City of Carlsbad Habitat Management Plan
Annual Report

Reporting Year 15, November 2018–October 2019

February 2020

City of Carlsbad
Environmental Management
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Batiquitos Lagoon Foundation

Buena Vista Audubon

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Acronyms and Definitions

Annual Reports – Preserve-specific annual reports, which summarize management and monitoring activities, threats, and monitoring results, are due in November of every year. Pre-HMP preserves are generally not required to prepare annual reports unless stipulated in previously negotiated agreements with the city and/or Wildlife Agencies. HMP-wide annual reports (e.g., the current report) are due to the Wildlife Agencies in December of every year. HMP annual reports summarize gains and losses in the HMP preserve system, current status of individual preserves and species, management and monitoring activities, and a financial summary. Every third year, the HMP annual report includes an analysis of species monitoring data. The latest 3-year report was prepared as part of the 2016/2017 HMP annual report.

ASMD – Area Specific Management Directive.

BLF – Batiquitos Lagoon Foundation.

Caltrans – California Department of Transportation. Caltrans is responsible for design, construction, maintenance and operation of the California State Highway System and Interstate Highway segments within the state's boundaries.

City – City of Carlsbad.

CDFW – California Department of Fish and Wildlife (formerly CDFG – California Department of Fish and Game).

CNDDB – California Natural Diversity Database, operated and maintained by CDFW.

CNLM – Center for Natural Lands Management, a non-profit organization that provides management and biological monitoring of mitigation and conservation lands in perpetuity.

Compliance Monitoring – Monitoring to determine if the HMP is being properly implemented pursuant to the Implementing Agreement and state and federal take authorizations/permits.

Conservation Easement (as defined in California Civil Code Section 815.1) – Any limitation in a deed, will or other instrument in the form of an easement, restriction, covenant or condition, which is or has been executed by or on behalf of the owner of the land subject to such easement and is binding upon successive owners of such land, and the purpose of which is to retain land predominantly in its natural, scenic, historical, agricultural, forested or open-space condition.

Critical Location – An area that must be substantially conserved for a particular sensitive species to be adequately conserved by the MHCP. Critical locations often coincide with major populations of the same sensitive species, but not all major populations are considered critical.

Edge Effects – Impacts to natural open space resulting from adjacent, contrasting environments, such as developed or disturbed land. When an edge is created, the natural ecosystem is affected for some distance in from the edge.

Effectiveness Monitoring – Monitoring habitat and species to determine if the HMP is protecting sensitive biological resources as planned and if any adaptive management is needed.

EMP – SANDAG's TransNet Environmental Mitigation Program, a funding allocation category for the costs to mitigate habitat impacts for regional transportation projects. Funding grants from this program may be used for habitat acquisition, management, and monitoring activities as needed to help implement the MHCP.

ESA – Endangered Species Act.

Existing Hardline Preserve Areas – Natural habitat open space areas, such as Ecological Reserves and Dawson-Los Monos Reserve that were preserved prior to final approval of the HMP, or areas that were previously Proposed Hardline Areas or Standards Areas that have secured preservation, long-term management and monitoring, and a non-wasting endowment to fund activities in perpetuity.

FPA – Focused Planning Area.

GIS – Geographic Information System.

Gnatcatcher Core Area – An area identified in the MHCP that is considered critical to the recovery of the coastal California gnatcatcher. Approximately 500 acres of core habitat must be conserved by the MHCP jurisdictions as a condition of coverage for gnatcatcher. Although the core area is located outside of the City of Carlsbad, the city is responsible for 307.6 acres of conservation.

Habitrak – A GIS-based tool that was developed and is maintained by CDFW for habitat accounting. The tool calculates the acreage, type and location of vegetation communities that are gained (conserved), or lost (impacted) from the HMP planning area.

HCP – Habitat Conservation Plan, a planning document required as part of an application for an incidental take permit from the USFWS that describes the anticipated effects of the proposed taking, how those impacts will be minimized or mitigated, and how the HCP is to be funded.

HMP – Habitat Management Plan; serves as the MHCP Subarea Plan for the City of Carlsbad.

HMP Hardline– an HMP Hardline is a preserve that has been set aside for permanent conservation and is protected by a conservation easement, which runs permanently with the land. Hardline properties cannot be developed.

HOA – Home Owners' Association.

HRS – Habitat Restoration Sciences, Inc. A for-profit native habitat restoration and general engineering firm specializing in installation and long-term maintenance of natural areas.

Implementing Agreement – The legal agreement between the City of Carlsbad, CDFW, and USFWS that ensures implementation of the Carlsbad HMP binds each of the parties to perform the obligations, responsibilities and tasks assigned and provides remedies and recourse should any of the parties fail to perform.

IPM – Integrated Pest Management, a science-based, decision-making process that combines biological, physical and chemical tools in a way that achieves control objectives while minimizing economic, health, and environmental risk.

Landowner – The legal entity that owns the land in fee-title. The landowner has the ultimate responsibility to ensure that preserve management is secured prior to habitat impacts. Often, the management responsibility is contracted to a third party.

LFMZ – Local Facility Management Zone, one of 25 Growth Management Plan sub-areas the City of Carlsbad used for planning and financing infrastructure improvements and other city services and facilities concurrent with development.

Major Population – A population of sensitive species considered sufficiently large to be self-sustaining with a minimum of active or intensive management intervention (especially for plants) or that at least supports enough breeding individuals to contribute reliably to the overall meta-population stability of the species (especially for animals). Also includes smaller populations that are considered important to long-term species survival.

Management Unit – Groupings of adjacent or nearby preserve parcels that have similar management needs.

MHCP – Multiple Habitat Conservation Program, a subregional conservation plan prepared and administered by SANDAG that encompasses the cities of Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach and Vista. The goal of the MHCP is to conserve approximately 19,000 acres of habitat and contribute toward the regional habitat preserve system for the protection of more than 80 rare, threatened, or endangered species. The MHCP serves as an umbrella framework to guide the preparation of city-specific plans such as the Carlsbad Habitat Management Plan.

NCC – Natural Communities Coalition, a non-profit group in Orange County whose main purpose is to coordinate the land management, monitoring, and research across the approximately 38,000-acre Reserve System.

NCCP – Natural Community Conservation Planning, a program of CDFW that takes a broad-based ecosystem approach to planning for the protection and perpetuation of biological diversity throughout the state. The MHCP is a sub-regional component of the statewide NCCP.

Non-Wasting Endowment – An endowment with sufficient principal that provides for the setup costs and management/monitoring of a preserve in perpetuity through investment returns. The endowment is designed to increase in value over time for the generated revenues to

increase, and thus keep pace with inflation. Pre-HMP preserves generally did not require endowments to fund management, unless specified in a previously negotiated agreement with the city and/or Wildlife Agencies.

OSMP – Open Space Management Plan, which serves as the Preserve Management and Monitoring Plan referenced in Section 12.3 of the Implementing Agreement.

PAR – Property Analysis Record, a cost analysis that estimates the management and monitoring costs of a specific preserve in perpetuity, often in the form of an endowment to fund long-term management. A PAR is based on industry-accepted parameters, allows an objective cost/benefit analysis for each line item, and adjusts for inflation.

PMP – Area-specific preserve management plan, the permanent management plan developed for a particular preserve within the preserve system. The city has contracted CNLM to develop a master PMP for all city-owned preserves that addresses each preserve individually.

