Triennial Monitoring Summary Report

Carlsbad Habitat Management Plan (HMP)

Prepared for
City of Carlsbad

February 2015

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TABLE OF CONTENTS

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Carlsbad HMP

Contents **Page**

1.0 INTRODUCTION 1

2.1 VEGETATION COMMUNITIES 4

2.1.1 Vegetation Mapping 4
2.1.2 Long-Term Coastal Sage Scrub Monitoring 4
2.1.3 Post-Fire Monitoring 5

2.2 SPECIES 8

2.2.1 Upland Plants 12
2.2.2 Vernal Pool Species 22
2.2.3 Lagoon/Coastal Bird Species 24
2.2.4 Riparian Bird Species 33
2.2.5 Upland Bird Species 35
2.2.6 Wildlife Movement 38

REFERENCES 46

List of Tables

Contents **Page**

Table 1. Vegetation Types within the Poinsettia Fire Burn Area* 8
Table 2. Priority Species Surveys Conducted on Actively Managed Preserves 10

List of Figures

Contents **Page**

Figure 1. HMP Preserve Categories 2
Figure 2. Preserve Ownership/Management 3
Figure 3. Poinsettia Fire Perimeter 7
Figure 4. Upland Herbs 39
Figure 5. Upland Shrubs 40
Figure 6. Vernal Pool Species 41
Figure 7. Lagoon Species 42
Figure 8. Riparian Birds 43
Figure 9. Coastal California Gnatcatcher 44
Figure 10. Wildlife Linkages 45

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1.0 Introduction

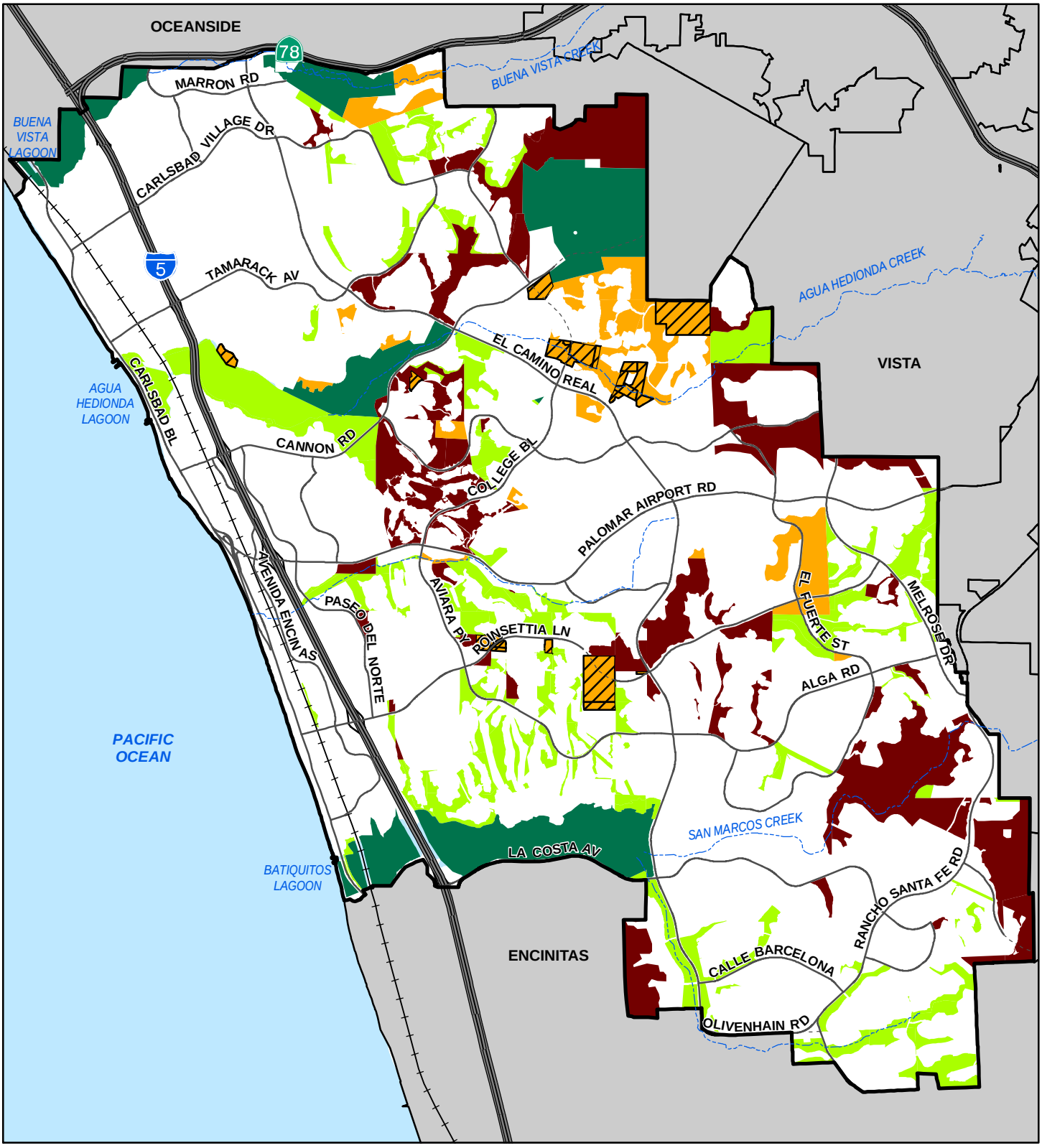
This report summarizes the results of biological monitoring that has been conducted within the Carlsbad Habitat Management Plan (HMP) preserve system since adoption of the HMP in November of 2004. This monitoring summary is provided every three years, pursuant to the HMP and Open Space Management Plan (TAIC 2004). Monitoring is conducted by the on-site preserve manager of each preserve. The monitoring results are then submitted through site-specific annual reports and GIS data to the HMP Preserve Steward, who summarizes the data every three years into a triennial monitoring summary report.

The preserve system is made up of several categories of HMP preserves (Figure 1):

1. Established private and city-owned preserves - established after approval of the HMP. These preserves are funded through endowments or other permanent funding sources for active management.
2. California Department of Fish and Wildlife (CDFW) ecological reserves - owned and managed by CDFW.
3. Pre-existing preserves - established prior HMP approval. These preserves are generally owned and managed by private HOAs. Management on these lands is minimal, consisting mostly of access control and trash collection.
4. Standards Areas - undeveloped areas within the HMP boundary. When these areas are developed, specific HMP standards must be followed, including the permanent conservation of a portion of the property.

For the most part, monitoring data is collected on established private and city-owned preserves and CDFW ecological reserves. Figure 2 shows the land owner and preserve manager for individual preserves. Results of monitoring for vegetation communities and species are summarized below.

In the last couple of years, drought and wildfire had a significant impact on the condition of the preserve system. Severe drought conditions were especially prominent during the 2012/2013 and 2013/2014 wet season. The wet season generally occurs between October and February. When looking at annual rainfall totals between October and September, the average rainfall in Carlsbad (based on historical weather data from Palomar Airport) is 10.3 inches. Total rainfall in Carlsbad over the last two years was only 6.2 inches in 2012/2013 and 4.7 inches in 2013/2014 (McConnell 2014), which is only 60 percent and 46 percent, respectively, of the average.



Legend

- Established Private and City-owned Preserve
- California Department of Fish and Wildlife Ecological Reserve
- Pre-existing Natural Open Space Preserve
- Standards Area
- Future Preserve Standards Area

N

0 — Feet — 6,400

CITY OF CARLSBAD

City of Carlsbad
Categories of HMP Preserves

Figure 1

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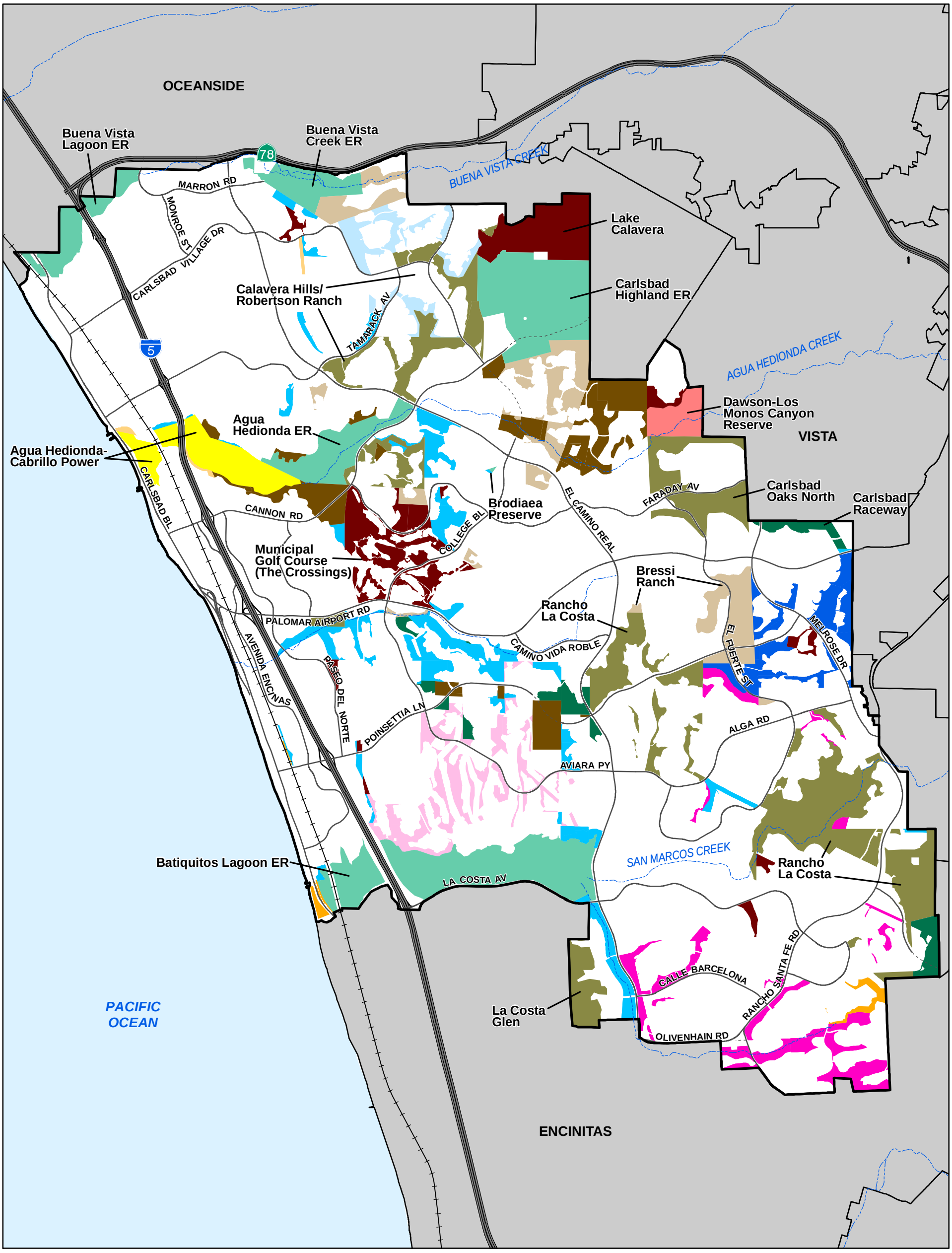
Date: 1/13/2015



City of Carlsbad
- City Preserves*
  - Batiquitos Drive
  - Carlsbad Village Dr
  - Carrillo Ranch
  - Crossings Golf Course
  - Faraday
  - La Costa Canyon Park
  - La Costa/Romeria
  - Lagoon Lane
  - Lake Calavera
  - Los Monos
  - Macario Canyon
  - Poinsettia Park
  - Veteran's Park

Other Public/Semi-Public
- Cabrillo Power
- San Diego Gas & Electric
- Other Public Agencies
  - North County Transit District
  - San Dieguito Union School District
  - State of California

Wildlife Agencies
- California Department of Fish and Wildlife
  - Agua Hedionda ER
  - Buena Vista Creek ER
  - Carlsbad Highlands ER
  - Batiquitos Lagoon ER
  - Buena Vista Lagoon ER
  - Brodiaea Preserve

Conservation Management Entity
- Center for Natural Lands Management
  - Carlsbad Oaks North
  - Encinas Creek
  - La Costa Glen
  - Calavera Hills II/Robertson Ranch
  - Kelly Ranch
  - Rancho La Costa
- Other Management Entity
  - Habitat Restoration Sciences (HRS)
  - Helix Environmental
  - San Diego Habitat Conservancy
  - San Diego Urban Corps Habitat Services

University of California Reserve System
- Dawson-Los Monos Canyon Reserve

Private
- Aviara HOAs
- Calavera Hills HOAs
- La Costa HOAs
- Rancho Carrillo Master HOA
- Other HOAs and Private Open Space

Other
- Pending
- Future Preserves
  - Undeveloped Standards Area
  - Other Future Preserve

* Managed by Center for Natural Lands Management (CNLM)

N

0 1 Miles

CITY OF CARLSBAD

City of Carlsbad
Current Preserve Ownership/Management

Figure 2

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Date: 1/13/2015

The drought conditions helped pave the way for the Poinsettia Fire, which burned over 300 acres in Carlsbad in May of 2014, most of which was within the HMP boundary. On the day the fire broke out, the area was experiencing extreme Santa Ana conditions, which is a fairly rare occurrence at that time of year, bringing the humidity levels down and bringing temperatures up to almost 100 degrees Fahrenheit.

2.1 Vegetation Communities

2.1.1 Vegetation Mapping

Long-term vegetation monitoring within the HMP is accomplished through periodic mapping and focused studies. Mapping is conducted within preserves by the preserve managers every five years to document changes in vegetation community boundaries over time. Vegetation communities have been mapped using the Holland (1986) classification system, as revised by Oberbauer (2008), which is the classification system used in the MHCP and HMP. Recently, the San Diego Association of Governments (SANDAG) commissioned an effort to develop a classification system that conforms to national and statewide mapping efforts. The resulting *Vegetation Classification Manual for Western San Diego County* was completed in 2011 (SANDAG 2011). This system is based on alliances and associations, which are defined by the presence and abundance of diagnostic species. Because this classification is much more fine-scaled, mapping is more time-consuming; however, it provides more information about variation within the habitat. Although not required by the HMP, preserve managers are encouraged to use this newer classification system. Information about preserve-level changes in vegetation mapping is provided in site-specific annual reports.

2.1.2 Long-Term Coastal Sage Scrub Monitoring

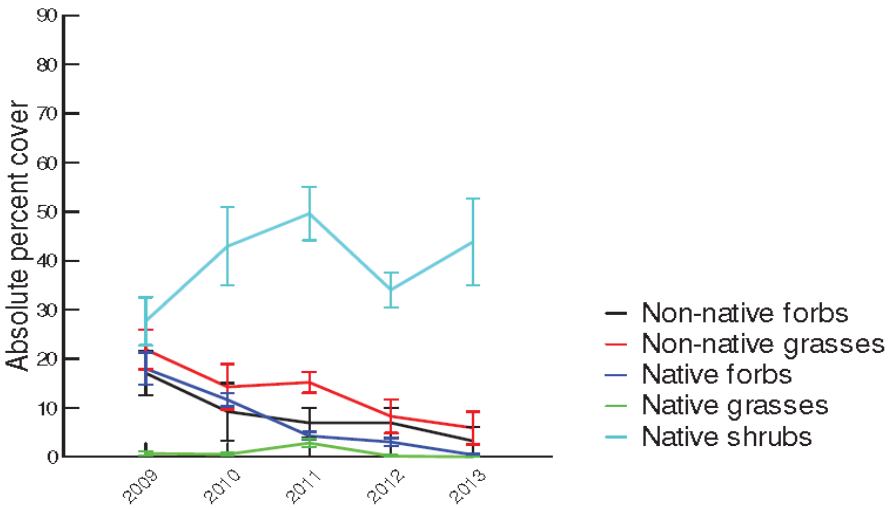
The Center for Natural Lands Management (CNLM) began a long-term monitoring program in coastal sage scrub (CSS) habitat during the spring of 2009 by setting up modified Whittaker plots (see CNLM 2010a for methods and rationale). CNLM collaborated with Dr. Douglas Deutschman of San Diego State University (SDSU) in 2010 to develop a rotating panel approach to monitoring for a trial period prior to determining the ideal sample replicate size. Various sites in Carlsbad, which are distributed evenly across the landscape, will be visited every year on a three-year return interval. A selection of the sites will be visited every year. The purpose of the study is to track and evaluate changes in the structure and composition of coastal sage scrub over time.

