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November 28, 2007

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15600 Sand Canyon Avenue  
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**SUBJECT: DRAFT FIELD METHODS FOR NROC COASTAL RESERVE  
CACTUS WREN STUDY**

Dear Lyn,

In 2006, I worked with Milan Mitrovich, then of the Nature Reserve of Orange County (NROC), to develop methods for mapping and characterizing cactus resources in and around the NROC's coastal reserve, and to survey for Cactus Wrens in areas judged to comprise potentially suitable nesting habitat. The areas covered in 2006 included all reserve lands, "special linkage" and "existing use" areas, as well as non-reserve natural open spaces in the NROC's coastal subarea. In addition to mapping the boundaries of cactus scrub, it was important to identify different types of scrub and to document its composition at each site, thereby allowing reserve managers to build models of habitat suitability for the Cactus Wren by correlating wren presence with relevant habitat features. We identified an additional need to identify expanses of cactus in the early and middle stages of succession after having burned (mostly during the 1993 Laguna Fire). In 2007, I worked with Will Miller of the U.S. Fish & Wildlife Service (Service) to refine the survey methodology and conducted two rounds of Cactus Wren surveys at the subset of cactus scrub sites located within or straddling the boundaries of the coastal reserve. This letter report describes the final field methods developed during the study's first two years.

**IDENTIFICATION OF PLANNING AREAS**

As an initial step, I divided the NROC's coastal subarea into twenty Planning Areas, giving each an uppercase alphabetical identification.

**PLANNING AREAS IN THE COASTAL SUBAREA**

<b>PLANNING AREA</b>	<b>LOCATION</b>	<b>LAND DESIGNATION</b>
<b>A</b>	Shady Canyon/French Hill	Reserve
<b>B</b>	Turtle Rock	Existing Use
<b>C</b>	Shady Canyon Golf Course	Special Linkage

<b>PLANNING AREA</b>	<b>LOCATION</b>	<b>LAND DESIGNATION</b>
<b>D</b>	San Joaquin Hills North of Toll Road (excluding Planning Area A)	Reserve
<b>E</b>	Coyote Hills Area	Reserve
<b>F</b>	Bonita/San Joaquin Reservoir Area	Reserve
<b>G</b>	UC Irvine Open Space	Reserve
<b>H</b>	Upper Newport Bay	Reserve & Non-reserve
<b>I</b>	Talbert Regional Park	Reserve
<b>J</b>	Buck Gully/San Joaquin Reservoir	Special Linkage
<b>K</b>	Buck Gully	Reserve
<b>L</b>	Pelican Hill Golf Course	Special Linkage
<b>M</b>	Pelican Hill Coastal Slope	Special Linkage
<b>N</b>	San Joaquin Hills South of Toll Road (excluding Planning Areas E, F, K, Q)	Reserve
<b>O</b>	Sycamore Hills	Reserve
<b>P</b>	Aliso and Woods Canyons	Reserve
<b>Q</b>	Crystal Cove Coastal Strip	Reserve
<b>R</b>	Salt Creek Corridor	Existing Use
<b>S</b>	Nellie Gale	Reserve
<b>T</b>	Northeastern Laguna Canyon	Non-reserve

## **DATA RECORDING AND ARCHIVING METHODS**

All field data were recorded on data sheets and the information then entered into an Excel spreadsheet. For archiving and backup purposes, copies of the spreadsheet should be periodically transferred to NROC, the Service, and the County of Orange (County).

## **CLASSIFICATION OF CACTUS RESOURCES**

I classified cactus resources as follows:

- ▶ Cactus scrub: Expanses of mature cactus scrub judged as capable of supporting a Cactus Wren nest.
- ▶ Proto cactus scrub: Other cactus-containing habitats judged as likely incapable of supporting a Cactus Wren nest.
- ▶ Satellites: Individual cactus plants growing outside the boundaries of cactus scrub or proto cactus scrub.

I judged the potential of habitat to support a Cactus Wren nest in accordance with the species' known nesting requirements in coastal southern California. In general, nesting Cactus Wrens require cactus at least 1 m tall growing in a cactus patch expansive enough to protect the nest against predation or disturbance. A lone, meter-tall cactus plant does not meet this criterion, nor does a large area of cactus that does not include any meter-tall plants, but a large patch of low-growing cactus may be suitable for nesting if it contains even one large cactus plant that is afforded protection by the surrounding cactus.