Preserve – Land conserved with a conservation easement, restrictive covenant, deed restriction, or transfer of fee-title to the city or CDFW that is being managed to HMP and MHCP standards. (Note: Lands already set aside for preservation through an open space easement prior to HMP adoption have limited management activities until a regional funding source is available).

Preserve Manager – The entity responsible for monitoring and managing the preserve. The majority of preserve lands are owned/managed by the city, CDFW, CNLM, or private HOAs. Pursuant to state due-diligence legislation that took effect January of 2007, preserve managers must be certified by either the city or CDFW before they can begin managing lands in the city.

Priority Species – Sensitive species that have site-specific permit conditions requiring populations to be tracked individually using GIS.

Proposed Hardline Preserve Areas – Areas identified in the HMP as natural habitat open space that were proposed for permanent conservation and perpetual management during the design phase of development projects but not completed prior to final approval of the HMP.

RY – Reporting Year, or from November 1 to October 31.

Rough Step Assembly – A policy that requires development (losses) occur in "rough step" with land conservation (gains) during preserve assembly to ensure that development does not greatly outpace land conservation. It is generally understood by the Wildlife Agencies that losses should be no more than 10 percent greater than gains.

SANDAG – San Diego Association of Governments. SANDAG is the San Diego region's primary public planning, transportation, transit construction and research agency, providing the public forum for regional policy decisions about growth, transportation planning and transit construction, environmental management, housing, open space, energy, public safety and binational topics.

SDG&E – San Diego Gas and Electric.

SDHC – San Diego Habitat Conservancy, a non-profit organization that provides management and biological monitoring of mitigation and conservation lands in perpetuity. Prior to February of 2009, SDHC was called Helix Community Conservancy.

SDMMP – San Diego Management and Monitoring Program, a science-based program that provides a coordinated approach to management and biological monitoring of lands in San Diego that have been conserved through various programs, including the Multiple Species Conservation Program, the MHCP, the TransNet Environmental Mitigation Program, and various other conservation and mitigation efforts.

Standards Areas – Areas that were included in the MHCP Focused Planning Area (i.e., considered high priority for inclusion into the preserve system), but for which projects had not been proposed prior to the city's HMP approval. Because potential protected habitat areas had not been delineated, a set of zone-specific conservation standards were established as a condition of future project approval.

T&C – Terms and Conditions.

Take – As defined in the Federal Endangered Species Act; to harm, harass, pursue, hunt, shoot, wound, kill, trap, capture, or collect a listed species or attempt to do so, including impacts to the habitats upon which these listed species depend.

TET – The Environmental Trust. TET was a habitat management company that owned and managed several preserves in Carlsbad until declaring bankruptcy in 2005. Their properties were unmanaged until CDFW acquired title and management responsibility in early 2010.

TransNet – The San Diego County half-cent sales tax for transportation improvements first approved by voters in 1988 and extended in 2004. The EMP is a component of TransNet that funds habitat-related environmental mitigation activities required to implement projects identified in SANDAG's Regional Transportation Plan, including a funding allocation for habitat acquisition, management, and monitoring activities as needed to help implement the Multiple Species Conservation Program and the MHCP.

UC – Urban Corps Habitat Services, a non-profit organization that provides management and biological monitoring of mitigation and conservation lands in perpetuity.

USACE – U.S. Army Corps of Engineers.

USFWS – U.S. Fish and Wildlife Service.

Wildlife Agencies – Term used collectively for CDFW and USFWS.

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Executive Summary

This is the fifteenth annual Habitat Management Plan (HMP) summary report, covering the period of November 1, 2018 to October 31, 2019. This report summarizes the preserve status, implementation activities, and preserve gains and losses that have occurred during the current reporting period. Highlights of the HMP activities are summarized below.

Current Status of Preserves

The existing preserves continued to be managed, monitored, and/or maintained during the reporting period. Established private and city-owned Hardline Preserves were managed and monitored in accordance with their approved preserve management plans; California Department of Fish and Wildlife (CDFW) preserves were managed subject to available funding and resources; and pre-existing natural open space areas were maintained according to their respective Open Space Easements and/or Covenants, Conditions, and Restrictions, if applicable. Descriptions of the different categories of preserves are contained in Section 1.3.

Lake Calavera Mitigation Parcel

During the reporting period, there were no debits from the mitigation parcel. To date, cumulative debits and adjustments for wetland mitigation sites are 94.9 acres, leaving a total of 111.2 acres (credits) remaining.

Gnatcatcher Core Area Conservation Obligation

The city has conserved 294.67 acres of the 307.60-acre Gnatcatcher Core Area conservation requirement and continued to explore opportunities to conserve the remaining 12.93 acres during the reporting period.

Land Acquisitions

On Jan. 8, 2019, the city took ownership of the 61-acre Calavera Hills Village H property, which consists of 46.0 acres of existing HMP Hardline, 12.6 acres of undeveloped open space, and 2.3 acres used for RV Storage. The property is located at Victoria Lane on both sides of Carlsbad Village Drive. No new HMP hardline acreage was added to the preserve system; however, long-term management was added to the two previously unmanaged parcels south of Carlsbad Village Drive (5.4 acres and 4.4 acres).

Habitat Gains and Losses

A total of 4.29 acres of habitat was gained and 2.25 acres were lost (impacted). A gain of 1.99-acres at Poinsettia Station Vernal Pool Preserve was related to a corrected preserve boundary. The remaining gains and losses were associated with project-related HMP compliance.

Regulatory Compliance

Minor amendments: During the reporting period, a minor amendment was processed for the Snyder Residence Project through a Consistency Finding, and minor amendments were processed for the El Fuerte View Subdivision and the West Oaks Project through Equivalency Findings. **Take Authorization**: A detailed description of the city's compliance with the terms and conditions of the Implementing Agreement, NCCP take authorization/permit, federal Endangered Species Act Section 10(a)(1)(B) take authorization/permit, and HMP zone-specific standards is given in Appendix A.

Preserve Management and Monitoring

Ongoing management and monitoring activities in HMP preserves conducted this year included invasive species monitoring and control, installation and maintenance of fences and signage, rare plant counts and habitat assessments, vegetation mapping, sensitive bird species surveys, wildlife movement monitoring, post-fire habitat assessment, and public outreach activities, which are summarized in Appendix B. Specific projects implemented by the city and its partners during the reporting period include (1) several studies on the Village H property to better understand current land use and wildlife movement, including wildlife cameras, dog waste and roadkill; (2) initiation of the Ward's Weed Eradication Program as part of the city's Early Detection and Rapid Response strategy; (3) establishment of a long-term management endowment, baseline biological surveys, and intensive weed management at the Poinsettia Station Vernal Pool Preserve; and (4) completed the post-fire habitat

Financial Summary

Habitat Mitigation Fee Program. A total of $25,387 of in-lieu mitigation fees was collected, and there were no expenditures during the reporting period. As of October 31, 2019, the account had a balance of -$169,900, which reflects previous advances from the General Fund. The advance will be reimbursed with future Habitat Mitigation Fee Fund revenues.

Preserve Management Endowments. During the reporting period, a total of $777,599 was spent by the land managers on management and monitoring activities on 24 preserves and endowments for these properties (not including most lands owned by the city) totaled $15,813,003.