In 2009, CNLM established 15 plots and collected data from 9 of the plots. In 2010, an additional five plots were established and data were collected from 9 of the plots (3 of which were repeats of data collected in 2009). In 2011, four more plots were established. To date, 40 plots have been established within CNLM-managed preserves, and data have been collected from 36 of these plots. Two have been identified on CDFW land, but have not yet been installed,

as they will be rotated into the annual monitoring during 2016. Starting in the spring of 2015, six additional plot locations will be added within the Aviara Master Association area in locations of documented gnatcatcher presence. Two of the six sites will be visited every year, repeating on a three-year return interval (rotating panel approach), which will complement the larger fraction of total plots visited annually throughout Carlsbad.

Results

To date, it appears that no change in shrub cover has occurred over time (see graph below). However, there have been noticeable declines in non-native grass cover over the repeated monitoring years (2009/2012 and 2010/2013). Additionally, both non-native and native forb cover is markedly lower over time, with native forb cover having the largest decrease. No statistical testing has been done on these data, but the size of the error bars, and distance between those bars suggests that the native forb cover is significantly lower in 2012 than in 2009, and also much lower in 2013 than in 2010. These declines relate to the highly variable rainfall experience during the years since 2009, especially the drought conditions experienced in 2012 and 2013.

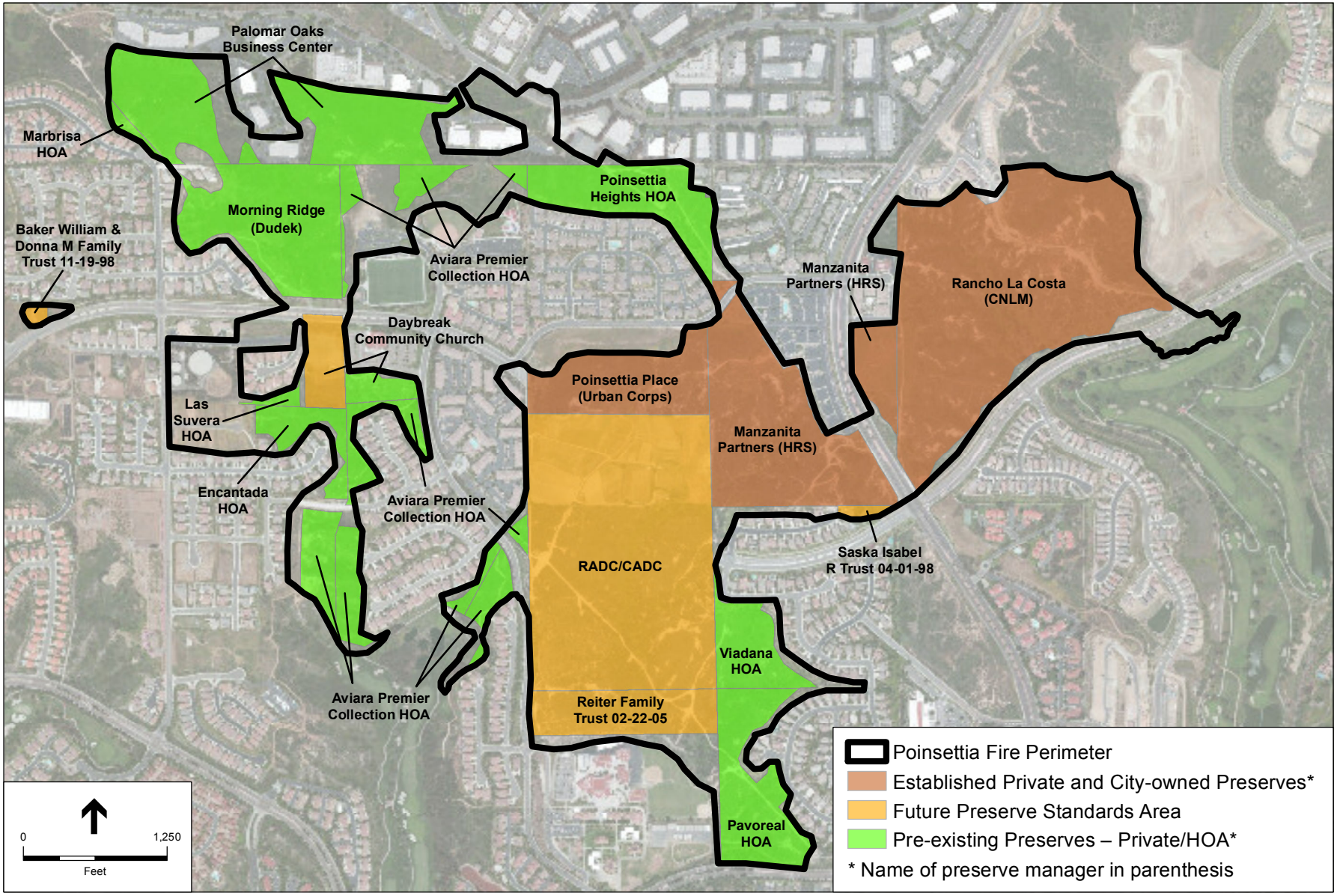


Average Vegetation Percent Cover in CSS. Note that plots are repeated on a three-year return interval (+/-1s.e). For example, 2009 shrub cover is most similar to 2012 shrub cover because these are the same plots being re-read.

2.1.3 Post-Fire Monitoring

In May of 2014, approximately 317 acres of habitat burned in the Poinsettia Fire (Table 1). The majority of this habitat was within the HMP preserve boundary in pre-existing preserves (private HOA lands), actively managed preserves (established private and city-owned), and Standards Areas (future preserves) (Figure 3). In order to evaluate the trajectory of habitat recovery, the City of Carlsbad (City), in coordination with the Preserve Steward and CNLM, developed a post-

fire monitoring protocol, which consists of a quantitative and qualitative assessment in 26 locations throughout the burn area, stratified by habitat type (southern maritime chaparral, southern mixed chaparral, coastal sage scrub, vernal pools, and oak woodland/forest). The



SOURCE: City of Carlsbad

City of Carlsbad Preserve Steward . 120574

Figure 3

Fire Perimeter - Preserves and Preserve Manager

monitoring will be conducted annually for five years, starting in the spring of 2015 to inform preserve managers about adaptive management actions that may be needed to ensure successful habitat recovery.

Table 1. Vegetation Types within the Poinsettia Fire Burn Area*

Vegetation Type	Acres
Southern Maritime Chaparral	150.3
Chaparral	60.9
Coastal Sage Scrub	27.1
Agricultural	28.3
Disturbed	22.4
Grassland	15.5
Oak Woodland	9.2
Wetlands	1.2
Eucalyptus Woodland	1.0
Riparian Scrub/Woodland/Forest	0.6
TOTAL	**316.5**

* including natural lands outside of the HMP boundary

2.2 Species

This section summarizes the monitoring results for species with site-specific permit conditions (i.e., those that require individual populations to be tracked) (MHCP 2003, Vol. III). The species are grouped by general type, including upland plants, vernal pool plants and animals, lagoon/coastal birds, riparian birds, upland birds, and wildlife movement. Long-term focused species monitoring is being conducted to document species persistence in the preserve system, and to inform site-specific management actions. The information summarized in this report comes from site-specific annual reports, regional species monitoring reports, and GIS data.

Table 2 below summarizes the years during which focused species surveys have been conducted on each preserve. Figures 4 – 9 show the known locations of these species based on data from Preserve Managers, California Natural Diversity Database (CNDDB), and the U.S. Fish and Wildlife Service (USFWS). Figure 10 shows the habitat linkages and potential pinch points (barriers to movement) that were evaluated as part of a wildlife movement evaluation study. These maps are located at the end of this report.

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Table 2. Priority Species Surveys Conducted on Actively Managed Preserves

Species	Agua Hedionda Lagoon ER	Batiquitos Lagoon ER	BV Lagoon ER	1-Ac Brodiaea Preserve	BV Creek ER	Calavera/Rob Ranch E	Carlsbad Highlands ER	Carlsbad Oaks N	Carlsbad Raceway	City Preserves	City Ventures	Emerald Pointe	Encinas Ck	La Costa Glen	Kelly Ranch	Manzanita Partners	Morning Ridge	Poinsettia Place	Rancho La Costa
Upland Plant Species																			
San Diego thornmint	NP	NP	NP	NP	NP	2008-2012[2]	NP	2007-2014[2]	NP	NP	NP	2010, 2014	NP	NP	NP	NP	NP	NP	2005-2014[2]
Thread-leaved brodiaea	NP	NP	NP	Not surveyed	2011-2014[2]	2006-2014[2]	2008	2007-20014[2]	NP	2010-2014[2]	NP	NP	NP	NP	NP	NP	NP	NP	2005-2014[2]
Del Mar manzanita	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	2013, 2014	2009, 2014	2013	2008	2004, 2014	2005, 2008, 2014
Del Mar mesa sand aster	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	2014	NP	NP	2007	NP	1998, 2013	NP	NP	NP
Encinitas baccharis	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	2013, 2014 not found	NP	NP	NP	NP	NP
Orcutt's hazardia	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	2004-2014[2, 3]	NP	NP	NP	2004-2014[2, 3]
Vernal Pool Species																			
California Orcutt grass Little mousetail San Diego button-celery Spreading navarretia Riverside fairy shrimp San Diego fairy shrimp	Vernal pools do not occur on these preserves								Vernal pool present; species not surveyed	Vernal pools do not occur on these preserves						Vernal pools burned in 2014	Vernal pools do not occur on these preserves		
Lagoon/Coastal Species																			
Belding's savannah sparrow	1973-2010[1]	1973-2010[1]	1973-2010[1]	Lagoon species do not occur on these preserves															
California least tern	not surveyed	2001-2014[2]	not surveyed																
Western snowy plover	2001-2014[2]	2001-2014[2]	2001-2014[2]																
Light-footed clapper rail	2000-2014[2]	2000-2014[2]	2000-2014[2]																
Riparian Bird Species																			
Least Bell's vireo	2008	NSI	NSI	NP	2008, 2009, 2010, 2014	2008, 2009, 2013, 2014	NSI	NP	NP	2009, 2010, 2011, 2014	NP	NP	2008-2014[2]	NP	NP	NP	NP	NP	2014
SW willow flycatcher	NSI	NSI	NSI	NP	2008, 2009, 2010, 2014	2008, 2009, 2013, 2014	NSI	NP	NP	2009, 2010, 2011, 2014	NP	NP	2008-2011[2]	NP	NP	NP	NP	NP	NP
Upland Bird Species																			
California gnatcatcher	2008, 2010, 2013	2008, 2010, 2013	NSI	NP	2008, 2010, 2013	2007, 2010, 2013	2008, 2010, 2013	2007, 2010, 2013	2014	2011, 2013	NP	2009, 2012	2009, 2013	x	2003-2007, 2010, 2013		2005, 2013	X	2005, 2007, 2010, 2013

NP = Not present

NSI - no survey information

[1] Every 5 years

[2] Annually

[3] Transplanted population

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Site-specific species monitoring will not be able to provide information about population trends. However, regional monitoring and associated research being coordinated by the San Diego Management and Monitoring Program (SDMMP) will provide information about population trends, genetic exchange, and best management practices for individual species. To this end, the SDMMP has prepared a science-based regional Management Strategic Plan (MSP) (2013), which provides regional and local (population-specific) goals and objectives. Other pertinent documents include the Connectivity Strategic Plan (2013; to be revised in 2015), Invasive Plant Strategic Plan (2012; to be revised in 2015), Wild Fire Management Strategic Plan (to be completed in 2015), and the Monitoring Strategic Plan (to be completed in 2015). The City and HMP Preserve Steward will continue to coordinate with regional monitoring and management efforts and will incorporate site-specific recommendations as necessary.

2.2.1 Upland Plants

San Diego Thornmint

Acanthomintha ilicifolia

Status: federally threatened, state endangered

Critical Locations and Major Populations

The 1999 MHCP identified critical locations and major populations in scattered locations throughout Carlsbad, mostly in private HOA preserve lands. Other populations of San Diego thornmint are located within the Carlsbad Oaks North and Rancho La Costa Preserve.

Management Actions Conducted to Protect the Species

Best Management Practices (BMPs) for San Diego thornmint are currently being developed based on the best available science and local knowledge of land managers (SDMMP 2013). Within Carlsbad, this species is under active management within Carlsbad Oaks North, Emerald Pointe, and Rancho La Costa preserves. Active management on these preserves generally focuses on intensive invasive species removal around thornmint populations (including hand weeding around plants), thatch removal, and access control. HOA-managed properties only include a basic level of management (e.g., trash pick-up and fence maintenance).

Long-Term Monitoring

Long-term monitoring for selected populations of San Diego thornmint in Carlsbad has been ongoing since 2008. Regional monitoring efforts to understand the species as a whole is being coordinated by the SDMMP.

Overall Condition and Major Threats

Monitored populations of San Diego thornmint in Carlsbad occur at Carlsbad Oaks North, Emerald Pointe, and Rancho La Costa Preserve (Figure 4). As is typical for many annual species, San Diego thornmint counts varied tremendously at each location between 2008 and 2014, including 151 to 648 plants at Carlsbad Oaks North, 6 to 110 in Emerald Pointe, and 79 to 965 at Rancho La Costa, as shown in the table and graph below. A fourth occurrence at the Calavera Hills/Robertson Ranch East Preserve was observed to have two to four individuals between 2008 and 2010, but none were observed in 2011 or 2012, and this location is no longer monitored (McConnell 2012). The status of San Diego thornmint on preserve land managed by private HOAs is unknown at this time.

