration site.

Photo Point 5. Habitat restoration crews planting cactus at the 1.0-acre restoration site.

Photo Point 6. Viewing southwest at the northern portion of the 1.0-acre restoration site.

Photo Point 7. Viewing south from the northern end of the 1.0-acre restoration site. Photo taken on May 24, 2010.

Photo Point 8. Viewing northeast at the 0.4-acre restoration site following initial planting. Photo taken September 9, 2010.

Photo Point 9. Viewing west at Transect 1 (0.4-acre restoration site) on September 2, 2014.

Photo Point 10. Viewing south at Transect 2 (1.0-acre restoration site) on September 2, 2014.

Photo Point 11. Viewing north at 1.0-acre restoration site) on September 2, 2014.

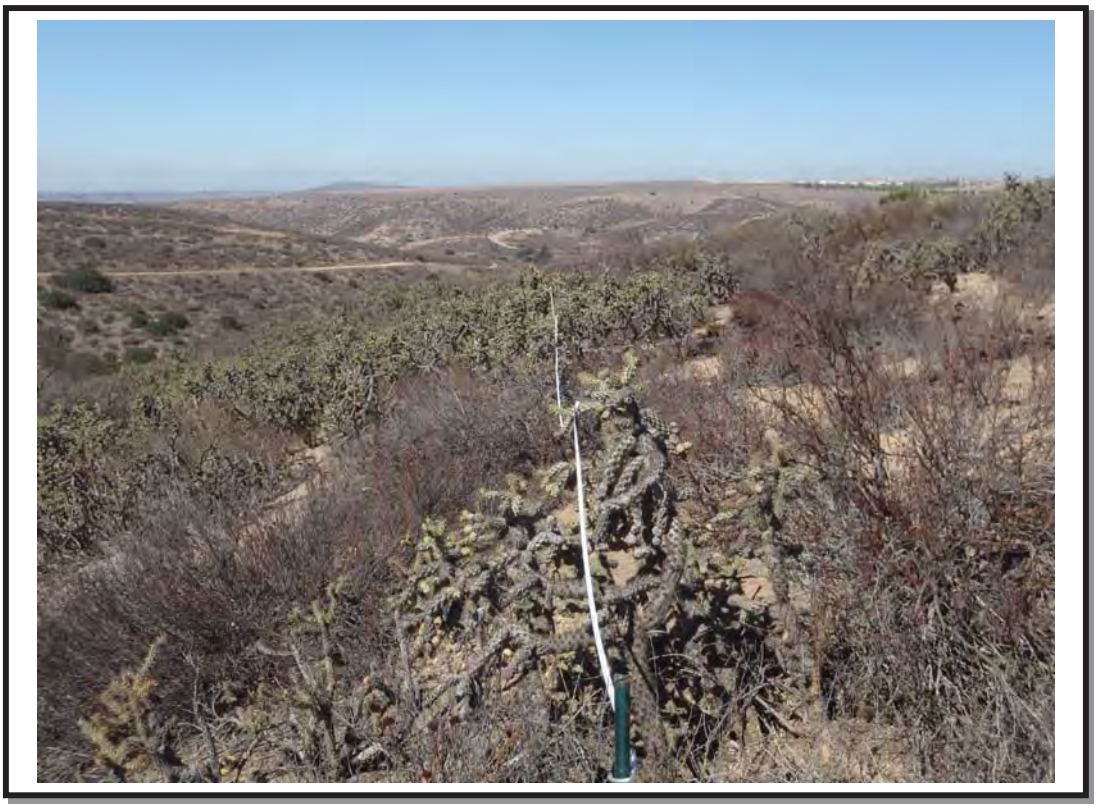

Photo Point 12. Viewing southwest at Transect 3 (cactus wren occupied habitat). Photo taken September 2, 2014.