1.0 Plan Administration

1.1 Introduction

The Habitat Management Plan (HMP) is a citywide plan that describes how the city will comply with state and federal environmental laws while remaining consistent with the city's General Plan and Growth Management Plan. The HMP was developed in coordination with the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife (collectively, the Wildlife Agencies) as part of a regional planning effort under the North County Multiple Habitat Conservation Program (MHCP).

The purpose of this document is to report the status and activities of the HMP program during the current reporting period (November 1, 2018–October 31, 2019). Annual tracking and reporting of habitat gains, losses, management, and monitoring is required by Sections 12.1 and 12.2 of the Implementing Agreement (Nov. 12, 2004); the Federal Fish and Wildlife 10(a)(1)(B) Permit No. TE022606-0 (Nov. 12, 2004); and the NCCP Permit No. 2835-2004-001-05 (Nov. 15, 2004). This annual report covers year 15 of the 50-year HMP permit period.

1.2 HMP Compliance Monitoring and Effectiveness Monitoring

1.2.1 HMP Conservation Goals

To evaluate the city's compliance with the HMP and the effectiveness of the MHCP/HMP program with respect to natural resources protection, it is necessary to understand the underlying goals of the plan, which are summarized below (see HMP p. A-2 for a complete list):

- Conserve the full range of vegetation community types, with a focus on sensitive habitat types.
- Conserve populations of narrow endemic species and other covered species.
- Conserve sufficient habitat, functional biological cores, wildlife movement corridors, and habitat linkages, including linkages that connect coastal California gnatcatcher (*Polioptila californica californica*) populations and movement corridors for large mammals, to support covered species in perpetuity.
- Apply a "no net loss" policy to wetlands, riparian habitats, and oak woodlands.
- Implement appropriate land use measures to ensure the protection of preserve lands in perpetuity.
- Meet conservation goals stated above while accommodating orderly growth and development in the city.

- Coordinate and monitor protection and management of conserved lands within the preserve system.
- Minimize costs of ESA-related mitigation and HMP implementation.

1.2.2 Compliance Monitoring

Compliance monitoring is required by the HMP-related permits and Implementing Agreement to ensure that the city doing what it agreed to do from a regulatory perspective, such as conserving particular species locations and acres of habitat, monitoring the condition of the habitat and species, and performing required management actions (MHCP Vol. I). The preserve steward assists the city by working with the preserve managers to ensure coordinated management across the city. Habitat tracking results are provided in Section 1.4; regulatory compliance is discussed in Section 1.5 and Appendix A; and management and monitoring activities are summarized in Section 2.0 and Appendix B.

1.2.3 Effectiveness Monitoring

Effectiveness monitoring, also known as biological, ecological, or validation monitoring, determines the effectiveness of the conservation program by evaluating if the preserve assembly and management actions are achieving the HMP/MHCP goals within the city and across the MHCP planning area. The preserve-level monitoring program is used to evaluate the effectiveness of management at specific preserve areas (MHCP Vol. III). At the subregional (MHCP-wide) level, effectiveness monitoring evaluates the status and trends in populations of covered species, and assessing how well the conservation strategy is working to maintain natural ecological processes (MHCP Vol. III).

Monitoring the effectiveness of the MHCP and HMP is more challenging than compliance monitoring because the biological goals are broad and it may take many years or decades before trends in species populations and habitat conditions are detectable. Species and habitat monitoring, and monitoring to evaluate the effectiveness of management are being conducted on individual preserves as well as the regional landscape level. This work is being done through a partnership with the city, preserve steward, preserve managers, Wildlife Agencies and San Diego Management and Monitoring Program, which has developed regional and site specific monitoring and management strategic plans and protocols for conserved lands across San Diego County.

1.3 Current Status of Preserves

This section contains: (1) a description of the different categories of preserves within the HMP preserve system, (2) an accounting of the mitigation credits at the city's Lake Calavera Mitigation Parcel, (3) the status of the city's Gnatcatcher Core Area conservation obligation, and (4) the status of the HMP Mitigation Fee Fund.

1.3.1 Categories of HMP Preserves

Lands within the HMP preserve system can be grouped into four categories: (1) established private and city-owned Hardline Preserves; (2) CDFW Ecological Reserves; (3) pre-existing natural open space preserves; and (4) future preserves (Proposed Hardline Preserves and Standards Areas). These categories of preserve lands are distinguished by the level of management, ownership, and/or status as described below and shown in Figure 1.

Established Private and City-Owned Hardline Preserves

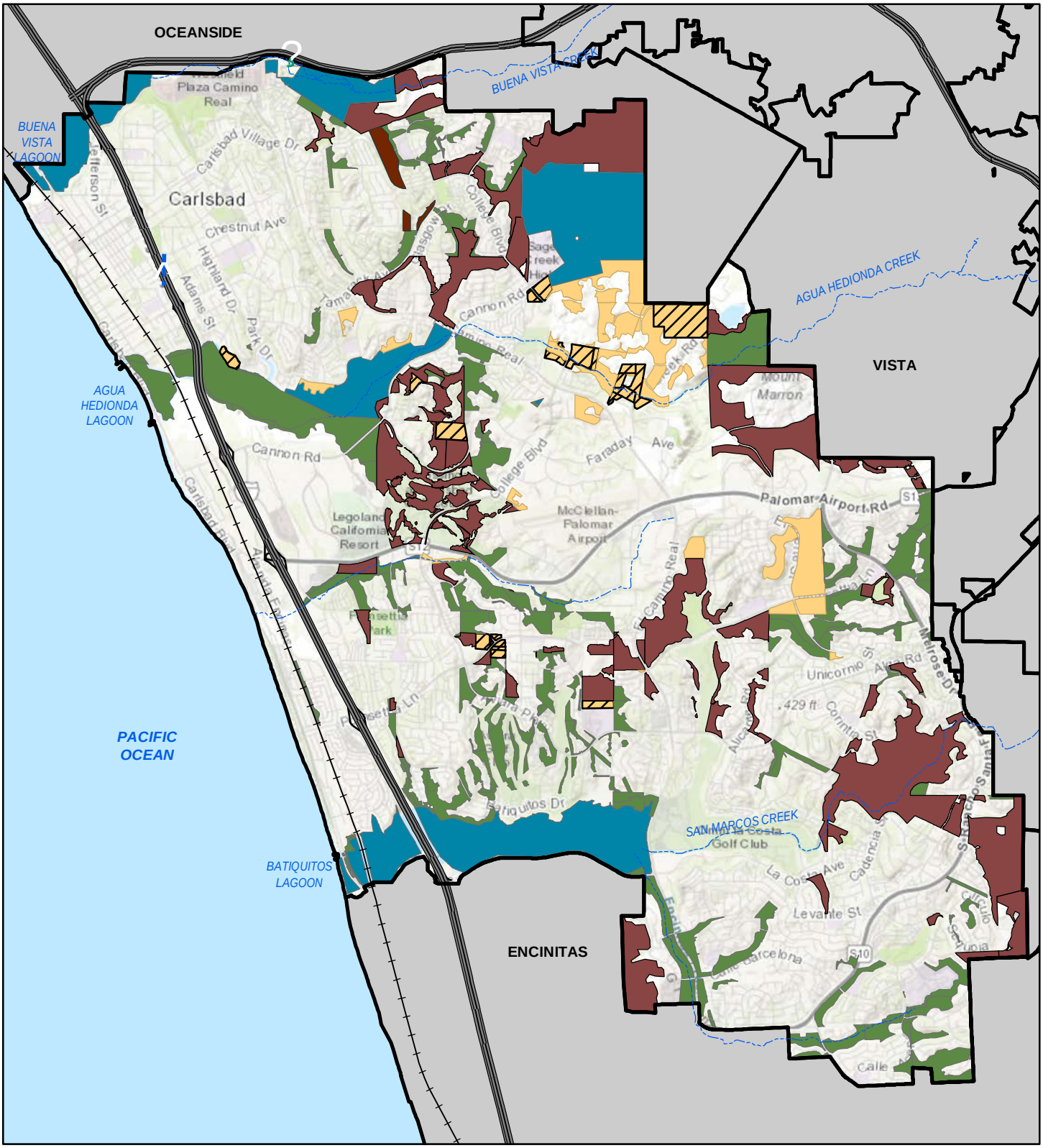
These Hardline Preserves were established during or after the adoption of the HMP. They have approved preserve management plans implemented by preserve managers and are funded through non-wasting endowments or, in the case of the city-owned preserves, through annual budget appropriations. The city requires site specific annual reports for these preserves. The underlying property owners for these preserves are a preserve management entity, home owners' association (HOA), or the city. Except for the city-owned properties, these Hardline Preserves are protected by recorded conservation easements. Examples of these preserves include Rancho La Costa, Carlsbad Oaks North, Lake Calavera and the Crossings Golf Course, among others.