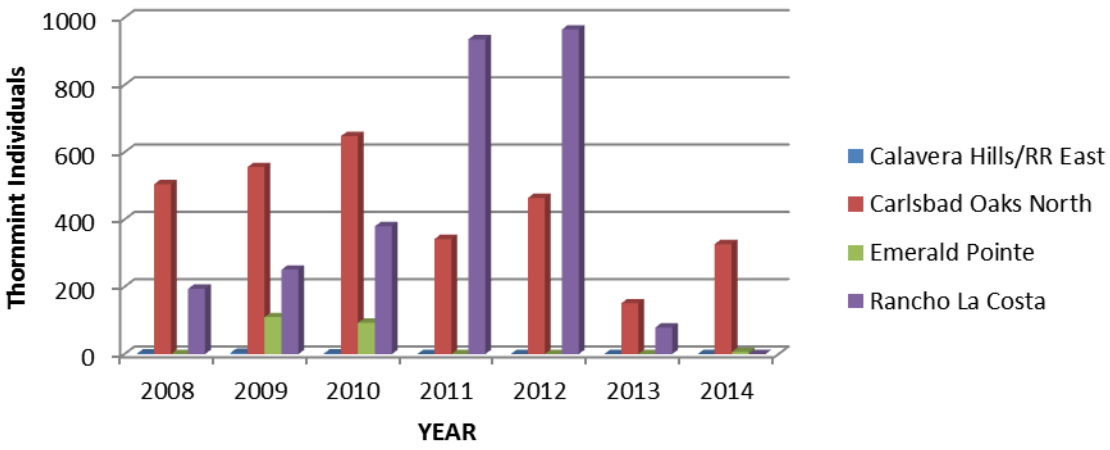
Population of San Diego Thornmint on Carlsbad Preserves with Rainfall Data

Number of Individuals

Preserve	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Calavera Hills/Robertson Ranch East	2	4	2	0	0	NS	NS
Carlsbad Oaks North	505	556	648	342	464	151	327
Emerald Pointe	NS	110	93	NS	NS	NS	6
Rancho La Costa (the Greens)	194	251	380	936	965	79	652
Rainfall totals* (inches)	**-**	**-**	**12**	**17**	**10**	**6.2**	**4.7**

NS = not surveyed
*Measurements from Palomar-McClellan Airport in Carlsbad, CA (NOAA 2014)
- = no data

Population of San Diego Thornmint on Carlsbad Preserves



Due to the high annual variability of the populations, it is difficult to determine the overall trend of a specific population or the species as a whole. To better understand what drives dynamics of the species populations in Carlsbad, CNLM has been conducting studies to evaluate the status of the plants in relation to weather, cover of native and non-native forbs and grasses, and invasive species removal. CNLM is also conducting genetic studies to understand the genetic diversity and structure of the species. Additionally, regional monitoring and management efforts for San Diego thornmint are being coordinated by CNLM through the San Diego Thornmint Working Group, and by the

SDMMP through the San Diego Thornmint Adaptive Management Framework, which was developed by the Conservation Biology Institute (2014).

The major threats to San Diego thornmint are invasive species, direct impacts and disturbance, habitat fragmentation with loss of pollinators, prolonged drought, and small populations that are more vulnerable to environmental conditions (SDMMP 2013). Within Carlsbad, the most important threat is invasion by purple false brome (*Brachypodium distachyon*) (M. Spiegelberg, personal communication 2014). Wildfire is another important threat. The Poinsettia Fire burned over 60 acres of habitat within Rancho La Costa Preserve in May of 2014. If not for a 4-foot by 1,000-foot containment line that was constructed by CalFire using hand tools to contain the fire, this population would have likely burned (Godfrey, 2014).

Overall, this species appears to be well protected on actively-managed properties in Carlsbad; it will be critical to continue intensive invasive species removal efforts and coordinate with CalFire to protect the Carlsbad populations should other fires break out in the future. In addition, it is recommended that the species-specific BMPs be implemented, as feasible, once they are developed by SDMMP.

Thread-Leaved Brodiaea

Brodiaea filifolia

Status: federally threatened, state endangered

Critical Locations and Major Populations

The 1999 MHCP identified critical locations/major populations in the following preserves: Calavera Hills Phase II, Carlsbad Highlands Ecological Reserve, Rancho Carrillo, Fox-Miller, Brodiaea Preserve, and Rancho La Costa.

Management Actions Conducted to Protect the Species

Known populations on CNLM-managed preserves, including Calavera Hills/Robertson Ranch East, Carlsbad Oaks North, Rancho Carrillo, and Rancho La Costa, are actively managed mostly through intensive invasive species removal (including hand weeding) and thatch removal around brodiaea populations, and access control (Figure 4). Management within CDFW-managed preserves, which include the one-acre Brodiaea Preserve and Carlsbad Highlands Ecological Reserve, is limited to basic stewardship (access control, trash removal, etc.). The brodiaea restoration area on the Fox-Miller property (mitigation for project impacts to this species) is still under restoration maintenance because it did not meet its Year 5 success criteria in 2011. Once the success criteria have been met, this area will fall under long-term management (the long-term manager is still to be determined).

Best Management Practices for thread-leaved brodiaea will be developed in the next five years by SDMMP (SDMMP 2013), and will guide land managers in San Diego County in prioritizing

management actions at the site-specific level. In the meantime, the species-specific goal for thread-leaved brodiaea established by SDMMP is to inspect and manage (i.e., inspect each occurrence to confirm presence and identify and address management issues).

Long-Term Monitoring

Long-term census monitoring of thread-leaved brodiaea is being conducted annually using index plots at all CNLM-managed preserves. Additionally, a life-stage study was established at these preserves in the winter of 2013-2014; results will be presented in next year's site-specific annual reports. The goal of the study is to provide information about the life history of thread-leaved brodiaea, including degree of flowering, variance of dormancy, and how these factors relate to flowering. This information can then be used to determine a better method for estimating counts (e.g., whether flowering counts are a suitable replacement for vegetative counts). This study will continue annually into the foreseeable future.

Overall Condition and Major Threats

Plant counts of this species vary tremendously year to year depending on timing and amount of rainfall, and the season during which the surveys were conducted (e.g., when plants are flowering or in their vegetative state). CNLM has determined that the plant count during the flowering season may represent only 2%-26% of the actual population size, since only a fraction of a population flowers at a given time. No flowering took place on any of the CNLM-managed populations in 2013 or 2014, although in some locations over 1,000 vegetative individuals were counted. Due to the large variability in the plant counts, as described above, detailed survey results will not be provided in this report; however, these details are available upon request from CNLM. Figure 4 shows known locations of thread-leaved brodiaea in Carlsbad and USFWS critical habitat for this species.

Major threats to this species are invasive species, drought, altered hydrology, erosion, off-road vehicles, herbivory, and fragmentation with reduced pollinator connectivity (SDMMP 2013). In Carlsbad, the major threat appears to be invasive species and thatch build-up. Although it is difficult to determine the population trajectory of Carlsbad occurrences (increasing, decreasing, or stable), the populations managed by CNLM appear to be well protected due to intensive, localized management efforts that are conducted at least annually. Populations managed by other entities should, at minimum, be inspected to confirm presence and population-specific threats should be identified and addressed.

Del Mar Manzanita

Arctostaphylos glandulosa ssp. *crassifolia*
Status: federally endangered

Critical Locations and Major Populations

The 1999 MHCP identified critical locations/major populations on preserve lands owned by the City, the County, private HOAs, and La Costa Villages.

Management Actions Conducted to Protect the Species

Management actions include invasive species removal, access control, and public outreach. In addition, special attention will be given to the burn areas in Rancho La Costa and Morning Ridge Preserves to encourage recovery of this population. Regionally, this species has been designated by SDMMP as a "VF" species, which means that this species is likely to persist in the Management Strategic Plan Area (MSPA) with appropriate management of the vegetation community. VF species are those with limited distribution in the MSPA and/or those that have specific vegetation characteristics that need to be managed for persistence in the MSPA (SDMMP 2013). What this means to the land manager is that by protecting and managing the vegetation community as a whole, this species is expected to remain in stable condition.

Long-Term Monitoring

Surveys for Del Mar manzanita have been conducted periodically on the following preserves: La Costa Glen, Kelly Ranch, Manzanita Partners, Morning Ridge, Poinsettia Place, and Rancho La Costa Preserve (see table below for dates) (Figure 5). No other surveys for this species in Carlsbad have been conducted. Identification of individuals to the subspecies level of on Rancho La Costa and Kelly Ranch has been conducted by CNLM and confirmed by taxonomic experts. Because the non-sensitive Eastwood manzanita (*Arctostaphylos glandulosa* ssp. *glandulosa*), also occurs on Rancho La Costa, Del Mar manzanita was re-mapped on the property pursuant to taxonomic confirmation (Spiegelberg and Vinje 2008). All individuals observed on Kelly Ranch were confirmed to be the Del Mar manzanita subspecies (McConnell 2011).

Overall Condition and Major Threats

Prior to the initiation of long-term management, it was reported that Rancho La Costa supported over 500 individuals; however, this number was greatly reduced (to nine individuals) after the shrubs were re-identified to subspecies by CNLM (M. Spiegelberg personal communication, 2011). The number of individuals reported on other actively managed preserves ranges from 2 clumps (number of individuals unknown) to 313 individuals. Three preserves burned during the Poinsettia Fire in May 2014; post-fire monitoring will determine how many of the burned individuals survived.

	Number of Del Mar Manzanita Individuals										
Preserve	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
La Costa Glen	NS	NS	NS	200[1]	NS	NS	NS	NS	NS	313	Unk[2]
Kelly Ranch	NS	NS	NS	NS	NS	2[3]	NS	NS	NS	NS	2
Manzanita Partners	NS	117	NS	NS	NS	NS	NS	NS	NS	117	NS
Morning Ridge	NS	8	NS	NS	8	NS	NS	NS	NS	NS	burned
Poinsettia Place	53	NS	NS	NS	NS	NS	NS	NS	NS	NS	burned
Rancho La Costa	NS	>500[4]	NS	NS	9	NS	NS	NS	NS	NS	burned

NS = Not Surveyed

[1] Conducted for the MHCP, prior to long-term management

[2] Unknown number; survey conducted but exact number of individuals not reported

[3] Number of clumps is reported; number of individuals unknown

[4] Survey performed prior to long-term management; taxonomic confirmation of subspecies not yet conducted

[5] Pre-fire surveys were conducted on Poinsettia Place and Rancho La Costa in 2014; post-fire counts are presumed to be zero if the entire preserve burned, including above-ground biomass. A post-fire inspection on Rancho La Costa reported seven resprouting shrubs, and one near, but undamaged by the bulldozed fire line.

The species is well protected within the Kelly Ranch Preserve. This population was reportedly in good condition during the 2014 survey. The condition of the La Costa Glen population is unknown, but it is assumed to be in good condition due to the steep topography and inaccessibility of the site. All of the Del Mar manzanita shrubs on the Morning Ridge and Poinsettia Place Preserves were burned in 2014 in the Poinsettia Fire, which burned all habitat on both preserves. Many of the Del Mar manzanita shrubs on Rancho La Costa Preserve were also damaged or destroyed during the Poinsettia Fire, which burned over 60 acres of high quality southern maritime chaparral habitat in Rancho La Costa Preserve (Godfrey 2014). Some shrubs were burned in the fire, and two were "masticated, torn up by their roots, and pushed into a pile along [a] bulldozer line corridor" that was 30 feet wide and 1,200 feet long. CNLM contends that the bulldozer line was constructed, sometime after the fire was contained, through excellent quality, non-burned southern maritime chaparral habitat. CNLM was not able to identify the responsible agency, and therefore must try to repair the damage on its own by installing erosion control and access control.

Post-fire monitoring will be conducted annually within the burned areas for approximately five years. Information collected during this effort should include a detailed description of the status (present/absent) and condition (status of recovery, signs of disease, etc.) of each Del Mar manzanita shrub, presence or absence of seedlings, and specific threats to each population. Long-term monitoring of non-burned Carlsbad populations should include this information as well.

Prior to the fire, threats to the actively managed Carlsbad populations were considered minimal due to the robustness of woody shrubs (i.e., they are not as vulnerable to drought, invasive species encroachment, or edge effects as small annuals) and the inaccessibility of most of the known locations. In burned areas, the major threat to recovery is erosion; many of the plants occur on very steep slopes that now have little to no vegetation holding the soil in place. Generally, wildfire is not considered a major threat to Del Mar manzanita; this species evolved with fire, and typically resprouts from a basal burl after it has been burned. Additionally, the seeds are dependent on fire

to germinate (USFWS 2010). Therefore, the burned populations in Carlsbad are expected to recover. As of January 2015, seven manzanita were resprouting in an area of Rancho La Costa Preserve where only two had previously been documented (S. Godfrey, pers. comm.). However, even with fire-adapted species, if the natural fire regime is altered (e.g., if fires become too frequent, or burn too hot, the effect on the species could be negative.

Del Mar Mesa Sand Aster

Corethrogyne filaginifolia var. *linifolia*

Status: California Rare Plant Rank (CRPR) 1B.1

Critical Locations and Major Populations

There are no critical locations in Carlsbad, according to the 1999 MHCP. The closest major population is at the southern boundary of Carlsbad, according to the 1999 MHCP. The majority of the population within the MHCP Subregion is in the City of Encinitas, but may extend into Carlsbad on private HOA lands.

Management Actions Conducted to Protect the Species

The City Ventures and Manzanita Partners populations are being managed through general habitat management (e.g., invasive species removal, trash removal, access control, etc.) (HRS 2014, J. Whalen Assoc. 2014,). Potentially suitable habitat for this species within the HMP preserve system, which consists of coastal bluff scrub and openings within coastal sage scrub and chaparral, is also being managed through general habitat stewardship. Del Mar Mesa sand aster was not identified by the SDMMP as a high priority for regional management and monitoring; therefore, BMPs will not be developed for this species.

Long-Term Monitoring

Long-term monitoring was initiated in 2014 for the City Ventures population of Del Mar Mesa sand aster, which was established in 2013. The surveys consist of delineating the boundaries of sand aster patches and estimating the density of the patches using 20 stratified, random 0.25-m plots (J. Whalen Assoc. 2014). Long-term monitoring for the Manzanita Partners population was initiated in 2013. Monitoring on this preserve consists of general rare plant surveys every 10 years to confirm presence. This population was burned in the Poinsettia Fire. Recovery will be assessed annually during the post-fire monitoring period. Figure 4 shows the locations of Del Mar Mesa sand aster on actively managed preserves. No other populations of this species are being monitored within Carlsbad.

Overall Condition and Major Threats

The greatest threat to the City Ventures population appears to be unauthorized access, including trails and encampments and other edge effects, such as trash and invasive species. This population is located right on the eastern edge of the preserve, adjacent to El Camino Real. The condition of the

habitat along the outer edges of the preserve was determined to be "poor" by the preserve manager due to the identified edge effects. However, with continued invasive species control, patrolling and access control, the habitat supporting this population is expected to improve. One of the primary threats to the Manzanita Partners population, if it still exists, is likely to be trampling and off-road vehicles. Although this locality is next to a dirt access road, the preserve did not experience major problems with unauthorized access prior to the fire; however, once the fire eradicated the vegetation, unauthorized access, including dirt bikes and people on foot, became an immediate problem (A. Hayworth, personal communication, 2014). Fences were installed by the City in late 2014 along road right-of-ways to deter unauthorized access in burned areas. The status of other populations of Del Mar Mesa sand aster in Carlsbad is unknown.

Encinitas Baccharis

Baccharis vanessae

Status: federally threatened, state endangered

Critical Locations and Major Populations

The closest major population is at the southern boundary of Carlsbad, according to the 1999 MHCP. The majority of the population is within Encinitas, but may extend into Carlsbad on private HOA lands. Within this major population, there are critical locations identified that may occur within Carlsbad; however, presence or absence of these observations have not been confirmed in the field since surveys were conducted in the 1990s for the MHCP, except in the La Costa Glen preserve, as described below.

Management Actions Conducted to Protect the Species

This species was identified as a high priority for regional management and monitoring (SDMMP 2013). One of the species-specific management objectives for Encinitas baccharis established by SDMMP is to inspect and manage (i.e., inspect each occurrence to confirm presence, and identify and address management issues). Potentially suitable habitat on actively managed preserves in Carlsbad is being managed through general invasive species removal and access control.

Long-Term Monitoring

One Encinitas baccharis locality was reported on the La Costa Glen preserve in the 1990s during surveys conducted for the MHCP. Long-term management for this preserve was established in January of 2013. Since then, two focused species surveys were performed by CNLM in 2013 and two were conducted in 2014. Encinitas baccharis was not observed during these recent surveys.