## MAPS AND MAPPING

Albert Lucero at the County created a 1 km × 1 km numbered grid system covering the entire coastal subarea. He then provided me with a master aerial photo of the entire coastal subarea that showed the grid system and all NROC boundaries (reserve, special linkage, and existing use). I have referred to these grid numbers when ordering aerial photo-based field maps needed for this study. Mr. Lucero has provided me with these maps at an approximate scale of one inch equals \_\_\_\_ feet (one km<sup>2</sup> grid per sheet). The aerial imagery used for these maps is from the year 200\_, and each map shows the grid lines and all NROC boundaries. I have been able to orient to the field maps by referring to the master aerial photo referred to above.

In 2006, I searched all of the natural communities in the coastal subarea with the goal of mapping all of the cactus resources in the subarea. I overlaid the paper aerials with clear acetate, which I drew on using fine-point *Sharpies* in different colors. Once I had finished mapping and surveying a given numbered square, I turned the field map in to the County for digitizing. For the second survey I used Mr. Lucero's digitized maps at an approximate scale of one inch equals \_\_\_\_\_ feet (four km<sup>2</sup> grids per sheet). These maps showed the locations of Cactus Wrens and all cactus mapped during Round 1. I field-checked these maps during Round 2 and returned them to Mr. Lucero so that he could input the additional Cactus Wren detections and mapping corrections.

In 2007, I used a single set of Mr. Lucero's digitized maps at an approximate scale of one inch equals \_\_\_\_\_ feet (four km<sup>2</sup> grids per sheet) for both rounds of surveys. In addition to showing the km<sup>2</sup> grid lines and NROC boundaries, these maps showed the 2006 Cactus Wren locations and all cactus resources mapped in 2006. As in 2006, I used clear acetate overlays and fine-point *Sharpies* to show the locations of the Cactus Wrens I detected. I further refined/corrected the mapping of cactus resources, including eight new patches of cactus scrub that I had missed in 2006.

In this study, each contiguous patch of cactus scrub is referred to as a "polygon," each polygon consists of at least one "site," and each site receives a unique alphanumeric code. The first part of this code is a capital letter corresponding to the Planning Area where the patch is located; next is a number corresponding to the polygon; third is a lowercase letter corresponding to the site. For example, a large polygon situated within reserve lands in the Shady Canyon/French Hill Planning Area might be divided into two sites with codes "A03a" and "A03b."

I mapped cactus scrub according to the following procedure:

- ▶ Map the polygon perimeter, erring on the side of making larger polygons rather than dividing them into multiple smaller polygons.
- ▶ Identify a survey point that is strategically located within or near the site, from which the surveyor, using playback of Cactus Wren vocalizations, can expect to detect any Cactus Wrens that may be present within the site. Mark the location on the map and record the location using a GPS unit (data = NAD 83).
- ▶ If more than one survey point is necessary in order to cover the entire polygon, the polygon will need to be subdivided into multiple "sites." In this case, divide the polygon into the minimum number of sites necessary to effectively survey the entire polygon. Within a given polygon, ridges or other topographic features should usually be used to delineate sites, where possible. There is no implied relationship between the size of a survey site and the home range of a Cactus Wren pair.
- ▶ Finally, using asterisks or other small marks, indicate the locations of any and all cholla plants (*Cylindropuntia prolifera*) within the polygon.

I mapped all areas of proto cactus scrub and all satellites, but recorded no data and completed no protocol Cactus Wren surveys in these areas. I broadcast Cactus Wren vocalizations in marginal areas that might have been regarded either as proto cactus scrub or cactus scrub, but in no instances did this elicit a response from a Cactus Wren. This lack of response provided one line of evidence that these marginally developed areas did not warrant classification as cactus scrub (i.e., scrub capable of supporting nesting Cactus Wrens). Satellites and proto cactus scrub are regarded as having very low potential for occupancy by Cactus Wrens.