California Department of Fish and Wildlife Ecological Reserves

These Hardline Preserves were established prior to or subsequent to the adoption of the HMP and are all owned by the State of California. According to the HMP Implementing Agreement, the level of management and monitoring of the CDFW preserves is based upon the available state funding and resources. Except for the Buena Vista Creek Ecological Reserve, there are currently no finalized long-term management plans for the CDFW Ecological Reserves in Carlsbad. Management is guided by draft plans, which have not been submitted to the city. CDFW obtains State Wildlife Grant funding annually for management and monitoring activities on CDFW's preserves. Management accounts have been established for Carlsbad Highlands Ecological Reserve and Agua Hedionda Lagoon Ecological Reserve. The Batiquitos Lagoon Ecological Reserve is managed and monitored by CDFW and funded through a mitigation account established by the Port of Los Angeles and held by CDFW. The Buena Vista Creek Ecological Reserve is managed by Center for Natural Lands Management (CNLM), a non-profit land management entity, through a contract and funded by a non-wasting endowment held by CNLM. The city receives some CDFW monitoring data for the lagoon preserves and a CNLM-prepared annual report for the Buena Vista Creek Ecological Reserve.

Pre-Existing Natural Open Space Preserves

These Hardline Preserves predate the HMP and are composed of natural open space areas within subdivisions or master plan communities (owned by the respective HOA), the University of California's Dawson-Los Monos Reserve, and areas owned by Cabrillo Power, San Diego Gas and



Legend

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

N

0 Feet 6,400

City of Carlsbad

City of Carlsbad
Categories of HMP Preserves

Figure 1

Document Path: C:\Users\rhumph\Documents\ArcGIS\Packages\Figure1_CategoriesHMPPreserves_Jan2020_BA2F5C46-8FE0-489A-9ED2-BAE73A476CA3\v105\Figure1_CategoriesHMPPreserves_Jan2020.mxd

Date: 2/1/2020

Electric (SDG&E), and the San Dieguito Union High School District. The lands were included in the HMP because of their biological resources and ecological value. There are no preserve management plans or active management and monitoring associated with these preserves, and maintenance of the property is the responsibility of the property owner. Generally, management consists of trash pickup and fence maintenance. The HMP envisioned that future management and monitoring of these lands would be financed through a regional funding source. The preserves owned by HOAs are protected by an Open Space Easement. The Dawson-Los Monos Reserve is owned by the Regents of University of California and has no open space or conservation easement protection. Examples of the HOA-owned preserves include Calavera Hills Phase I, Aviara, and Arroyo La Costa.

Future Preserves (Proposed Hardline Preserves and Standards Areas)

These preserves are identified in the HMP and are associated with developable lands but have yet to begin management and monitoring. As a condition of approval for any development on the property, the developer is obligated to establish the preserve by preparing a preserve management plan approved by the city and Wildlife Agencies, contracting with a qualified land manager, funding a non-wasting endowment or other secure financing mechanism, and recording a conservation easement. An Equivalency Finding, approved by the city and Wildlife Agencies, is required for any alterations to the Proposed Hardline Preserve boundary, and the final preserve design for Standards Areas must be approved by the city and Wildlife Agencies through a Consistency Finding. Examples of these future preserves include Mandana and Kato.

1.3.2 Lake Calavera Mitigation Parcel

The city-owned Lake Calavera Mitigation Parcel, also known as the Lake Calavera Preserve, provides mitigation as needed for upland habitat impacts related to city construction projects. Credits are deducted on an acre-for-acre basis, regardless of the type of habitat being impacted, except for impacts to gnatcatcher-occupied coastal sage scrub, southern maritime chaparral, and maritime succulent scrub. No credits can be sold to outside entities.

The HMP (Section D.3.B) states that there are 266.1 available acres on Lake Calavera Preserve and the Implementing Agreement (Section 10.7) states that there are 206.1 acres. The Wildlife Agencies and city have agreed to use the more conservative 206.1 acres stated in the Implementing Agreement for tracking purposes.

In addition to the use of the Lake Calavera Mitigation Parcel for upland mitigation credits, the city also uses the property for wetland mitigation through active habitat creation, restoration, and/or enhancement of disturbed areas within the preserve, in coordination with the Wildlife Agencies and wetland permitting agencies. Once an area has been mapped and identified as mitigation for a city project, it is no longer eligible for future mitigation credits, and the acreage of the mitigation

site is debited from the available balance. During the reporting period, there were no debits. Cumulative upland debits and adjustments for wetland mitigation sites to date are 94.9 acres, leaving a total of 111.2 acres (credits) remaining (see Table 1).

Table 1. Mitigation Acreage at Lake Calavera Mitigation Parcel RY 15 (2018–2019)

Credits and Debits	Acres[1]
Initial Credits	**206.1**
Total acres available as of November 1, 2018	111.2
Year 15 Deductions (Nov. 2018–Oct. 2019)	0.0
Total acres available as of October 31, 2019	**111.2**

[1] Rounded to the nearest tenth of an acre.

1.3.3 Gnatcatcher Core Area Preservation Obligation Acreage

When the HMP was being developed, the Wildlife Agencies determined there was not enough coastal sage scrub habitat in the city to conserve the coastal California gnatcatcher. Because of this limitation, the city was required to preserve an additional 307.6 acres of coastal sage scrub in the Gnatcatcher Core Area, a large block of high quality habitat southeast of the city, which is regionally important for the long-term survival of the species.

To date, the city has conserved 294.7 acres of the 307.6-acre Gnatcatcher Core Area conservation requirement. No Core Area credits were acquired during the reporting period. The city continues to explore opportunities to conserve the remaining 12.9 acres. Table 2 shows the status of Core Area conservation credits.