Overall Condition and Major Threats

The status of populations within Carlsbad is currently unknown. Major threats to this dioecious species are altered fire regime, low seedling recruitment, low seed viability, reduced reproductive potential at older age classes, fuel modification, trampling, and invasive species. Additionally, small,

isolated occurrences with little connectivity and dioecious life history make this species more vulnerable to changes in environmental conditions (SDMMP 2013).

Orcutt's Hazardia
Hazardia orcuttii
Status: state threatened

Critical Locations and Major Populations

There are no naturally occurring critical locations or major populations in Carlsbad, according to the 1999 MHCP. However, if the transplanted populations in Carlsbad prove to be self-sustaining, they would be considered critical populations.

Management Actions Conducted to Protect the Species

Orcutt's hazardia has been identified regionally as a high priority species for management and monitoring (SDMMP 2013). All known populations, including the single naturally occurring population in Encinitas and transplanted populations in Carlsbad, are under active management by CNLM. Management activities consist of intensive invasive species removal, access control, and transplant studies, which have been approved by the wildlife agencies. The transplant studies, which have been ongoing since 2003, consist of transplanting Orcutt's hazardia to new locations and studying reproduction and survival as part of a population viability analysis. By better understanding population dynamics, it is hoped that this program will reduce the possibility of local extinction (the species still occurs in northern Mexico) due to unforeseen events.

Long-Term Monitoring

Orcutt's hazardia were transplanted by CNLM to the CNLM's Kelly Ranch and Rancho La Costa preserves in 2003. CNLM has been tracking these transplants and documenting recruitment annually.

Overall Condition and Major Threats

By 2004, a total of 125 Orcutt's hazardia individuals were transplanted at Kelly Ranch and 200 individuals were transplanted at Rancho La Costa. As of 2014, a total of 254 individuals (102 adults and 152 juveniles) were observed on Kelly Ranch and 171 individuals were observed on Rancho La Costa (147 adults and 24 juveniles). Overall, the adult plants on both sites have fared well over time, becoming stable within a few years after the initial transplantation through 2012. A few individuals were lost between 2012 and 2014. For the most part, juveniles on both sites steadily increased over time. In contrast, the number of seedlings dropped to zero in 2013 and 2014 on both sites, presumably due to the extreme drought conditions experienced in San Diego County. The nearby weather station at Palomar Airport recorded only 6.2 inches of rain during the 2012 – 2013 rainfall year (October to September), reaching only 60 percent of the average 10.3 inches per year. Rainfall

in 2014 was even lower, at 4.7 inches, which is only 46 percent of average (McConnell 2014). These data suggest that drought may be a major hindrance to reproduction by reducing seedling survival.

It is interesting to note that, although there were many more adults transplanted on Rancho La Costa (200) than on Kelly Ranch (125), the number of juveniles and seedlings on Kelly Ranch (maximum annual count of 157 and 77, respectively) is consistently significantly higher than on Rancho La Costa (a maximum annual count of 24 and 8, respectively). This is likely due to the high clay content soils and non-native grasses, such as purple false brome, at Rancho La Costa. These factors make this area less suitable for Orcutt's hazardia recruits than Kelly Ranch, which has more suitable soil and fewer non-natives.

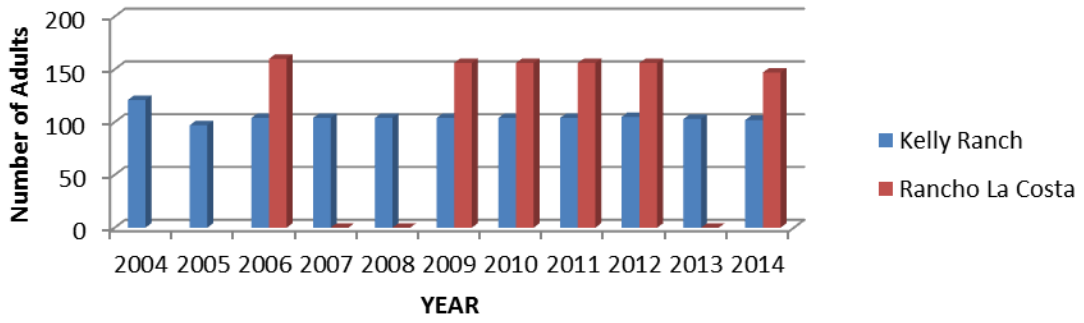
Counts of Orcutt's Hazardia Transplanted to Kelly Ranch Preserve

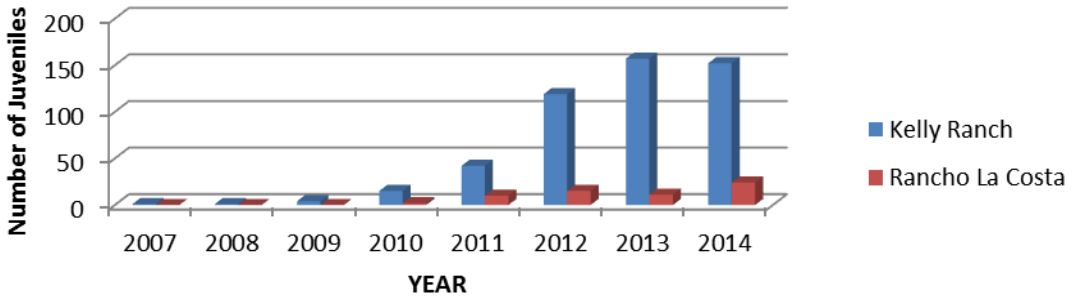
Life Stage	Number of Individuals Counted, by Year										
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Adults (flowering)	121	97	104	104	104	104	104	104	105	103	102
Juveniles [2]	0	0	0	1	1	4	15	42	119	157	152
Seedlings	0	0	0	4	17	14	68	77	55	0	0
Total count	121	97	104	109	122	122	187	223	279	260	254

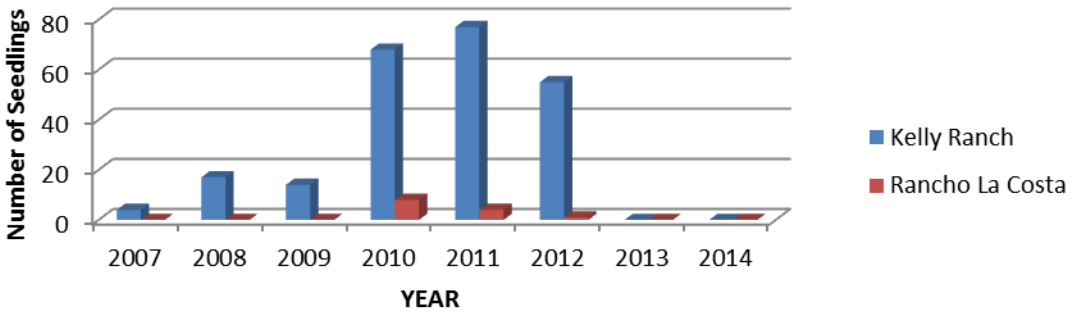
Counts of Orcutt's Hazardia Transplanted to Rancho La Costa Preserve

Life Stage	Number of Individuals Counted, by Year								
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Adults (flowering)	160	NS	NS	156	156	156	156	NS	147
Juveniles [2]	NS	NS	NS	NS	2	10	15	11	24
Seedlings	NS	NS	NS	NS	8	4	1	0	0
Total count	160	unknown	unknown	156	166	170	172	unknown	171

NS = not surveyed







The biggest threat to this species is that it occurs in only a few locations (only one of which is a natural population; all others were transplanted), and populations are very small and isolated, making this species highly vulnerable to extirpation by a catastrophic event, such as fire (SDMMP 2013). Ongoing drought appears to be a major threat as well based on the results of the transplant studies, as discussed above.

2.2.2 Vernal Pool Species

California Orcutt Grass
Orcuttia californica
Status: federally endangered, state endangered

Little Mousetail
Myosurus minimus ssp. *apus*
Status: CRPR 3.1

San Diego Button-Celery
Eryngium aristulatum var. *parishii*
Status: federally endangered, state endangered

Spreading Navarretia
Navarretia fossalis
Status: federally threatened

Riverside Fairy Shrimp
Streptocephalus woottoni
Status: federally endangered

San Diego Fairy Shrimp
Branchinecta sandiegonensis
Status: federally endangered

Critical Locations and Major Populations

There are three vernal pool complexes in the HMP preserve system: (1) Poinsettia Lane Train Station, (2) Hieatt property, north of the airport, and (3) Manzanita Partners Preserve, east of El Camino Real and south of the airport (Figure 6). The Poinsettia Lanes vernal pool has been identified as a critical location and major population for all vernal pool species listed above by the MHCP;

however, none of these species are currently covered by the HMP. Neither of the two other vernal pools were identified by the MHCP as critical locations or major populations.

Management Actions Conducted to Protect the Species

Long-term management was initiated by Habitat Restoration Inc. (HRS) on the Manzanita Partners Preserve in 2012 to preserve the quality of the vernal pool habitat through invasive species control. The vernal pools on this preserve were burned in the Poinsettia Fire. Post-fire management will focus on invasive species removal and access control. Fencing has been installed by the City along road right-of-ways to deter unauthorized access into burned areas.

Management of the Poinsettia Lanes Vernal Pools is the responsibility of North County Transit District (NCTD), and presumably consists of mowing within the railroad right-of-way as part of regular maintenance. The adjacent upland watershed buffer area, which is a semicircular area of coastal sage scrub between the vernal pools and residential development, is being managed by the Water's End HOA. This upland area has been fenced and signed to protect it from unauthorized access and to provide public education. The Hieatt property vernal pools are not being actively managed.

Long-Term Monitoring

Long-term monitoring is only being conducted at the Manzanita Partners pools, as the other two preserves are not under active management. Due to the 2014 wildfire, monitoring for the next five years will focus on post-fire recovery.

Overall Condition and Major Threats

Due to the severe drought conditions of the previous couple of years, the condition of the unmanaged vernal pools and associated species have not been evaluated since the last triennial monitoring summary report.

Poinsettia Lanes vernal pools. All of the vernal pool species that require species-specific reporting by the MHCP, as well as Orcutt's brodiaea (*Brodiaea orcuttii*), were observed on the Poinsettia Lanes vernal pools during 2008 surveys conducted by Dudek (A. Hayworth, personal communication, 2011). Based on a qualitative site visit conducted in 2014 the City's HMP Coordinator and Preserve Steward, the vernal pool area was observed to have a high cover of non-native species; however, the adjacent upland watershed buffer was in excellent condition. Currently, the primary threats to the Poinsettia Lanes vernal pool habitat and species are invasive non-native plants and long-term drought.

Manzanita Partners. The Manzanita Partners vernal pools were enhanced/restored in 2000, and five years of maintenance and monitoring was conducted by Dudek. Seven existing degraded pools were enhanced, seven suspected historic vernal pools were restored, and adjacent native upland habitat

was enhanced (Dudek 2005). In 2008, the condition of this restored vernal pool was determined to be good (A. Hayworth, personal communication, 2011); at project completion, all vernal pools held water during the rainy season, all pools had at least one of four vernal pool target plant species present, San Diego fairy shrimp were detected at five of the pools, coastal sage scrub habitat surrounding the pools was mature and healthy, and non-native species were under control and did not pose a threat to the vernal pools (Dudek 2005). A follow-up visit was made by the City HMP Coordinator and HMP Preserve Steward in April 2011 to assess the condition of the pools. The pools appeared to be in good condition overall, although there was a fairly high cover of non-native grasses. Beginning in 2013, active invasive species control was initiated as part of long-term management of the preserve. In May 2014, a wildfire consumed the entire preserve, burning the vegetation on-site completely. Post-fire monitoring will determine the trajectory of the recovery of this habitat and associated species. The greatest threats to these vernal pools are invasive species and unauthorized access (trampling, off-road vehicles, etc.).

Hieatt Property. The vernal pools on the Hieatt Property were restored by Helix Environmental Planning Inc. (Helix). The restoration plan was initiated on March 2, 2006, and was to last two years. Restoration monitoring reports have not been submitted to the City or Wildlife Agencies, and no request has been made for sign off on the success of the restoration. Prior to restoration, the pools did not contain any sensitive species, but contained the following vernal pool indicator species: dwarf wooly-heads (*Psilocarphus brevissimus* var. *brevissimus*), water pygmyweed (*Crassula aquatica*), chaffweed (*Centunculus minimus*), and grass poly (*Lythrum hyssopifolia*). On October 23, 2009, a site visit was conducted by ESA, and there were no signs of vernal pool indicator plant species nor were there other signs of a functioning vernal pool. The entire area was overrun by non-natives. The site has not been visited since.

Other Locations

Additional vernal pools have been identified to the north of the Poinsettia Lanes site along the same NCTD right-of-way (Rosie 2010), although these are outside of the HMP boundary. Several of these pools are reported to support San Diego fairy shrimp. These pools, which are generally in poor condition (few vernal pool species and dense cover of non-native grasses), are not currently protected by a Conservation Easement or other open space protection.

2.2.3 Lagoon/Coastal Bird Species

Belding's Savannah Sparrow
Passerculus sandwichensis beldingi
Status: state endangered

Critical Locations and Major Populations

The 1999 MHCP identified critical locations and major populations in Agua Hedionda Lagoon and Batiquitos Lagoon, which are managed by CDFW.

Management Actions Conducted to Protect the Species

Management actions include habitat management through invasive species control. The top priorities for CDFW to protect this species are habitat enhancement, protection and restoration in the form of improved tidal flushing, sediment control, limiting human disturbances, and the continued funding of a statewide census.

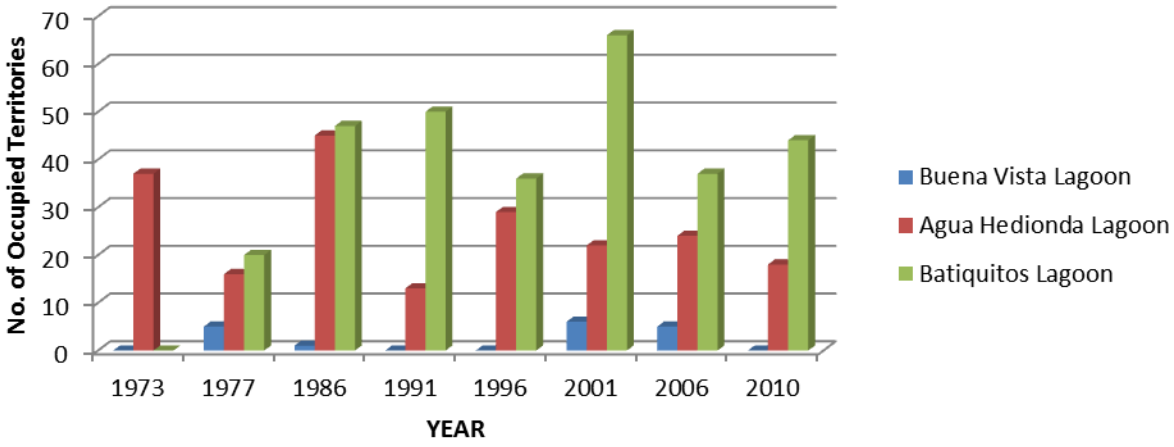
Long-Term Monitoring

Surveys are conducted approximately every five years as part of an ongoing census effort. The most recent census information available is from 2010, during which 30 coastal salt marshes in California were surveyed (Zembal and Hoffman 2010). Results of surveys conducted within Carlsbad are summarized below. See Figure 7 for a location map.