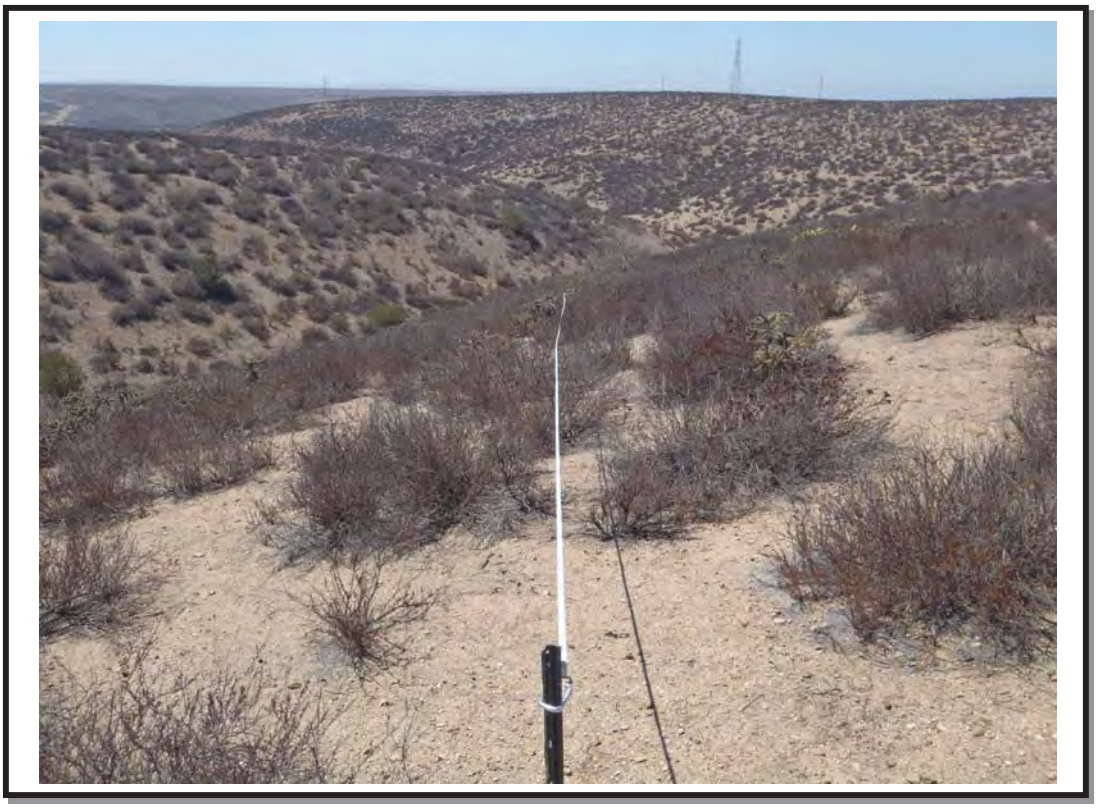

Photo Point 13. Viewing southwest at Transect 4 (cactus wren occupied habitat). Photo taken September 2, 2014.

Photo Point 14. Viewing southwest at Transect 5 (presumed suitable and now occupied cactus wren habitat). Photo taken September 2, 2014.

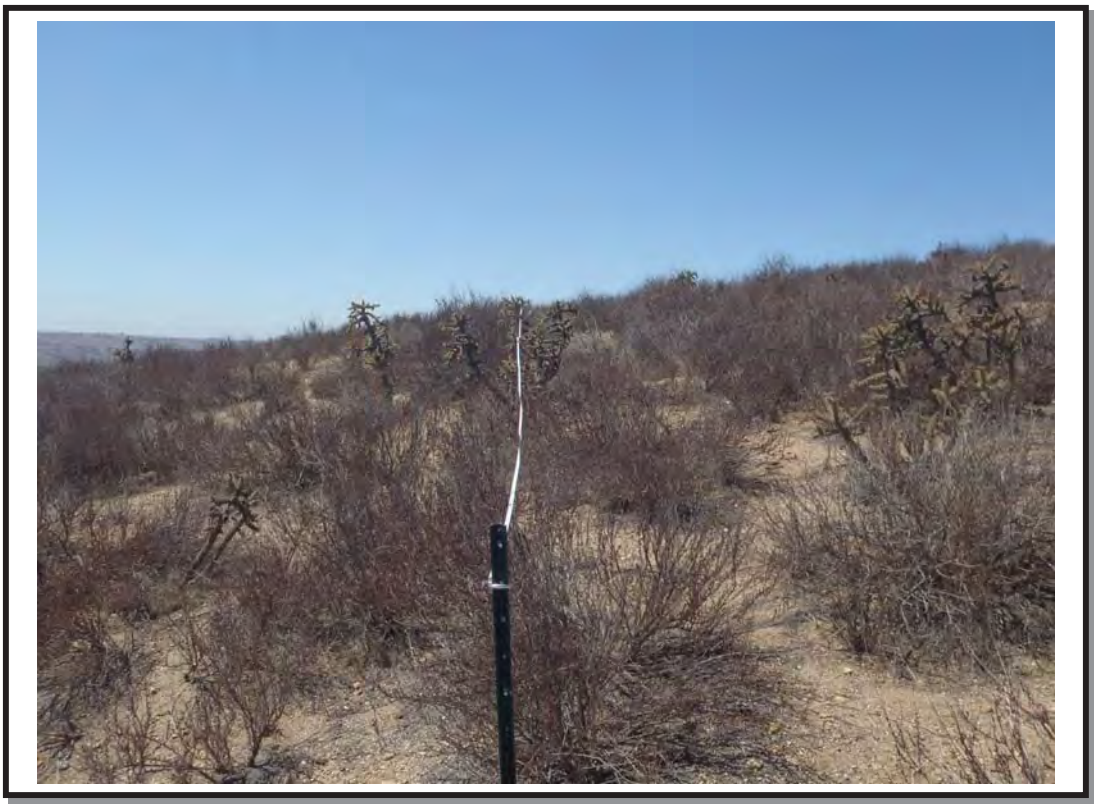

Photo Point 15. Viewing southwest at Transect 6 (presumed suitable but unoccupied cactus wren habitat). Photo taken September 2, 2014.