Table 2. Status of Carlsbad HMP Gnatcatcher Core Area Obligation through RY 15 (2018–2019)

Core Area Components	Acres
Total Core Area Conservation Requirement	**307.6**
Core Area Credits Acquired as of November 1, 2018	294.7
Core Area Credits Acquired in RY 15 (2018-2019)	0.0
Remaining Core Area Conservation Requirement	**12.9**

1.3.4 Habitat Mitigation Fee Program

The purchase of Gnatcatcher Core Area credits is funded through the Habitat Mitigation Fee Program (called the *In-lieu* Mitigation Fee Program in the HMP). Project impacts to certain upland habitat types require a mitigated fee, which is deposited into the Habitat Mitigation Fee Fund.

These funds can only be used to offset the cost of Gnatcatcher Core Area conservation. A total of $26,559.83 of in-lieu mitigation fees was collected during the reporting period, and nothing was expended during the reporting period. A detailed accounting of the in-lieu mitigation fees and expenditures is given in Section 3.1.2.

1.4 Habitat Gains and Losses

Pursuant to the HMP and Implementing Agreement, the city is required to provide an annual accounting of the amounts and locations of habitat lost and conserved over time due to public and private development projects and land acquisition. This information will be used to demonstrate to the Wildlife Agencies that: (1) the HMP preserve is being assembled as anticipated; (2) the habitat conservation goals of the HMP are being achieved; and (3) habitat conserved is in rough step with development. HabiTrak is a GIS database tool that was designed to satisfy these tracking and reporting requirements by providing standard tracking protocols and reporting output. It uses standard baseline spatial databases (e.g., vegetation, preserve boundaries, and parcel boundaries) and development project footprints to prepare standardized tables and maps for annual reporting.

1.4.1 Target Acreage

Some of the habitat types used in the standard HabiTrak table outputs are more specific than those used in HMP Table 8. To make it easier to compare the Habitrak tables with the HMP table for compliance monitoring, Table 3 below lists acres of target conservation and compares habitat categories in HMP Table 8 to categories used in HabiTrak. Note that the GIS data layers used for this analysis included the more detailed habitat categories.

Table 3. HMP Target Conservation of Habitats
(Comparison of Habitat Categories in HMP and Habitrak)

HMP Table 8		Habitrak	
Habitat Type	**Target Acres[1]**	**Habitat type**	**Target Acres[1]**
Coastal sage scrub	2,139	Maritime succulent scrub	29
		Coastal sage scrub	2,003
		Coastal sage-chaparral scrub	107
		Subtotal	*2,139*
Chaparral	676	Chaparral	676
Southern maritime chaparral	342	Southern maritime chaparral	342
Oak woodland	24	Coast live oak	20
		Other oak woodland	4
		Subtotal	*24*
Riparian	494	Riparian forest	82
		Riparian woodland	17
		Riparian scrub	395
		Subtotal	*494*

Marsh	1,252	Southern coastal salt marsh Alkali marsh Freshwater marsh Freshwater Estuarine Disturbed wetland *Subtotal*	143 9 165 53 789 93 *1,252*
Grassland	707	Grassland	707
Eucalyptus woodland	99	Eucalyptus woodland	99
Disturbed lands	745	Agriculture Disturbed Land Developed *Subtotal*	185 244 316 *745*
Total Target Conservation within Carlsbad	**6,478[2]**	**Total Target Conservation within Carlsbad**	**6,478[2]**
Carlsbad's Gnatcatcher Core Area Contribution	308	Not tracked in Habitrak	N/A
Total HMP Target Conservation	**6,786[2]**		

[1] Rounded to the nearest acre.

[2] Note that the target acreage includes 100 percent of all Standards Area parcels. However, a portion of these parcels are expected to be developed; therefore, the final total will be slightly less than the target value.

1.4.2 Land Acquisitions

Calavera Hills Village H Property

On Jan. 8, 2019, the city took ownership of the 61-acre Calavera Hills Village H property as part of a lawsuit settlement involving the Quarry Creek development project. This property consists of 46.0 acres of HMP Hardline, 12.6 acres of undeveloped open space, and 2.3 acres used for RV Storage. The property is located at Victoria Lane on both sides of Carlsbad Village Drive.

The 36.1-acre HMP Hardline parcel north of Carlsbad Village Drive is currently under long-term management by CNLM as part of the Calavera Hills/Robertson Ranch Preserve, which is funded by a pre-existing endowment; the two smaller parcels south of Carlsbad Village Drive (5.4 acres and 4.4 acres) are pre-existing HMP Hardline areas not previously funded for long-term management; and the 12.6-acre undeveloped open space parcel is located between the northern and southern HMP Hardline areas.

Since the city has taken ownership of the property, the historic trail has been formalized, cleaned up, brought up to city standards, and officially opened; CNLM has begun long-term management of the southern HMP Hardline parcels; and HMP Division staff and volunteers have installed numerous wildlife movement cameras, and conducted dog waste and roadkill studies to inform decisions about future uses of the property (See Section 2.1.2 for more information). The RV storage area on the southern end of the property will remain the same.

Prior to city ownership, the southern area was privately owned, signed and fenced; however, community members accessed this area for many years and used it for socializing and off-leash dog use. After the city accepted ownership of the property, city staff conducted extensive public outreach to evaluate the future land use on the property. The top five desired uses expressed by residents were: to experience and enjoy nature, protect wildlife, socialize, enjoy the area with their dog on leash, and enjoy the area with their dog off leash. After an evaluation of input from the public, constraints and opportunities presented by staff, City Council directed staff to incorporate an off-leash dog area on the property, while protecting the wildlife movement corridor and maintaining the leash-only trail (as required by city ordinances). More information is available on the city's website.

Other Land Acquisitions

The city's Open Space Acquisition Committee was formed in 2005 to establish priorities for open space property acquisition and trail linkage projects and make recommendations to the City Council about potential candidate acquisitions. The committee, which meets quarterly, is actively seeking potential properties with willing sellers. When found, properties are researched and ranked according to the established ranking system. If the property ranks high enough, staff requests authorization from City Council to pursue negotiations. Some of the characteristics that rank high include presence of sensitive native species or habitats, opportunity for wildlife movement, and opportunity for connectivity of habitat or trails. During the reporting period, approximately 7 properties were evaluated, and no properties were acquired.

1.4.3 Habitat Gains and Losses

During RY 15 (2018–2019) a total of 4.29 acres of habitat was gained (permanently protected and added to HMP preserve system) and 2.25 acres was lost (impacted). Some of the gains and losses were associated with project-related HMP compliance. The 1.99-acre gain at Poinsettia Station Vernal Pool Preserve was related to a corrected preserve boundary (see Section 2.4 for more details). Except for preserves established before adoption of the HMP, new preserves must have an established endowment to fund long-term management, conservation easement, preserve management plan and agreement with a qualified long-term manager prior to being counted as a "gain." Since adoption of the HMP, 6,189 acres have been gained and 1,760 acres have been lost. Figure 2 shows the status of the preserve system.

Table 4. Summary of Habitat Gains and Losses During RY 15 (2018-2019) by Project

Project or Preserve Name	Date	Gain (Acres)	Loss (Acres)
El Fuerte View Subdivision	9/20/19	1.88	1.60
Snyder Residence	9/20/19	0.42	0.65
Poinsettia Station Vernal Pool Preserve	9/24/19	1.99	0.00
Total Gains and Losses during RY 15		**4.29**	**2.25**

1.5 Regulatory Compliance

To ensure regulatory compliance, the city is implementing the HMP: (1) through the project review process for new development projects; (2) by issuing HMP permits when impacts to habitat or covered species are involved; (3) by issuing incidental take permits when take of a listed species is involved; and (4) by ensuring consistency with the terms and conditions of the Implementing Agreement, and State NCCP and Federal Fish and Wildlife permits.