Number of Occupied Territories by Year

	1973	1977	1986	1991	1996	2001	2006	2010
Buena Vista Lagoon	0	5	1	0	0	6	5	0
Agua Hedionda Lagoon	37	16	45	13	29	22	24	18
Batiquitos Lagoon	0	20	47	50	36	66	37	44

Overall Condition and Major Threats



Approximately 3,372 breeding territories were detected in California during the 2010 census. This is the highest total since counts began in 1973 and 7.6% higher than the next highest count, reported in 2006 (Zembal and Hoffman 2010). However, the number of territories was markedly lower in 2010 than in 2006 at both Agua Hedionda and Buena Vista Lagoons. Encroachment of freshwater marsh habitat, proliferation of invasive species, and human disturbances continue to exert pressure upon Belding's savannah sparrow and the habitat necessary to support the species (Zembal and Hoffman 2010).

Buena Vista Lagoon. The 2010 surveys revealed that the formerly occupied territories no longer contained Belding's savannah sparrow. Encroachment of freshwater marsh habitat and song sparrows has contributed to the decline of this species within Buena Vista Lagoon, in addition to human disturbance. Potential for restoration of the territories exists, and is highest on the islands and the north-east portion of the inner lagoon. Additional improvements to the habitat could be made by the cleanup of trash and homeless encampments, as well as invasive species control.

However, the transition to brackish marsh habitat limits the potential of the Buena Vista to support Belding's savannah sparrow (Zembal and Hoffman 2010).

Agua Hedionda Lagoon. The 2010 surveys revealed a 25% decline in territories from 2006. The territories were concentrated along a picklweed (*Salacornia* spp.) belt on the inland edges of the inner lagoon, which is threatened by encroaching freshwater marsh. Regular dredging maintains a connection to the ocean, resulting in good potential for habitat restoration in this lagoon; however, flow is constricted due to the narrowness of the opening. Human disturbances continue to be an issue in the lagoon, although CalTrans has installed fencing along the northern edge of the lagoon to exclude potential trespassers. Although CDFW is actively working to control detrimental species, including invasive algae (*Caulerpa taxifolia*) and Algerian sea-lavender (*Limonium ramosissimum*), much of the previously existing Belding's habitat has been affected and no longer supports adequate nest cover (Zembal and Hoffman 2010).

Batiquitos Lagoon. The 2010 surveys revealed that there was a 19% increase from the 2006 surveys, which showed a 44% decrease from the 2001 numbers (Zembal and Hoffman 2010). Past restoration of Batiquitos Lagoon resulted in the expansion of pickleweed, which is a critical component of Belding's habitat, and likely led to the doubling of numbers found between the 1996 and 2001 surveys. The 44% reduction in Belding's found in 2006 was presumably influenced by the reverting of much of the habitat back to brackish marsh due to inflow of urban freshwater runoff at the eastern edge of the lagoon (Zembal and Hoffman 2010). Much of the remaining pickleweed dominated marsh habitat is too narrow to support Belding's (Zembal and Hoffman 2010).

California Least Tern

Sterna antillarum browni

Status: federally endangered, state endangered and fully protected

Critical Locations and Major Populations

The 1999 MHCP identified critical locations in all three lagoons. The population at Batiquitos Lagoon is considered a major population.

Management Actions Conducted to Protect the Species

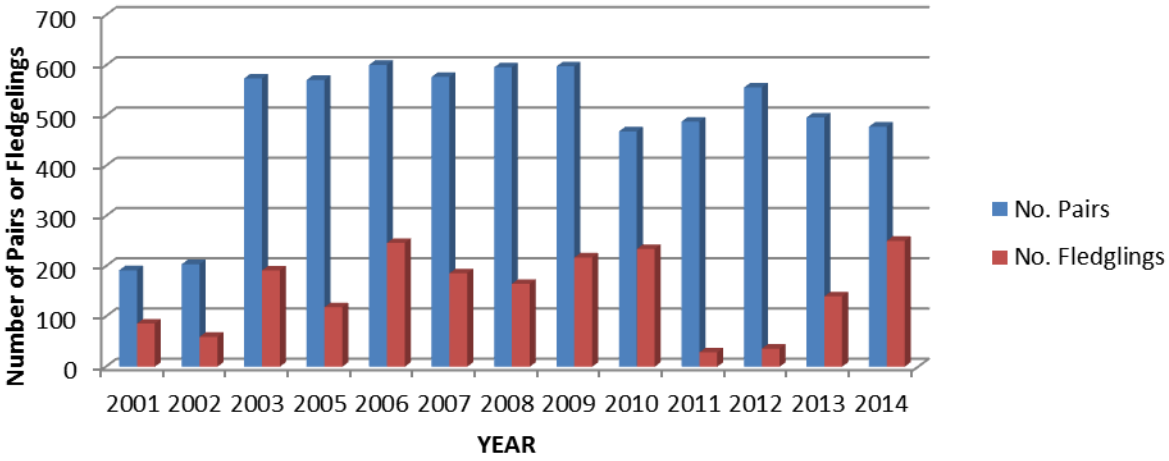
Annual management actions include use of shelters to protect chicks from predators and weather, decoys to attract adults, interpretive signage, vegetation management, and fencing (Frost 2014). Because the least tern nests on the ground, this species, especially its fledglings, is highly vulnerable to predators. Management of the species at Batiquitos Lagoon is currently being conducted by CDFW staff; however, due to budget constraints, the level of management has been reduced from pre-2011 levels. Annual monitoring and management at Batiquitos Lagoon, which has continued since then, is now conducted by local CDFW staff.

Long-Term Monitoring

Annual least tern monitoring, funded by CDFW, has been conducted annually at Batiquitos Lagoon from 1973 to 2014 (Figure 7). Biological data were collected in the following categories: estimation of breeding pairs (based on number of nests, less the number of re-nests), and productivity (total number of nests, number of eggs, number of chicks hatched, number of chicks reaching fledgling age, and number of fledglings surviving to disperse). Mortality and predation data were also collected.

Number of Nests, Pairs, and Fledglings by Year

	2001	2002	2003	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
No. Nests	222	226	615	596	627	594	610	649	480	532	563	558	479
No. Pairs	192	203-205	574	571	601	575-578	596	576-620	457-480	457-519	550-562	433-559	478
Estimated No. of Fledglings	73-99	53-66	155-228	109-128	223-270	146-226	143-187	212-233	208-261	20-37	34-38	117-163	232-269



Overall Condition and Major Threats

Throughout California. The long-term monitoring data for the California least tern was analyzed by Lewison and Deutcshman (2014) to (1) identify population trends and drivers for those trends and (2) evaluate the current monitoring and management practices. The study focused on 24 sites throughout the range of the least tern that have been monitored consistently between 1990 and 2013. Batiquitos Lagoon was one of these sites. This analysis concluded the following regarding statewide population trends:

- The number of breeding pairs and nests have declined significantly since about 2007;
- Clutch size (number of eggs per nest) has remained constant across the state over the last 10 and 20 years;
- The number of hatched eggs show variability over time, but no clear trend; and
- The number fledged has shown extreme variability and a significant decline across the state over time.

There was no significant relationship found between these productivity variables and colony size or latitude, with the exception of number of fledglings per pair, which increases significantly with latitude (more fledglings per pair in the north than in the south). In addition, the changes in productivity did not appear to be density dependent (i.e., affected by the density of a population).

Within Carlsbad. Based on 2012 monitoring data, Batiquitos Lagoon had the third highest number of breeding pairs in California (Frost 2014). Measures of productivity, including number of nests, breeding pairs, clutch size, and number of surviving fledglings have been variable over time, and it is difficult to evaluate the overall trends of this subpopulation. Most notable, however, is the precipitous drop in the number of surviving fledglings, which decreased by more than 80% between 2010 and 2011. This was likely due to the lack of funding for monitoring and predator control (Foster 2011, Sisson 2011). In 2012, the number of fledglings increased only slightly, but rebounded significantly (almost quadrupling) by 2013, and was back up to 2010 levels by 2014 (Frost 2014). Continued threat of predation from many species, including common raven (*Corvus corax*), American crow (*Corvus brachyrhynchus*), peregrine falcon (*Falco peregrinus*), great blue heron (*Ardea Herodias*), American kestrel (*Falco sparverius*), Red-tailed hawk (*Buteo jamaicensis*), and gulls (*Larus* spp.), is a major concern for the species (Frost 2014).

Light-Footed Clapper Rail (Ridgeway's Rail)*

Rallus longirostris levipes (*Rallus obsoletus levipes*)

Status: federally endangered, state endangered and fully protected

***Taxonomic Note**

Taxonomic changes to the light-footed clapper rail have been proposed recently due to an analysis of genetic data. The clapper rail species *Rallus longirostris*, which included the light-footed clapper rail and two additional California subspecies, was split into three separate species (AOU 2014). Based on this analysis, the three California subspecies have become subspecies of Ridgeway's rail (*Rallus obsoletus*), resulting in a taxonomic reclassification from *Rallus longirostris levipes* to *Rallus obsoletus levipes*.

Critical Locations and Major Populations

The 1999 MHCP identified critical locations and major populations at all three lagoons in Carlsbad.

Management Actions Conducted to Protect the Species

Management actions at all three lagoons include habitat restoration and tidal enhancement, predator study and control program, nesting site provision, adaptive management studies, captive breeding, genetic and demographic augmentation of smaller subpopulations, and continued long-term monitoring of population status and effects of management actions (Zembal et al. 2014). Priorities for CDFW are continued habitat enhancement/restoration, and funding of the statewide census. Release of captive-bred rails in Carlsbad has been conducted by a team of state, federal and

zoological organizations to contribute genetic diversity and support recovery of this species (CDFW 2014). In 2014, six rails were released into Batiquitos Lagoon in July and six additional rails were released in November. Previous releases in Batiquitos Lagoon were performed in 2004 (8 rails), 2005 (8 rails), and 2013 (6 rails). Rails were also released in Agua Hedionda Lagoon in 2004 (5 rails), 2011 (6 rails), 2012 (16 rails), and 2013 (9 rails), and in Buena Vista Lagoon in 2011 (15 rails).

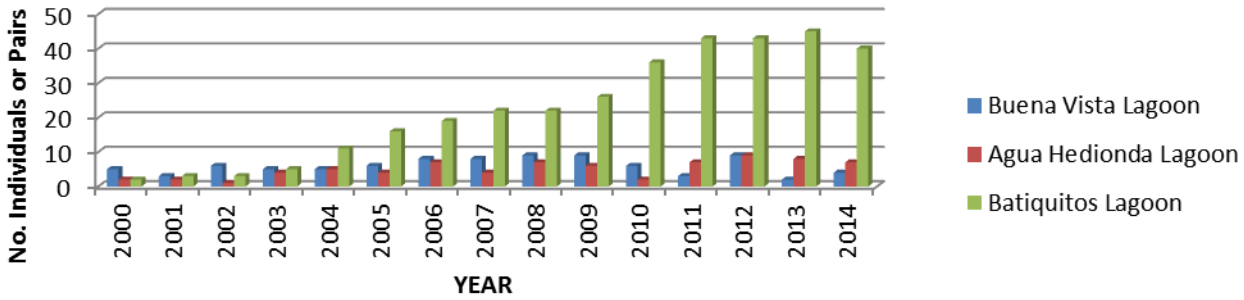
Long-Term Monitoring

In 2014, the 35th consecutive annual census of light-footed clapper rails in California coastal wetlands was conducted in 30 locations by assessing call counts. This long-term annual monitoring program, which extends from Carpinteria Marsh in Santa Barbara County to Tijuana Marsh National Wildlife Refuge on the Mexican border, is funded by CDFW. Clapper rails are typically monitored by two methods – spring call counts, and winter high tide counts. Results through the 2014 season are summarized below for areas within Carlsbad (Zembal et al. 2014). These areas are shown on Figure 7.

Number of Pairs or Unpaired Individuals of Clapper Rails by Year

Lagoon	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Buena Vista	5[1]	3[1]	6[1]	5[1]	5[1]	6[1]	8[1]	8[1]	9[1]	9[1]	6	3[1]	9[1]	2	4
Agua Hedionda	2	2	1	4	5	4[1]	7[1]	4	7	6	2[1]	7	9	8	7[1]
Batiquitos	2[1]	3[1]	3[1]	5	11	16[1]	19[1]	22	22	26[1]	36[1]	43[1]	43[1]	45	40

[1]includes unpaired individuals (all others are pairs)



Overall Condition and Major Threats

For the last three years (2012-2014), more than 500 breeding pairs of light-footed clapper rail were documented throughout their range in California. A total of 528 breeding pairs were recorded in 2014, which is the highest number recorded to date. In 2007, a total of 443 breeding pairs were documented which, at that time, was the highest number recorded since the surveys began in 1980. Up until then, the population had been steadily increasing. The population crashed to 234 pairs in 2008, presumably due to weather-related causes, but recovered by 37% in 2009 to 320 breeding pairs, and has shown a steady increase ever since (Zembal et al. 2011, 2014). Three subpopulations

occur in Carlsbad in the Buena Vista, Agua Hedionda, and Batiquitos Lagoons, which account for 11 percent of the total California population (Figure 7).

Batiquitos Lagoon. Batiquitos Lagoon supports the third largest subpopulation in the state (a high of 45 pairs in 2013), and the largest subpopulation in Carlsbad. This subpopulation has shown a steady increase ever since census monitoring began in 1980. In 2008, when many other subpopulations crashed, this subpopulation remained stable from the previous year. The only exception was in 2014, when the number of rails decreased from 45 to 40. The reason for this dip is unclear (Zembal et al. 2014). The success of this population has been supported by the release of captive-bred rails into Batiquitos Lagoon, as described above.

Agua Hedionda Lagoon. Agua Hedionda Lagoon supports the second largest subpopulation in Carlsbad. In 2014, six pairs and one advertising female were observed in this lagoon. The size of this subpopulation has varied over time from one pair in 2002 to an all-time high of nine pairs in 2012. As in Batiquitos Lagoon, this subpopulation has been augmented by the release of captive-bred rails. Although none of these captive-bred rails, which are banded, have been observed since their release, rails are being observed around the edges of the lagoon in previously unoccupied areas (Zembal et al. 2014).

Buena Vista Lagoon. The size of the Buena Vista Lagoon subpopulation has been variable over time. A high of nine pairs was detected in 2008, 2009, and 2012. Only two pairs were observed 2013 and four pairs in 2014. To augment this population, captive-bred rails have been released; however, no releases have been allowed since 2011, pending implementation of planned habitat restoration.

Despite the crash in 2008, which reduced the number of pairs by almost 50 percent, the population of light-footed clapper rails in California has recovered well, and has exceeded the maximum population size recorded prior to 2008. Habitat degradation (e.g., invasion by non-native trees and shrubs), development, and predators continue to be the greatest threats to the light-footed clapper rail. Implementation of the management actions described above appear to be successful in protecting and expanding this species within Carlsbad and across California, although it is unclear if the Agua Hedionda Lagoon and Buena Vista Lagoon subpopulations are stable and self-sustaining without the introduction of captive-bred individuals.

Western Snowy Plover

Charadrius alexandrinus nivosus

Status: federally threatened

Critical Locations and Major Populations

The 1999 MHCP identified critical locations and major populations at all three lagoons.