Photo Point 16. Cactus wren (*Campylorhynchus brunneicapillus*) nest at 1.0-acre restoration site. Photo taken May 8, 2014.

Photo Point 17. Cactus wren (*Campylorhynchus brunneicapillus*) nest at 1.0-acre restoration site. Photo taken April 18, 2014.

Photo Point 18. Woodrat (*Neotoma lepida intermedia*) nest at 1.0-acre restoration site. Photo taken April 18, 2014.

APPENDIX 3. QUARTERLY MONITORING REPORTS

Merkel & Associates, Inc.
5434 Ruffin Road, San Diego, CA 92123
Tel: 858/560-5465 • Fax: 858/560-7779
e-mail: associates@merkelinc.com

May 2, 2014
M&A #09-048-01

Ms. Cheryl Goddard
Department of Parks and Recreation
County of San Diego
9150 Chesapeake Drive, Suite 200
San Diego, CA 92123

Re: Year 5, 1st Quarterly Progress Report for the Salt Creek Coastal Cactus Wren Habitat Enhancement/Restoration Project

Dear Cheryl:

The purpose of this letter is to provide you with a progress report of the Salt Creek Coastal Cactus Wren Habitat Enhancement/Restoration Project. Merkel & Associates (M&A) visited the site on April 18, 2014. Both the 1.0-acre and 0.4-acre areas continue to thrive. Most of the cacti looked healthy and they appeared to have grown since our last quarterly site visit in September. Coastal sagebrush (*Artemisia californica*) appears to be filling in between cacti at the 0.4-acre site. New seedling growth of San Diego viguiera (*Bahiopsis laciniata*), flat top buckwheat (*Eriogonum fasciculatum* var. *fasciculatum*), and matchweed (*Guiterrezia sarothrae*) were also noted in this area.

Two cactus wren (*Campylorhynchus brunneicapillus*) nests were observed at the 1.0-acre site. Both nests were in cacti that were planted prior to the site's restoration effort. These plants occur adjacent to the access road and are one to two feet taller than most of the cacti that were planted as part of this project. Nonetheless, these are the first wren nests observed within the boundary of the restoration effort. No eggs were observed in these nests. They will be reviewed again later this month during this year's quantitative bird assessment, and their status will be assessed at that time.

I have attached photos of the restoration areas for your review. If you have any questions, please do not hesitate to contact me at Kince@merkelinc.com or (858) 560-5465.

Sincerely,

Kyle L. Ince
Project Biologist

PHOTO PAGES

Photo Point 1. Viewing east at 0.4-acre site.

Photo Point 2. Viewing north at 1.0-acre site.

Photo Point 3. Coastal cactus wren (*Campylorhynchus brunneicapillus*) nest at 1.0-acre site, southern end.

Photo Point 4. Coastal cactus wren (*Campylorhynchus brunneicapillus*) nest at 1.0-acre site, northern end.

Merkel & Associates, Inc.
5434 Ruffin Road, San Diego, CA 92123
Tel: 858/560-5465 • Fax: 858/560-7779
e-mail: associates@merkelinc.com

July 21, 2014
M&A #09-048-01

Ms. Cheryl Goddard
Department of Parks and Recreation
County of San Diego
9150 Chesapeake Drive, Suite 200
San Diego, CA 92123

Re: Year 5, 2nd Quarterly Progress Report for the Salt Creek Coastal Cactus Wren Habitat Enhancement/Restoration Project

Dear Cheryl:

The purpose of this letter is to provide you with a progress report of the Salt Creek Coastal Cactus Wren Habitat Enhancement/Restoration Project. Merkel & Associates (M&A) visited the site on July 9, 2014. Both the 1.0-acre and 0.4-acre areas continue to thrive. Most of the cacti looked healthy, and there appears to be several new plants that have originated from detached stem segments (i.e., joints) from planted cacti. Native plants continue to fill in the space between cacti at both sites. Coastal sagebrush (*Artemisia californica*) ranges from 2 to 14 inches in height, and flat-top buckwheat (*Eriogonum fasciculatum* var. *fasciculatum*) ranges from 3 to 6 inches in height. Other native species occurring between cacti included San Diego viguiera (*Bahiopsis laciniata*), matchweed (*Guiterrezia sarothrae*), and broom baccharis (*Baccharis sarothroides*). Weed coverage was minimal and included tocalote (*Centaurea melitensis*) and short-pod mustard (*Hirschfeldia incana*).