#### CHARACTERIZING CACTUS SCRUB

We defined four basic cactus scrub "types" for the purposes of this study:

- ▶ **Cactus Scrub Type 1:** Highest quality. Site includes at least 1.0 *contiguous* acre with  $\geq 20\%$  estimated areal cover of mature cactus (generally  $\geq 1$  m tall). Site may also include habitat with sparser cactus cover.
- ▶ **Cactus Scrub Type 2:** Site covers  $\geq 1.0$  acre. Well-developed cactus patches may be present, but site does not include 1.0 *contiguous* acre with  $\geq 20\%$  estimated areal cover of mature cactus (generally  $\geq 1$  m tall).
- ▶ **Cactus Scrub Type 3:** Small, isolated stands of mature cactus *with* cholla. Polygon (a) covers less than 1.0 acre, *and* (b) includes at least one cholla plant  $\geq 1$  m tall. Density of cactus within the polygon is irrelevant.
- ▶ **Cactus Scrub Type 4:** Small, isolated stands of mature cactus *without* cholla. Polygon (a) covers less than an acre, *and* (b) does *not* include at least one cholla plant  $\geq 1$  m tall. Density of cactus within the polygon is irrelevant.

Scrub was then further characterized by the presence or absence of cholla. For sites that include cholla, we defined three “cholla types”:

- ▶ **Cholla Type 1:** High quality. At least one cluster is fully developed, standing  $\geq 1.3$  m tall and in good health with extensive branching.
- ▶ **Cholla Type 2:** Medium quality. At least one plant/cluster is  $\geq 1.0$  m tall, in good health, with branching extensive enough to readily hold nest(s).
- ▶ **Cholla Type 3:** Poor quality. No plants/clusters appear to have branching extensive enough to readily hold nest(s).

Other data on vegetation recorded at each site:

- ▶ Specification of up to four dominant overstory plant species in descending order of abundance.
- ▶ Specification of presence/absence of prickly-pears (*Platypuntia littoralis*, *P. oricola*).
- ▶ Specification of presence/absence of Coast Cholla.
- ▶ Specification of presence/absence of Lemonade Berry (*Rhus integrifolia*).
- ▶ Specification of presence/absence of Mexican Elderberry (*Sambucus mexicana*).
- ▶ Specification of whether the site includes any fuel modification zones.

#### **METHODS FOR SURVEYING FOR CACTUS WREN PRESENCE OR ABSENCE**

After an initial testing period, I adopted the following survey method:

- ▶ Surveys should be conducted primarily during the morning hours, but may extend into the early afternoon (typically no later than 2:00 p.m.).
- ▶ Surveys must be conducted in fair weather. Wind speed should not exceed 8 mph and surveys should be suspended during periods of rain or drizzle. When surveying in the afternoon, temperatures should not exceed 85°F.
- ▶ Survey each site from the single vantage point that has already been mapped and established using GPS (data = NAD 83).
- ▶ Broadcast three minutes of digitized recordings of Cactus Wren calls, using battery-powered speakers to achieve volume levels high enough that wrens will be able to hear the calls throughout the site.
- ▶ Wait three minutes in silence.
- ▶ This study identifies “likely territories” as the basic unit of measurement for the Cactus Wren population. A “likely territory” is indicated by the presence of at least one *adult* Cactus Wren. Independent juveniles (i.e., those without adults nearby) should be recorded and mapped, but do not count as representing “likely territories” since they may be dispersing birds.