Management Actions Conducted to Protect the Species

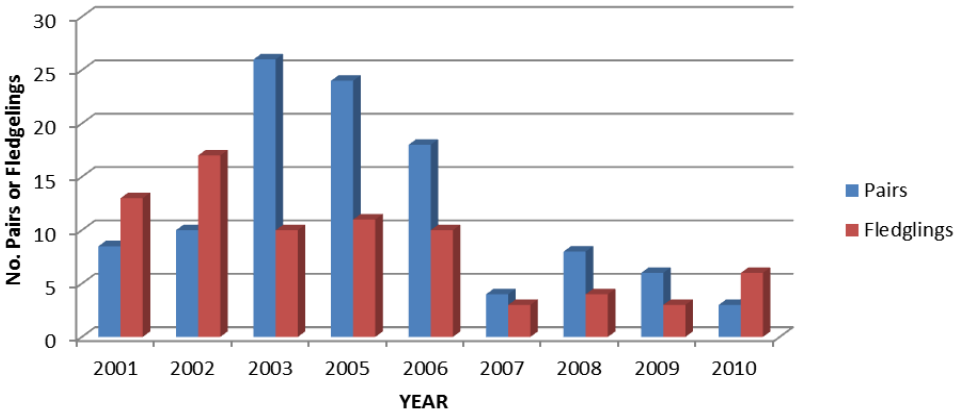
The following management activities have been conducted on Batiquitos Lagoon Ecological Reserve to encourage snowy plover nesting: (1) Habitat management –paths linking the breeding habitat with the north mud flats that had been created in 2008 were maintained via the use of herbicide and hand-weeding; (2) Predator control - exclosures (wire cages) were placed over active nests to protect the eggs from predators (Squires 2010).

Long-Term Monitoring

Western snowy plover monitoring has been conducted annually at Batiquitos Lagoon through 2014 as part of a statewide census. Surveys were not conducted in 2011 due to freeze on private contracting. Currently, annual surveys are conducted by local CDFW staff. Monitoring results beyond 2010 have not been submitted to the City; results through 2010 are summarized below. See Figure 7 for a location map.

Western Snowy Plover Monitoring Results for Batiquitos Lagoon

	2001	2002	2003	2005	2006	2007	2008	2009	2010
Nests	19	25	29	24-25	16	5	6	5	3
Pairs/Breeding Adults	8-9[1]	10[1]	26[2]	24[2]	18[2]	4[2]	8[2]	6[2]	3[1]
Fledglings	10-16	17	9-10	9-12	10+	2-3	3-4	3	6



Overall Condition and Major Threats

The numbers of nests, breeding adults, and fledglings throughout California plummeted in 2006 and 2007. The numbers remained relatively steady between 2007 and 2009 (Squires and Wolf 2010, Squires 2010), but showed a decrease in 2010. The monitoring results at Batiquitos Lagoon were consistent with this pattern. Despite the drop in number of nests and breeding pairs in 2010, a total of six chicks fledged at Batiquitos Lagoon, which is the highest number recorded since 2006. The decline in snowy plover numbers within Batiquitos Lagoon and throughout the state in recent years may be due to predator activity, as well as the decline in suitable foraging habitat (Squires 2010).

2.2.4 Riparian Bird Species

Least Bell's Vireo

Vireo bellii pusillus

Status: federally endangered, state endangered

Critical Locations and Major Populations

There are no critical locations or major populations of least Bell's vireo in the City of Carlsbad, according to the 1999 MHCP.

Management Actions Conducted to Protect the Species

This species is managed indirectly through general habitat management (e.g., trash pick-up, access control, patrols, and invasive species removal). On Buena Vista Ecological Reserve, additional management actions include active habitat restoration (cuttings/container planting and targeted invasive species removal within the riparian habitat) and cowbird trapping (2 traps for 2 months in 2012 and 2013). Regionally, this species has been designated by SDMMP as a "VF" species. VF species are those with limited distribution in the MSPA and/or have specific vegetation characteristics that need to be managed for persistence in the MSPA (SDMMP 2013). Therefore, by protecting and managing the vegetation community as a whole, this species is expected to remain in stable condition.

Long-Term Monitoring

Focused species surveys were conducted in suitable habitat on several preserves by CNLM between 2008 and 2014, as summarized below. Incidental observations made during other activities were also recorded. The purpose of the surveys is to periodically inspect suitable habitat, map occurrences, and identify threats to inform site-specific management. Figure 8 shows the locations of observations from focused surveys and incidental observations.

Estimated Number of Least Bell's Vireo Pairs

Preserve	2008	2009	2010	2011	2012	2013	2014
Buena Vista Creek Ecological Reserve	3 - 4 pair	3 pair 3 males	7 pair 3 males	3 pair[1] 2 males[1]	NS	NS	10 - 12 territorial males
Calavera Hills/Robertson Ranch East	1 pair[1] 1 male[1]	1 indv. [1]	NS	NS	NS	3 males[1]	2 males[1]
Encinas Creek	1 pair	1 pair 3 males	1 male	1 male	0	1 male	0
Rancho La Costa Preserve	NS	NS	NS	2 indv[1]	NS	NS	0[3]
City Preserves							
The Crossings Golf Course	NS	1 pair, 3 males	1 pair, 3 males	0	NS	1 male[2]	NS
Lake Calavera	NS	0	0	0	NS	0	1 male[1]
Poinsettia Park	NS	0	0	0	NS	0	NS
Lagoon Lane	NS	0	0	0	NS	NS	NS

NS = not surveyed
[1] incidental observation
[2] Migratory male
[3] Surveys consisted of one site visit only

Overall Condition and Major Threats

Since surveys began in 2008, the number of least Bell's vireo pairs and/or individual males on Buena Vista Creek Ecological Reserve, Calavera Hills/Robertson Ranch, Encinas Creek, and city-owned preserves has been somewhat variable. In Buena Vista Creek Ecological Reserve the number of territories, as indicated by pairs or territorial males, has varied from three to approximately twelve over the course of seven years. The number of potential territories on the other preserves has varied from zero to four.

Least Bell's vireo habitat is well -protected and appears to be in good condition on actively managed properties. Although no nest monitoring has occurred, this species appears to be breeding successfully in the preserve system.

Southwestern Willow Flycatcher

Empidonax traillii extimus
Status: federally endangered, state endangered

Critical Locations and Major Populations

There are no critical locations or major populations in the City of Carlsbad, according to the 1999 MHCP. USFWS proposed critical habitat is located along Agua Hedionda Creek, east of El Camino Real, and along the eastern portion of Agua Hedionda Lagoon, west of El Camino Real (Figure 7).

Management Actions Conducted to Protect the Species

Regionally, the southwestern willow flycatcher is considered to be a high priority for species-specific management (SDMMP 2013); however, regional management goals and objectives have not yet

been developed. Within Carlsbad, management consists of general stewardship of suitable habitat on actively managed preserves, including trash removal, access control, and invasive species removal.

Long-Term Monitoring

Focused species surveys for the southwestern willow flycatcher are generally conducted concurrently with least Bell's vireo surveys, as these species have similar habitat requirements (see the Table 2 for survey dates).

Overall Condition and Major Threats

A migratory southwest willow flycatcher was observed many years ago at The Crossings Golf Course (Cotton/Beland/Associates, Inc. 2000) and suitable habitat existing from near Cannon Road up to the old quarry area along Macario Creek and at Lake Calavera (Spiegelberg 2013). However, all available survey data indicate that the southwestern willow flycatcher does not currently nest in Carlsbad.

2.2.5 Upland Bird Species

Coastal California Gnatcatcher
Polioptila californica californica
Status: federally threatened

Critical Locations and Major Populations

No major or critical populations have been identified in the MHCP. However, the regional stepping-stone corridor that provides dispersal opportunities between south San Diego County and Camp Pendleton (and into Orange and Riverside Counties) runs through Carlsbad. In addition, several areas of USFWS Critical Habitat have been identified within the City (Figure 9).

Management Actions Conducted to Protect the Species

Regionally, this species has been designated by SDMMP as a "VF" species, which are species with limited distribution in the MSPA and/or have specific vegetation characteristics that need to be managed for persistence in the MSPA (SDMMP 2013). VF species are likely to remain in stable condition with appropriate management of the vegetation community. Management BMPs for coastal sage scrub vegetation will be developed by SDMMP in the future. In Carlsbad, this species is managed through general habitat stewardship, including invasive species removal, patrolling, fence and sign maintenance, erosion control, habitat evaluations, and monitoring.

Long-Term Monitoring

Regional Monitoring. Regional monitoring efforts to understand the species as a whole are being coordinated by the SDMMP. Regional survey protocols developed in 2008 (Winchell et al., 2008) are

currently being re-evaluated and revised. Regional monitoring, which may or may not include sampling points within Carlsbad, will be initiated in 2016. Other studies of interest include a genetic analysis to understand gene flow throughout the species' distribution (Vandergast et al. 2014), and a post-fire gnatcatcher habitat recovery study, which will be initiated in 2015 (K. Preston, pers. comm. 2015).

City-Wide Monitoring. The City initiated a coordinated long-term monitoring survey effort in 2010 to assess the current condition (abundance, status-pair or single, and distribution) of the gnatcatchers throughout the City's HMP preserve system. See the 2007 triennial report for more details (ESA 2007). Surveys will be conducted every three years and coordinated among preserve managers to ensure consistency. In addition to actively managed preserves, surveys are also conducted on selected preserves within privately owned open space lands in the vicinity of the Aviara Master Association. Note that not all areas of suitable habitat within the HMP boundary were included in the survey effort due to financial and staffing constraints.

The Crossings Preserve. In addition to the city-wide monitoring effort, results of monitoring within The Crossings Golf Course Preserve are highlighted below. Development of the municipal golf course in 2007 required mitigation of impacts to 12 acres of California gnatcatcher habitat through the creation, restoration, and preservation of 25 acres of new habitat. To provide flexibility for potential future mitigation needs, a total of 40 acres of mitigation was provided. The City is hoping to use the excess mitigation towards the gnatcatcher core area preservation obligation, as required by the HMP. Onsite gnatcatcher surveys during and after restoration have been conducted to document that the habitat is suitable for nesting gnatcatchers. Surveys were initiated in 2007 after initial habitat installation, and annual surveys were conducted throughout the restoration period, ending in 2011 (Dudek 2011). Surveys continued every three years as part of long-term management by CNLM.

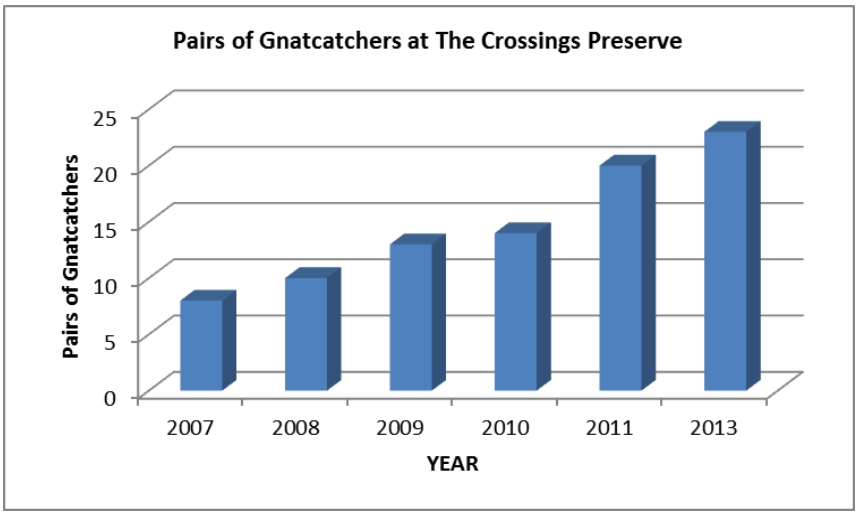
Overall Condition and Major Threats

City-Wide Monitoring. Approximately 1,500 acres of suitable habitat was surveyed in 2010 and 2013. A total of 122 pair and 33 single males (155 territories) were observed in 2013 in comparison to 85 pair and 42 males (127 total territories) observed in 2010. Observers concluded that nearly all males were single males. This is an increase of 28 territories despite little change in survey acreage (CNLM and ESA 2013). Areas with notable between-year differences include The Crossings Golf Course, which increased by 9 pair (14 to 23), Agua Hedionda Lagoon Ecological Reserve, which increased by 6 territories (4 to 10), Calavera Mountain, which increased by 5 territories (6 to 11) and Kelly Ranch, which decreased by 6 territories (8 to 2). The newly preserved La Costa Glen had 5 pair, which were observed using the preserve and adjacent slopes.

The 2010 and 2013 survey season results have provided a useful snapshot of gnatcatcher abundance, status and distribution in Carlsbad. Gnatcatchers are observed across the jurisdiction

and in all unit and vegetation patch sizes. Therefore, continued management of all unit and vegetation patch sizes is considered important for this species within the city. Small habitat patches will continue to play an important role in Carlsbad, especially during a catastrophic event, such as fire that burns some of the larger patches of coastal sage scrub (e.g., in La Costa Villages and Calavera), by serving as refugia. These small patches could be a source of CAGN recolonization after such an event occurs. In addition, the smaller patches are likely to be important "stepping stones" for gnatcatcher movement within and beyond the City.

The Crossings Preserve. In 2013, a total of 23 gnatcatcher pairs were observed within The Crossings Preserve foraging and nesting in mature coastal sage scrub creation/restoration areas. This greatly exceeds the total number of gnatcatchers observed prior to construction when a total of 17 observations were documented; it is unknown if these were pairs or unpaired individuals (Merkel and Assoc. 1998). This preserve has seen a steady increase in the number of pairs since habitat restoration was initiated, from 8 in 2007 to 10 in 2008, 13 in 2009, 14 in 2010, 20 in 2011, and 23 in 2013, as shown in the graph below.



Threats. There are currently no major threats to the coastal California gnatcatcher in the HMP preserve system other than wildfire. In May of 2014, occupied habitat supporting three documented gnatcatcher locations, based on 2013 gnatcatcher monitoring results, burned in the Poinsettia Fire. These locations were on the eastern and western borders of the Rancho La Costa Preserve, and on private HOA open space south of Poinsettia Lane.

Most of the suitable habitat in the City is under active management, or under a conservation easement or other type of open space protection. The open space on HOA lands that were surveyed in 2010 and 2013 appear to be well protected from unauthorized access and other edge effects, and the suitable gnatcatcher habitat was generally in moderate to excellent condition. Post-fire

monitoring will be conducted in burned areas to determine if management actions are necessary to recover the coastal sage scrub habitat lost in the Poinsettia Fire (approximately 27 acres).

2.2.6 Wildlife Movement

The MCHP was designed to "maintain connections between each of the major lagoon and estuary systems with larger blocks of inland habitats to allow movement for wildlife species" and allow for "demographic and genetic exchange by all species between preserve areas…to facilitate access by larger predators…between upland scrub and chaparral habitats and coastal habitats" (MHCP 2003). In order to evaluate the effectiveness of preserve design, the MHCP identifies several priority monitoring locations to establish where major constraints to mammal movement exist; some of these locations are within the HMP area. Tiering off the MHCP, a key objective of the HMP is to "maintain functional wildlife corridors and habitat linkages within the city and to the region," which is considered one of the HMP's primary contributions to regional biodiversity.