1.5.1 HMP Amendments

Amendments processed during the reporting period are described below. See HMP Section E-3 and Implementing Agreement Section 20.1 for a description of Minor Amendment types and the HMP amendment process.

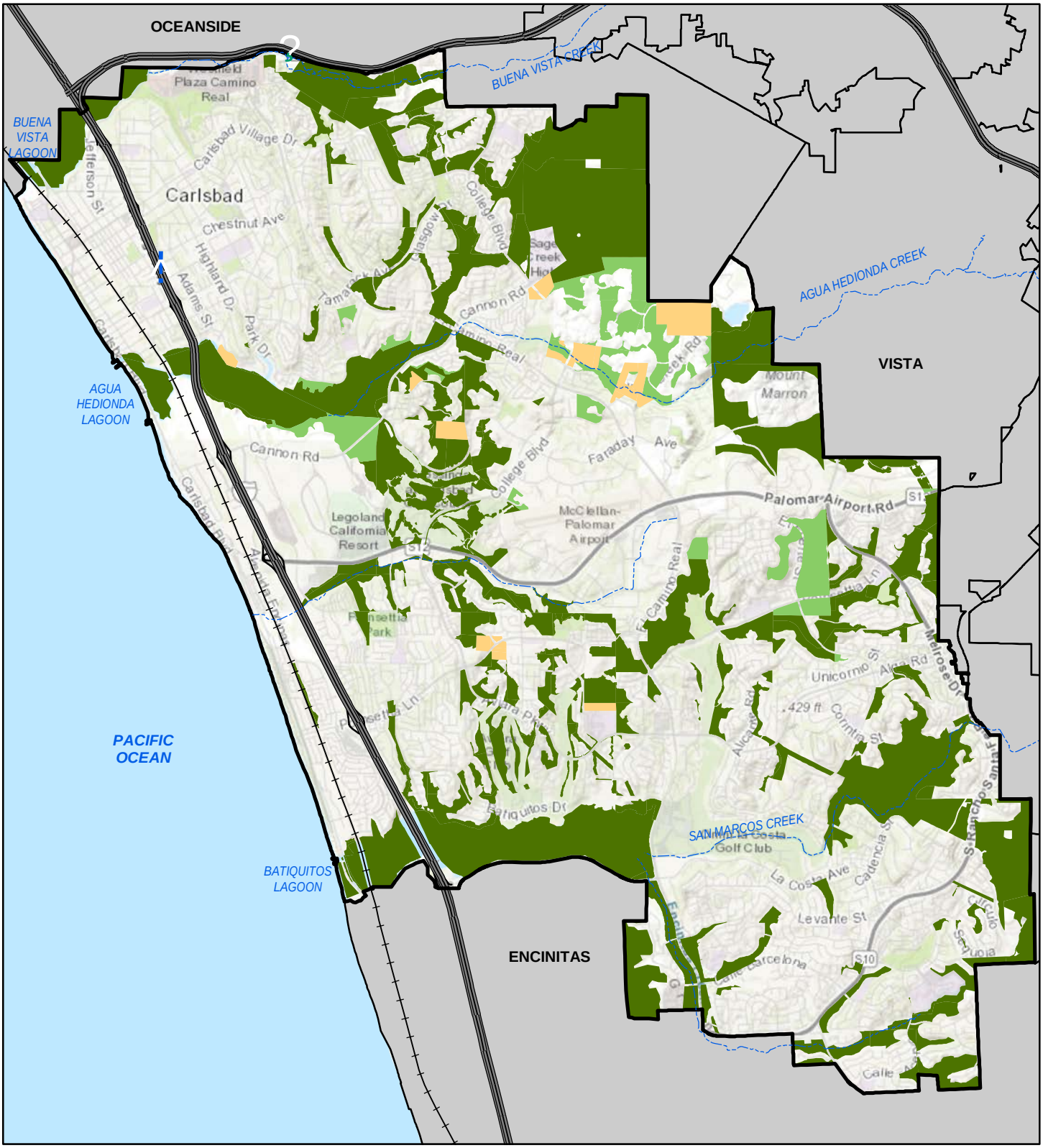
1. **Consistency Finding.** During the reporting period, a minor amendment was processed for the Snyder Residence Project through a Consistency Finding.
2. **Equivalency Finding.** During the reporting period, minor amendments were processed for the El Fuerte View Subdivision and the West Oaks Project through Equivalency Findings.
3. **Other Minor Amendments (pursuant to Section 20.1 of the Implementing Agreement).** No other minor amendments were processed during the reporting period.

1.5.2 City Compliance with Terms and Conditions of Take Authorization

To satisfy the terms and conditions of the state and federal take authorization, the city is required to fulfill the obligations outlined in Sections 10-14 of the Implementing Agreement, the Conditions of the State NCCP Permit, and Terms and Conditions of the Federal ESA Section 10(a)(1)(B) Incidental Take Authorization/Permit. Implementation tasks associated with these regulations are completed or ongoing, and are described in Appendix A.

1.5.3 City Compliance with HMP Zone-Wide Standards

The city is also required to ensure that all projects within Standards Areas comply with the zone-specific standards outlined in HMP Section D (Table 8). All projects that occur within a Standards Area are processed with a Consistency Finding. During this process, projects must demonstrate compliance with the standards before they receive concurrence from the Wildlife Agencies and are approved by the city; therefore, all approved development within Standards Areas is consistent with the HMP. Appendix A summarizes property-specific and linkage-related standards and current status. Refer to HMP Section D pages D-73 through D-82 for additional zone-specific standards.



Legend

- Existing Hardline
- Proposed Hardline
- Standards Area

0 Feet 6,400

City of Carlsbad

City of Carlsbad
2018 Current Conditions

Figure 2

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2.0 Preserve Management and Monitoring

The Wildlife Agencies have issued permits to jurisdictions and participating landowners for implementation of regional conservation plans like the HMP throughout California to address the development, conservation, and land management activities of conserved lands. One of the primary commitments made by permittees is to maintain the long-term habitat value of the preserve system and its ability to support viable populations of covered species. This section highlights some of the monitoring and management activities that took place during the reporting period. A more detailed preserve-by-preserve summary of activities is included in Appendix B.

2.1 Wildlife Movement Studies

Wildlife movement across the landscape is an important component of a healthy ecosystem. In an urbanized preserve system, wildlife corridors can connect fragmented patches of habitat, allowing migration, dispersal, and gene flow of wildlife species. However, wildlife movement can become restricted when wildlife corridors are blocked by development such as houses or roads. The presence of people and dogs, such as along heavily used trails, can also restrict or deter wildlife movement through avoidance of an area or behavioral changes, including limiting movement to nighttime hours. The city's wildlife movement program, implemented through a partnership with HMP staff, preserve steward, preserve managers and volunteers, evaluates wildlife movement at selected locations throughout the city. Three specific projects initiated during the reporting period are summarized below.