Two additional cactus wren (*Campylorhynchus brunneicapillus*) nests were observed at the 1.0-acre site since our last visit. A total of four nests have been recorded at the site. Three of the four nests are presumed to be roosting nests, while the fourth nest may have been used for breeding. Cactus wren typically breed from mid-March through early June. Other sensitive species observed within the restoration effort include San Diego desert woodrat (*Neotoma lepida intermedia*) and orangethroat whiptail (*Aspidoscelis hyperythra beldingi*). The whiptail was observed for the first time during this quarterly site visit.

Photos of the restoration areas area attached for your review. If you have any questions, please do not hesitate to contact me at Kince@merkelinc.com or (858) 560-5465.

Sincerely,

Kyle L. Ince
Project Biologist

PHOTO PAGES

Photo Point 1. Viewing east at 0.4-acre site.

Photo Point 2. Viewing west at 0.4-acre site.

Photo Point 3. New cactus originating from detached stem segment from planted cactus at 0.4-acre site.

Photo Point 4. Flat-top buckwheat (*Eriogonum fasciculatum* var. *fasciculatum*) in flower at 0.4-acre site. Plant presumed to have originated from introduced seed mix.

Photo Point 5. Viewing north at 1.0-acre site.

Photo Point 6. Viewing south at 1.0-acre site.

Photo Point 7. Coastal cactus wren (*Campylorhynchus brunneicapillus*) nest at 1.0-acre site.

Photo Point 8. Coastal cactus wren (*Campylorhynchus brunneicapillus*) nest at 1.0-acre site.

Merkel & Associates, Inc.
5434 Ruffin Road, San Diego, CA 92123
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October 14, 2014
M&A #09-048-01

Ms. Cheryl Goddard
Department of Parks and Recreation
County of San Diego
9150 Chesapeake Drive, Suite 200
San Diego, CA 92123

Re: Year 5, 3rd Quarterly Progress Report for the Salt Creek Coastal Cactus Wren Habitat Enhancement/Restoration Project

Dear Cheryl:

The purpose of this letter is to provide you with a progress report of the Salt Creek Coastal Cactus Wren Habitat Enhancement/Restoration Project. Merkel & Associates (M&A) visited the site on October 9, 2014. Despite the lack of rainfall and unseasonably warm temperatures, most of the vegetation within the 1.0-acre and 0.4-acre restoration sites appeared to be healthy. This includes most of the small, young coastal sage scrub plants that have grown between the planted cacti at the 0.4-acre site. Winter rains should promote their growth and further blend this area with the adjacent native habitat. It has become difficult to distinguish between the 1.0-acre restoration site and the adjacent native habitat.

No weeds were observed within the restoration areas. Quantitative data obtained during the annual monitoring survey conducted in September revealed that native vegetative cover has increased from 62.0 percent in 2013 to 66.0 percent in 2014. In addition, the average height of cacti in the restored areas has also increased from 16.3 inches in 2013 to 19.5 inches in 2014. Both the increase in native vegetative cover and cacti height is somewhat surprising given the lack of rainfall in the area. More detailed information will be provided in the forthcoming 5th annual monitoring report.

Native seed (primarily flat-top buckwheat) was collected by the maintenance crew from areas within and adjacent to the restoration sites. This seed will be sown in bare areas of the restoration sites just prior to a predicted rainfall event.

No additional cactus wren (*Campylorhynchus brunneicapillus*) nests were observed at the 1.0-acre site since the last monitoring visit. A total of four nests have been recorded at this site. The scat of black-tailed jackrabbit (*Lepus californicus*) was observed during this site visit. Other sensitive species previously observed within the restoration areas include San Diego desert woodrat (*Neotoma lepida intermedia*) and orangethroat whiptail (*Aspidoscelis hyperythra beldingi*).

Photos of the restoration areas are attached for your review. If you have any questions, please do not hesitate to contact me at Kince@merkelinc.com or (858) 560-5465.

Sincerely,

Kyle L. Ince
Project Biologist

PHOTO PAGES

Photo Point 1. Viewing east at 0.4-acre restoration site.

Photo Point 2. Planted coast cholla (*Cylindropuntia prolifera*) surrounded by coastal sagebrush (*Artemisia californica*) seedlings at the 0.4-acre site.

Photo Point 3. Viewing east at the 0.4-acre restoration site. Note coastal sage scrub plants occurring between planted cacti.

Photo Point 4. Viewing north at the 1.0-acre restoration site. The planted vegetation appears to visually blend in with the adjacent native habitat.

Photo Point 5. Viewing south at the 1.0-acre restoration site.

Photo Point 6. Coastal cactus wren (*Campylorhynchus brunneicapillus*) nest at the 1.0-acre restoration site.