To evaluate the City's progress toward this objective, the City, in partnership with the preserve steward and CNLM, initiated a wildlife movement corridor assessment in June 2013. This assessment is being funded by a CDFW Natural Community Conservation Planning Local Assistance Grant. The purpose of the project is to:

1. Provide a baseline inventory of movement corridors and potential pinch points
    a. east to west, as described in the MHCP
    b. north to south between core areas
    c. among smaller fragments of habitat
2. Monitor selected locations to evaluate movement through potentially constrained areas
3. Provide recommendations for adaptive management

As of November 2014 (the end of the triennial report period), the initial linkage evaluation and pinch point inventory has been completed. This inventory provides information and photographs of 104 potential pinch points, including vegetation cover, length x width of culverts, level of traffic on adjacent roads, and type of substrate. Subsequent to the pinch point inventory, wildlife cameras were placed within 22 pinch point locations (generally underpasses, culverts, and bridges) for at least 3 months per location starting in January 2014, and ending in January 2015. Figure 10 shows the wildlife linkages that were assessed, potential pinch points that were evaluated, and locations of cameras. Once the study is finalized, a report will be prepared and submitted to CDFW. Results of this study will be included in the next triennial report.

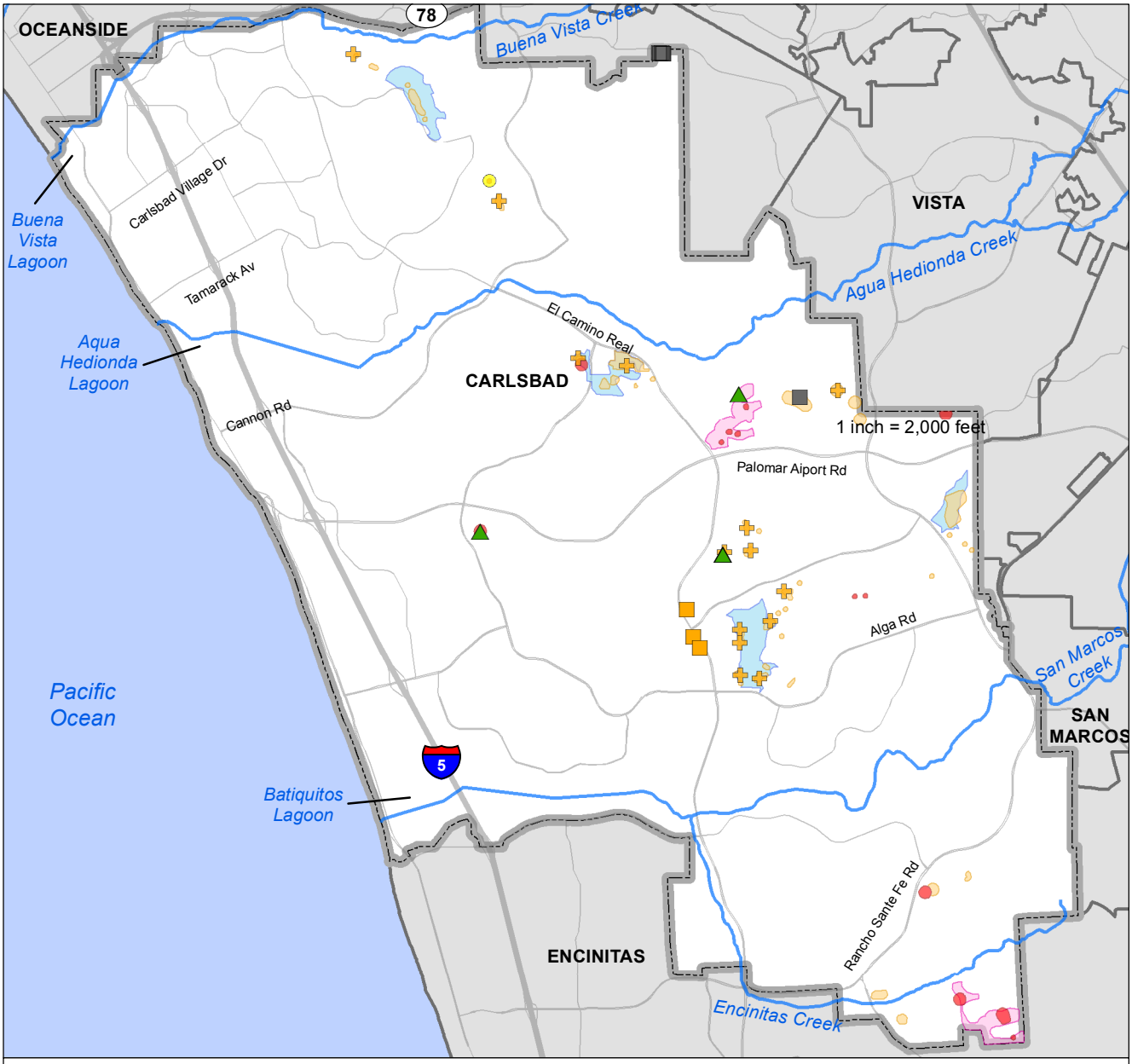


Figure Legend

CNLM Occurrence
- San Diego Thornmint
- thread-leaved brodiaea
- Del Mar sand aster

USFWS Occurrence
- San Diego thornmint
- thread-leaved brodiaea

USFWS Critical Habitat
- San Diego thornmint
- thread-leaved brodiaea

CNDDB Occurrence
- San Diego thornmint
- thread-leaved brodiaea

Basemap Legend
- Freeway
- Major Road
- River
- Carlsbad Boundary
- Municipal

0 8,500
Feet

SOURCE: CNDDB, USFWS, CNLM (Recent location 2012-2014)

Figure 4
City of Carlsbad
Current Status of Upland Herbs

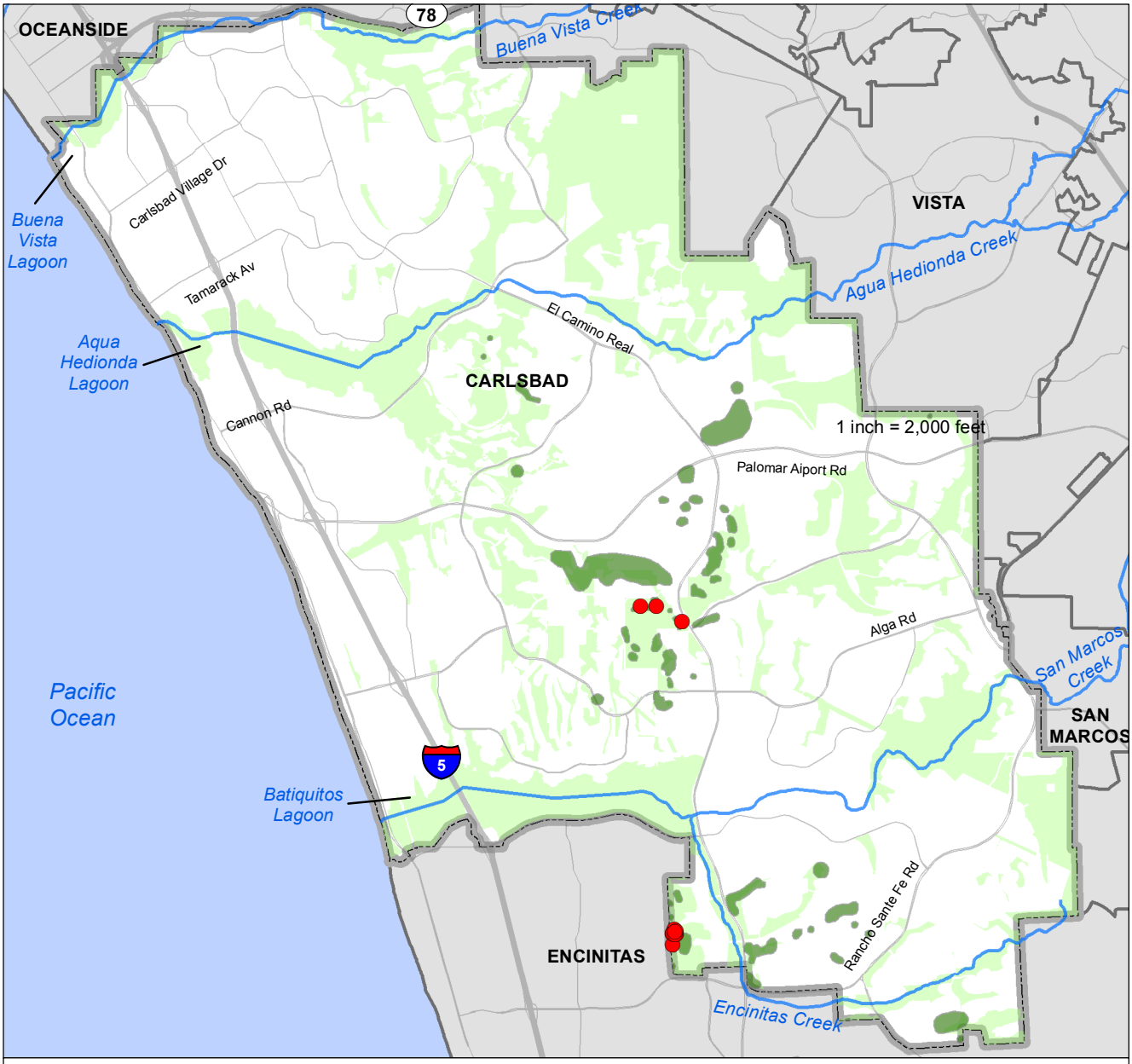


Figure Legend

CNLM Occurrence

- Del Mar manzanita

CNDDB Occurrence

- Del Mar manzanita

Basemap Legend

- Freeway
- Major Road
- River
- Carlsbad Boundary
- Municipal
- Hardlines/Softline Preserve

0 8,500

Feet

SOURCE: CNDDB, USFWS, CNLM (Recent location 2012-2014)

Carlsbad Preserve Annual Report . D211XXX

Figure 5

City of Carlsbad

Current Status of Upland Shrubs

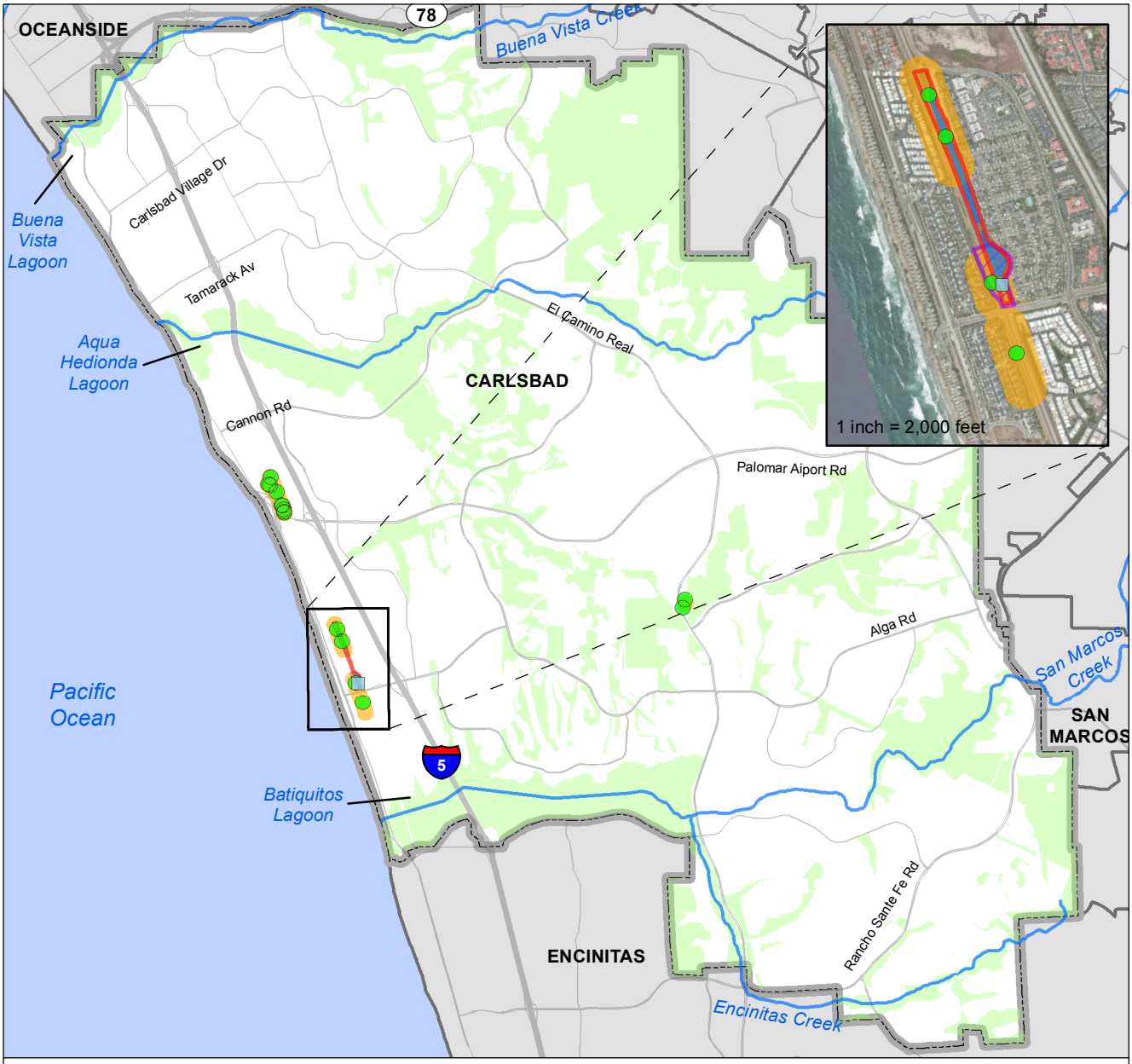


Figure Legend

USFWS Occurrence
- Riverside fairy shrimp
- San Diego fairy shrimp

USFWS Critical Habitat
- San Diego fairy shrimp
- Riverside fairy shrimp

CNDDB Occurrence
- Riverside fairy shrimp
- San Diego fairy shrimp

Basemap Legend
- Freeway
- Major Road
- River
- Carlsbad Boundary
- Municipal
- Hardlines/Softline Preserve

0 8,500
Feet

SOURCE: CNDDB, USFWS, CNLM (Recent location 2012-2014)