2.1.1 Roadkill pilot study

Roads are a significant threat to wildlife movement, particularly when they bisect habitat throughout the city with dense, fast-moving traffic. Wildlife that travel across roads are at high risk of being struck by oncoming traffic and becoming roadkill, in addition to being a road hazard and human safety concern. A safer alternative to traveling across a road would be traveling underneath a road through an underpass, bridge, or culvert.

The intersection of Cannon Road and El Camino Real is a potentially significant barrier to wildlife movement north-south between Agua Hedionda Lagoon and Robertson Ranch Preserve, and east-west between Agua Hedionda Lagoon and Agua Hedionda Creek. A citywide wildlife movement study conducted in 2015 identified 4 "pinchpoints" (bottlenecks) at this intersection (City of Carlsbad, CNLM and ESA 2015). Based on wildlife camera data, it appears that wildlife

smaller than deer move freely under the large bridges at pinchpoints EW2-4 and EW2-5, but movement is restricted through the culverts at EW2-1 and EW2-1B. A pilot roadkill study was conducted by the preserve steward and three volunteers for one year to determine if animals were being struck and killed by cars while trying to cross the road. A total of 16 roadkill occurrences were detected during the 171 survey dates (ESA 2019). One was a medium sized mammal (coyote) and the rest were mostly birds, rodents, rabbits and opossums. Compared to roadkill, the number of wildlife detections by cameras under Cannon Road was significantly higher (Table 5) (note that the two cameras likely captured many of the same individuals). Based on these results, it appears that target wildlife species (bobcats and coyotes) regularly use the EW2-4 and EW2-5 bridges and are not being killed by vehicles in large numbers. However, further studies are necessary to determine if there is movement to and from Robertson Ranch Preserve.

Table 5. Wildlife Camera Detections under Cannon Road August 2018 - August 2019

Species	Number of Detections (%)	
	EW2-4 Camera 1	EW2-4 Camera 2
Bird	6 (3.9%)	6 (6.4%)
Bobcat	67 (44.1%)	22 (23.4%)
Coyote	69 (45.4%)	45 (47.9%)
Opossum	2 (1.3%)	7 (7.4%)
Raccoon	6 (3.9%)	13 (13.8%)
Skunk	2 (1.3%)	1 (1.1%)
TOTAL	**152**	**94**

2.1.2 Village H Preserve and Open Space

As discussed in Section 1.4.2, the Village H property, which consists of HMP hardline and non-hardline open space, is being considered for the installation of an off-leash dog park. To understand how wildlife is using this property and how an off-leash dog area might affect wildlife movement, three studies were initiated shortly after the property came under the city's ownership.

Wildlife Cameras

Wildlife cameras with motion detectors were installed at various locations throughout the property to determine the presence or absence of native wildlife, humans, dogs on-leash and dogs off-leash (Figure 3). The cameras were set to take 10-second videos each time they were triggered. By moving the cameras around to many different locations and collecting data for up to a year, this study will provide information about what species are using this property, and which locations are most heavily used by each species. This information, in turn, will allow us to infer how wildlife may be moving across the site and if the presence of humans and dogs may be

Village H
Wildlife Camera Locations and Roadkill Study Area

Figure 3

City of Carlsbad

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Date: 2/6/2020

deterring use by wildlife in some areas. Bobcats and coyotes were the focus of this analysis because they have larger home ranges than the other species.

Note that this is not a statically rigorous study; the purpose of this study is to get a general idea of how animals are using the site. It was not designed to make a definitive statement about how wildlife move through the site or how many individuals use the site. It is not possible to identify individual non-domestic species, and several cameras are likely to be triggered by the same individuals as they move through the site. The purpose is to get an understanding of the *relative* amount of activity of native wildlife vs. domestic dogs or people at each location and determine what time of day or night these areas are being used. We can then use this information to inform management decisions and compare changes in activity patterns that may occur with changes to land use on the site.

Figure 3 shows the 21 camera locations that have been used from June 2019 through February 2020. Sample photos taken during the study are included in Appendix C. Because each camera has been in operation for a different number of days, the number of each species at each camera is given by the total number of "hits" divided by the total number of active camera days. If it is likely that a camera is picking up the same individual a few minutes apart, those individuals are only counted once. For example, bobcat cubs playing in front of the camera may show up in 4 videos several minutes apart. If a single video shows a maximum of two bobcats at a time, then these 4 videos would be counted as a total of two "hits." "Camera day" is defined as a 24-hour period of active camera time at a specific location.

Table 6 summarizes the camera data from June 25, 2019 through January 17, 2020. Bobcats, the species known to be the most sensitive to urbanization and habitat fragmentation, were most frequently observed at locations 1, 9, 13, 15 and 16, suggesting east-west movement along the northern side of Village H. Regular observations were also made at locations 8, 17 and 19 showing that they may also be moving north-south across the site. Coyotes and other mammals commonly seen on site are much more adapted to urbanization and the presence of people. For the most part, coyotes are more active in areas with less human activity (off the trail) although they have been observed at locations 2, 9, 13, and 18, which also show use by humans and dogs. Surprisingly, coyotes have not been observed using the undercrossings at locations 15/16 and 8.

Table 6. Summary of Wildlife Camera Data (No. Hits/No. Camera Days) June 25, 2019 - Jan. 17, 2020