- ▶ During each six-minute survey period, record and map all adult and juvenile Cactus Wrens detected at the site. If the surveyor believes that an adult Cactus Wren *may* have been detected during the six-minute survey period, he or she may leave the survey point and spend extra time walking the site and using playback in order to make this determination. Once it has been firmly established that at least one adult Cactus Wren is present at a given site, surveyors normally should not take extra time to determine the exact number of adults and/or juveniles present (unless there is some question regarding whether one pair is being detected using multiple sites; see below).
- ▶ All Cactus Wren sightings that take place at a given site during the six-minute survey period are recorded on the data sheet and entered into the Excel spreadsheet, but in cases where an adult is seen moving between sites the surveyor identifies only one "likely territory." The "likely territory" is credited to the first site where an adult Cactus Wren was detected. In all cases where the surveyor sees a wren moving between sites, he/she must note this on the field data sheet and enter the information into the "notes" section of the Excel spreadsheet (for all sites involved).
- ▶ If only one adult is detected at Site "A" and a second lone adult, with or without young, is detected at an adjacent Site "B" during the same round of surveys, the surveyor must search for additional adults at both sites. If no second adult can be found at either site within several minutes, the surveyor normally should conclude that the two adults probably represent a single pair foraging apart, and thus should recognize only one "likely territory" (at Site "A"). The surveyor may recognize two "likely territories" in this situation, but only if evidence suggests that the two adults are not paired. In any case, relevant observations should be recorded in the field and entered into the "notes" section of the Excel spreadsheet (for both Site "A" and Site "B").
- ▶ The surveyor must watch and listen for California Gnatcatchers and Brown-headed Cowbirds at each site. These species shall be counted if the birds are detected during the six-minute survey period, either on or near the cactus scrub polygon.

Conducting multiple rounds of surveys is necessary in order to estimate detection probabilities. In 2006 I surveyed all cactus scrub sites twice between March 13 and August 31. The surveys were authorized late in 2007, so I surveyed all cactus scrub sites within or straddling the reserve boundaries twice and completed a third round of surveys at 60 randomly selected sites between 29 June and 31 August. I believe that these surveys are best conducted between 1 March and 15 August. A benefit of surveying into August is that more data on productivity can be gathered.

Random selection may be readily accomplished as follows:

- ▶ Visit [www.random.org](http://www.random.org) and generate a random series corresponding to the total number of sites being covered that year. In 2007 I generated a series between "1" and "308" (the number of cactus scrub sites identified within the coastal reserve, or straddling the reserve boundary, in 2007).
- ▶ In order to identify, for example, 60 randomly selected sites, match the first 60

numbers in this series with the row numbers in the Excel spreadsheet containing the current year's data.

Conducting multiple rounds of surveys increases the potential for recording a Cactus Wren adult, pair, or family group at more than one site. In cases where Round 1 yields a wren detection at Site "X" but not at adjacent/nearby Site "Y," and these results are reversed during Round 2, the surveyor normally should recognize only one "likely territory" (at Site "X"). The surveyor may recognize two "likely territories" in this situation, but only if he/she uncovers evidence suggesting that more than one pair of wrens is involved. In any case, the relevant observations should be recorded in the field and entered in the "notes" section of the Excel spreadsheet (for both Site "X" and Site "Y").

The situation of one pair of Cactus Wrens being probably or definitely detected on multiple sites, either during a single survey day or on different days, arose only five times in 2006. This number increased to 19 times in 2007 even though many fewer cactus scrub sites were surveyed and many fewer wren territories were detected during 2007. Dana Kamada and I documented short-term movements by adult Cactus Wrens of several hundred meters in 2007. I did not observe adult wrens making such large movements in 2006. The increased tendency for Cactus Wrens to wander across multiple cactus scrub sites during the 2007 survey period almost certainly reflected excessively dry habitat conditions following record-low precipitation in 2006/2007. Food resources presumably were scarce in 2007, and many Cactus Wrens appeared not to nest, thus conserving their resources and leaving them better able to wander widely in search of resources. Also, the sparseness of Cactus Wren territories meant that there were few neighbors to keep birds from foraging across multiple patches of cactus scrub. It is appropriate for surveyors to take these types of considerations into account when making judgment calls regarding the number of "likely territories" represented by a cluster of sightings in a given area during a given season.

## CONCLUSION

The methods described in this letter report have evolved during the first two years of this study. Some changes reflected trial-and-error on my part and others came in response to comments and suggestions from Milan Mitrovich and Will Miller. I believe that the final methods described herein represent an appropriate balance between thoroughness and thriftiness, and that they could be readily adapted for use in other areas where managers need to census and monitor coastal Cactus Wrens at the landscape level while gaining an understanding of habitat features correlated with high and low levels of Cactus Wren occupancy. Please call me at 562-477-2181 if you have any questions or comments regarding this draft letter report. You may send e-mail to [robb@rahamilton.com](mailto:robb@rahamilton.com).

Sincerely,



Robert A. Hamilton  
Consulting Biologist