Figure 6
City of Carlsbad
Current Status of Vernal Pool Species

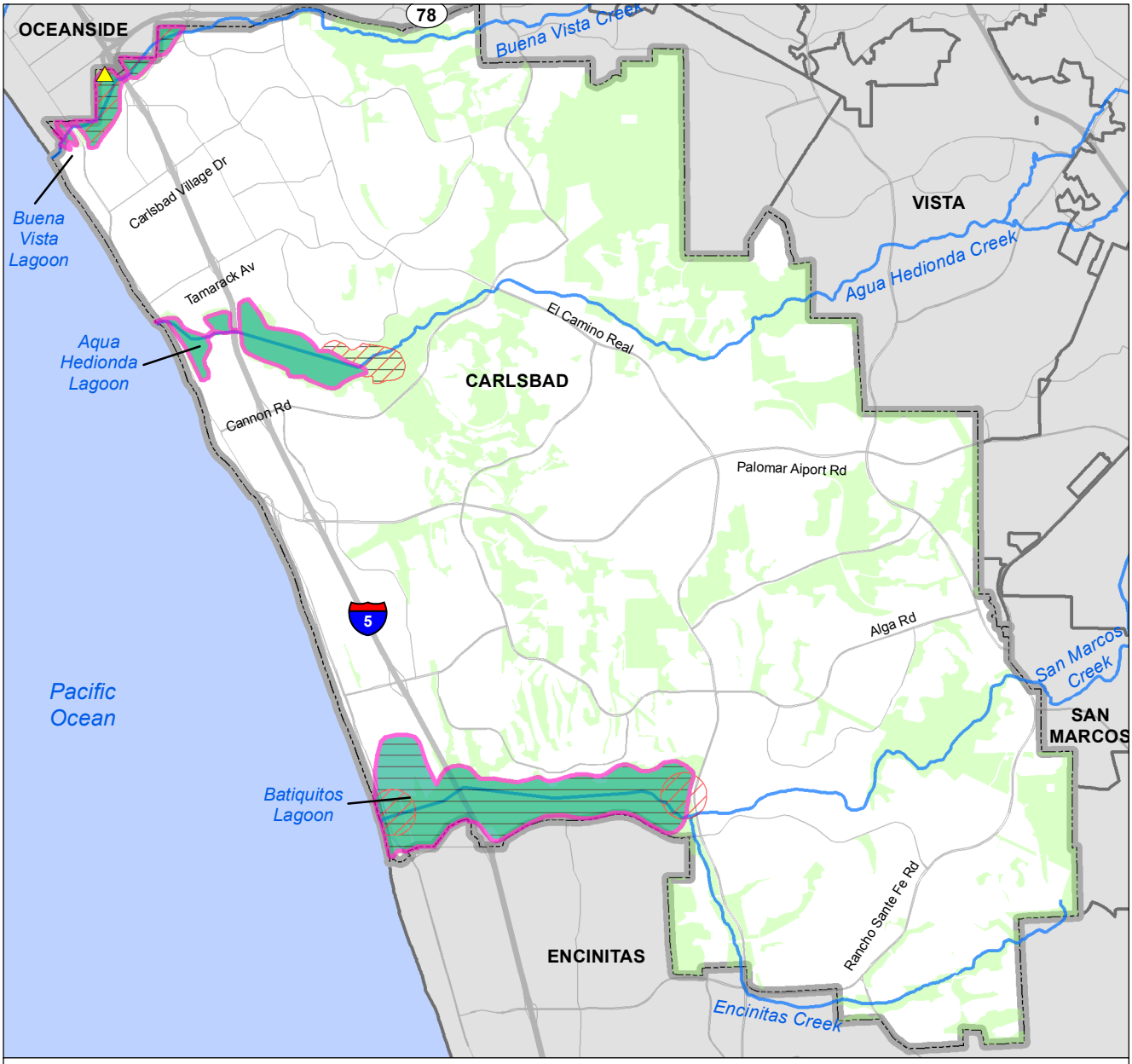


Figure Legend

USFWS Occurrence

- light-footed clapper rail

CNDDB Occurrence

- western snowy plover
- Belding's savannah sparrow
- California least tern
- light-footed clapper rail

Basemap Legend

- Freeway
- Major Road
- River
- Carlsbad Boundary
- Municipal
- Hardlines/Softline Preserve

0 8,500

Feet

SOURCE: CNDDB, USFWS, CNLM (Recent location 2012-2014)

Figure 7

City of Carlsbad

Current Status of Lagoon Species - Birds

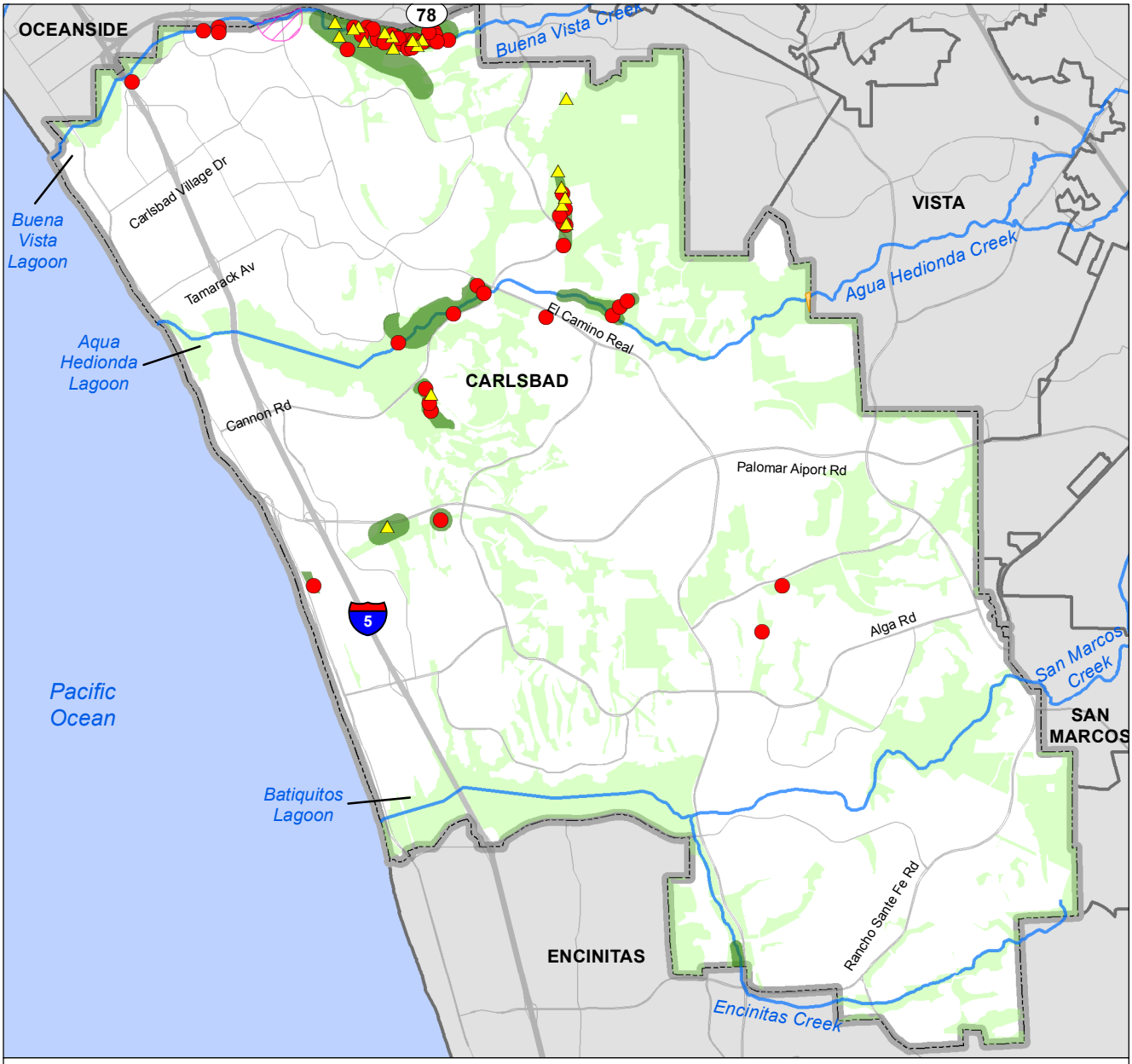


Figure Legend

CNLM Occurrence
- least Bell's vireo

USFWS Occurrence
- least Bell's vireo

USFWS Critical Habitat
- southwestern willow flycatcher

CNDDB Occurrence
- least Bell's vireo
- southwestern willow flycatcher

Basemap Legend
- Freeway
- Major Road
- River
- Carlsbad Boundary
- Municipal
- Hardlines/Softline Preserve

0 8,500
Feet

SOURCE: CNDDB, USFWS, CNLM (Recent location 2012-2014)

Figure 8
City of Carlsbad
Current Status of Riparian Birds

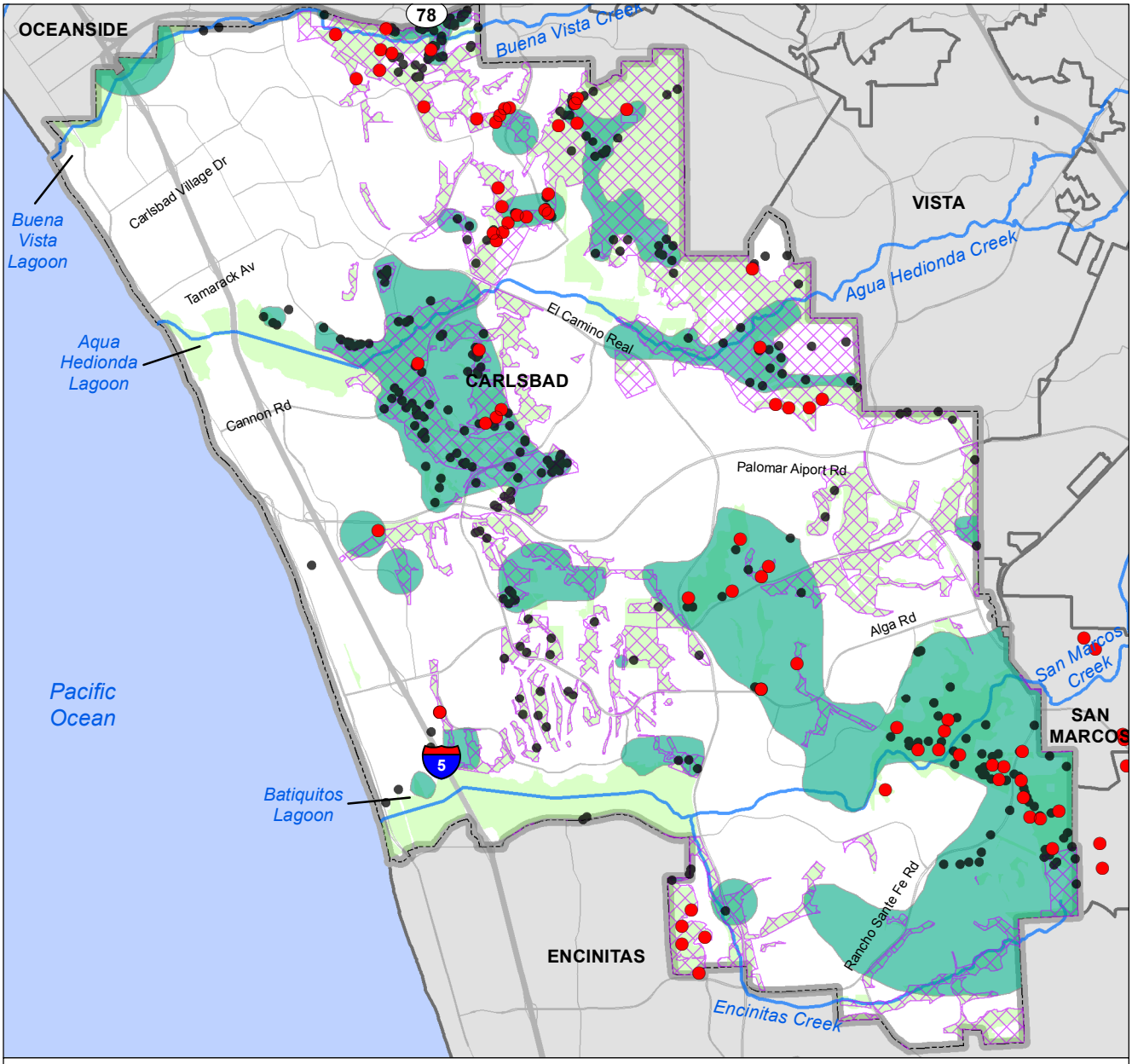


Figure Legend

CNLM Occurrence
- coastal California gnatcatcher

USFWS Occurrence
- coastal California gnatcatcher

USFWS Critical Habitat
- coastal California gnatcatcher

CNDDB Occurrence
- coastal California gnatcatcher

Basemap Legend
- Freeway
- Major Road
- River
- Carlsbad Boundary
- Municipal
- Hardlines/Softline Preserve

0 8,500
Feet

SOURCE: CNDDB, USFWS, CNLM (Recent location 2012-2014)

Figure 9
City of Carlsbad
Current Status of Coastal California Gnatcatcher

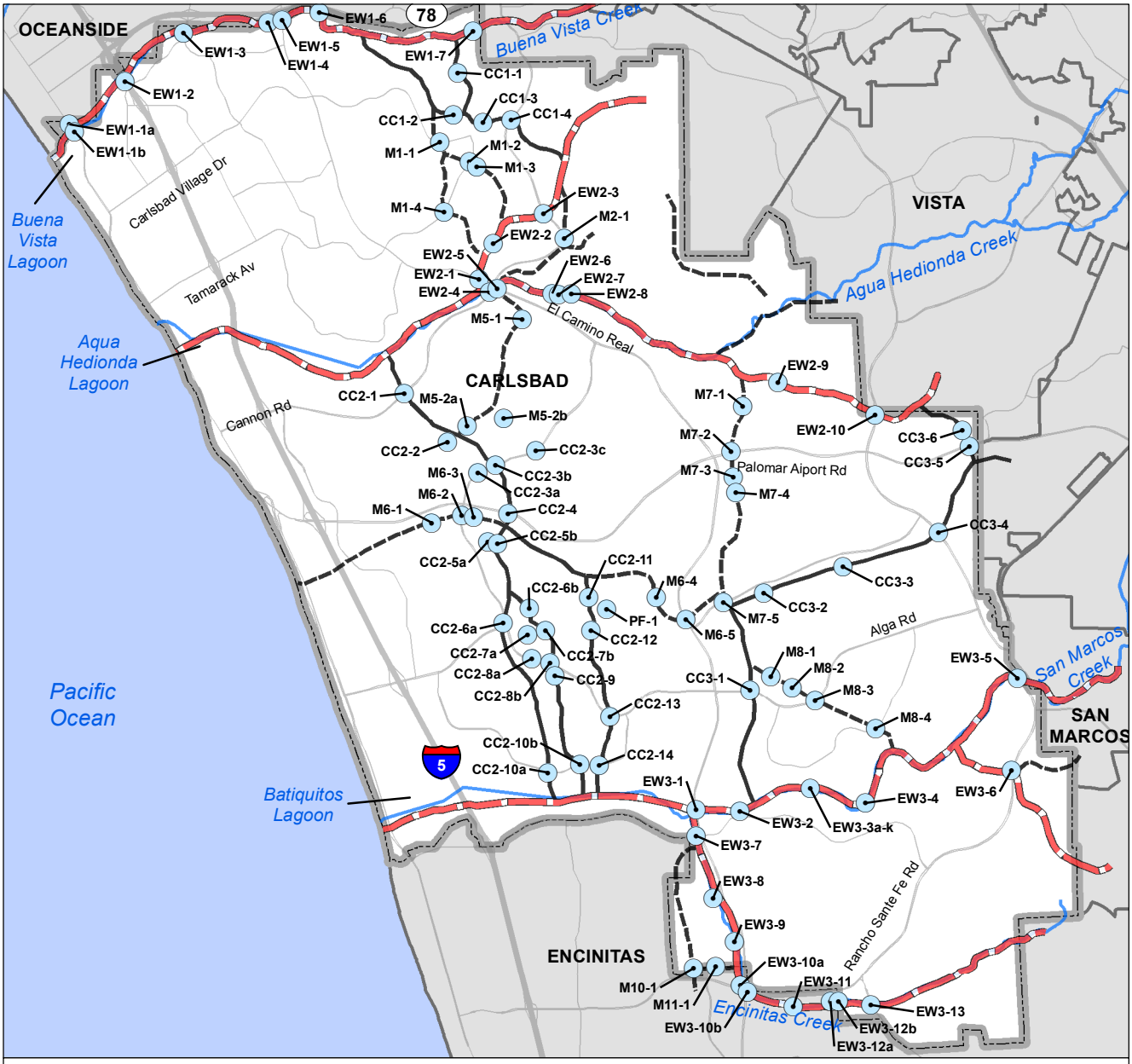


Figure Legend

- Pinch Point
- East-West
- Core to Core
- Minor

Basemap Legend

- Freeway
- Major Road
- River
- Carlsbad Boundary
- Municipal

SOURCE: CNDDB, USFWS, CNLM (Recent location 2012-2014)

Figure 10
City of Carlsbad
Wildlife Linkages

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