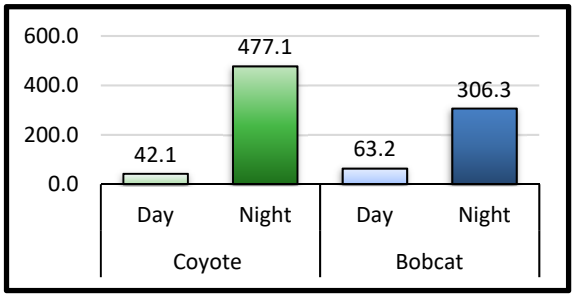
Species		Number of Individuals ("Hits") per Total Number of Camera Days*																			TOTALS
	Location	1	2	3	4	5	6	7	8	9	10	13	14	15	16	17	18	19	20	21	
	#Cam Days	136	42	44	11	177	99	174	198	106	14	98	20	112	112	112	49	16	49	34	1,603
Coyote	Day	0.7	2.4	4.5	0.0	0.0	7.1	8.6	0.5	7.5	0.0	1.0	0.0	0.0	0.0	1.8	0.0	0.0	2.0	5.9	42.1
	Night	8.8	54.8	9.1	9.1	1.1	0.0	80.5	5.1	71.7	7.1	115.3	5.0	3.6	0.0	13.4	42.9	37.5	12.2	0.0	477.1
Bobcat	Day	47.1	0.0	0.0	0.0	0.0	1.0	1.7	1.5	0.9	0.0	2.0	0.0	2.7	1.8	4.5	0.0	0.0	0.0	0.0	63.2
	Night	206.6	0.0	0.0	0.0	0.0	9.1	4.0	4.0	12.3	0.0	19.4	0.0	19.6	17.0	8.0	0.0	6.3	0.0	0.0	306.3
Skunk	Day	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Night	8.1	0.0	0.0	0.0	0.0	7.1	9.2	1.0	1.9	0.0	3.1	0.0	70.5	75.9	14.3	0.0	6.3	0.0	0.0	197.3
Rodents, Rabbits, Raccoons	Day	11.8	11.9	0.0	0.0	0.0	7.1	0.0	0.0	0.0	0.0	4.1	0.0	3.6	1.8	1.8	0.0	0.0	0.0	0.0	42.0
	Night	3.7	19.0	0.0	0.0	1.1	4.0	2.9	23.7	0.0	0.0	17.3	0.0	27.7	33.9	29.5	0.0	0.0	10.2	0.0	173.1
Bird	Day	20.6	0.0	2.3	0.0	0.0	3.0	1.1	5.1	3.8	7.1	21.4	0.0	8.0	6.3	0.0	0.0	0.0	0.0	0.0	78.7
	Night	4.4	0.0	2.3	0.0	0.6	1.0	0.0	0.0	6.6	0.0	0.0	0.0	0.0	0.0	1.8	2.0	0.0	0.0	0.0	18.7
TOTAL WILDLIFE	**Day**	80.1	14.3	6.8	0.0	0.0	18.2	11.5	7.1	12.3	7.1	28.6	0.0	14.3	9.8	8.0	0.0	0.0	2.0	5.9	226.0
	Night	231.6	73.8	11.4	9.1	2.8	21.2	96.6	33.8	92.5	7.1	155.1	5.0	121.4	126.8	67.0	44.9	50.0	22.4	0.0	1,172.5
Human	Day	208.8	350.0	1434.1	2563.6	0.6	1.0	0.6	20.2	98.1	35.7	64.3	0.0	5.4	8.9	13.4	1838.8	75.0	44.9	0.0	6,763.4
	Night	2.9	9.5	13.6	81.8	0.0	0.0	0.0	6.6	0.0	0.0	1.0	0.0	2.7	0.0	0.0	71.4	0.0	0.0	0.0	189.6
On-Leash Dog	Day	19.1	73.8	288.6	763.6	0.0	0.0	0.0	0.0	5.7	0.0	1.0	0.0	0.0	0.0	0.0	628.6	6.3	2.0	0.0	1,788.7
	Night	0.0	4.8	9.1	27.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.7	0.0	0.0	0.0	73.8
Off-Leash Dog	Day	299.3	171.4	600.0	954.5	0.0	0.0	0.0	0.0	150.9	14.3	174.5	5.0	0.0	0.0	0.0	542.9	50.0	34.7	2.9	3,000.4
	Night	7.4	9.5	2.3	54.5	0.0	0.0	0.0	0.5	0.0	0.0	5.1	0.0	0.0	0.0	0.0	36.7	0.0	0.0	0.0	116.0
TOTAL HUMANS + DOGS	**Day**	527.2	595.2	2322.7	4281.8	0.6	1.0	0.6	20.2	254.7	50.0	239.8	5.0	5.4	8.9	13.4	3010.2	131.3	81.6	2.9	11,552.6
	Night	10.3	23.8	25.0	163.6	0.0	0.0	0.0	7.1	0.0	0.0	6.1	0.0	2.7	0.0	0.0	140.8	0.0	0.0	0.0	379.4

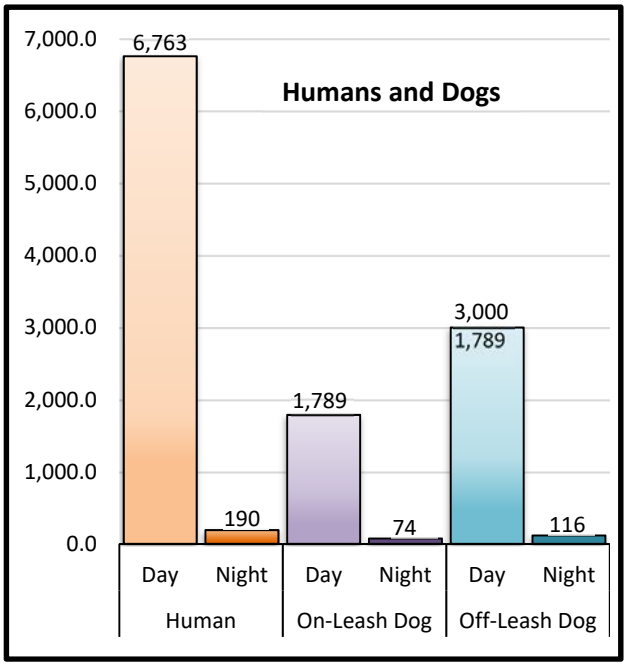
*Cameras 11 and 12 were stolen, so there is no data for these cameras.

One of the most obvious patterns that emerges from the data is that people and dogs are clearly most active during the day (defined as when it is light outside), whereas wildlife are most active during the night. In a natural setting, coyotes and bobcats tend to be more active during the day and at dawn and dusk (Tremore et al. 2017). It is likely that coyotes and bobcats have changed their natural activity pattern to be more nocturnal to avoid contact with people and dogs. It is well-documented that recreational use (hiking, biking, dog walking) negatively affects wildlife by causing them to avoid or restrict their movements or to become less active during the day in areas of high use by people and dogs (George and Crooks 2006, Jennings and Lewison 2013, Ruell et al 2002).

Figure 4. Activity Patterns: Day vs. Night

Target wildlife species (coyotes and bobcats) are compared to humans and domestic dogs, measured by (total "hits")/(total number of camera days). Note that the scales are not equal, so the actual difference between wildlife and humans/dogs is even more pronounced than what appears on the graphs.





Roadkill

A roadkill study was conducted by Environmental Science Associates biologists, HMP staff and volunteers along the roads surrounding Village H (portions of Tamarack Avenue, Carlsbad Village Drive and Glasgow Avenue) to determine if animals are being hit by cars trying to cross the road between the northern and southern portions of Village H (Figure 3). Roadkill monitoring began on July 25, 2019 and will continue for up to one year. An average of three surveys per week was conducted initially, and later reduced to once per week. Roadkill logs kept by the city were also reviewed regularly to capture any roadkill that might have been picked up by the city's contractor. As of January 31, 2020, the following species have been recorded as roadkill on Carlsbad Village

Drive between Tamarack Avenue and Glasgow Drive: three skunks, two opossums, one hawk and one dog. The remaining five roadkill observations were rabbits at scattered locations along the roads in the study area.

Dog Waste

Because Village H has been used by residents as an off-leash dog area for many years before becoming the city's property, a study was conducted to determine how much dog waste was on the ground before and after the official city trail opened. Off-leash dogs are not allowed on city trails or HMP Hardline or other open space. They are only allowed within a formal dog park. Once the city trail formally opened, several dog waste stations were available to users of the trail. During each site visit, Environmental Science Associates biologists, HMP staff and volunteers collected Global Positioning System (GPS) coordinates for each pile of dog waste, coyote/bobcat scat, and tennis ball or other dog toys using the ArcGIS Collector mobile application. Waste and trash was collected and disposed of at the end of each day. Prior to disposal, the dog waste was weighed and recorded. Surveys started on August 28, 2019, and were initially conducted approximately every other week and then reduced to once per month. The study will continue for up to one year.

Figure 5 shows the results of the study through January 31, 2020. The initial site visit documented 290 piles of dog waste, which weighed 16 pounds (Table 7), and 48 tennis balls (dog toys). Because of the extensive tree trimming, chipping, and mulching that was conducted prior to the official trail opening, most of the old waste piles were impossible to see. Although there is still a significant number of dog waste that is not being picked up, mostly from unleashed dogs, the amount has slowly decreased over time (Figure 6).

Village H
Dog Waste Collected Since August 2019

Figure 4

City of Carlsbad

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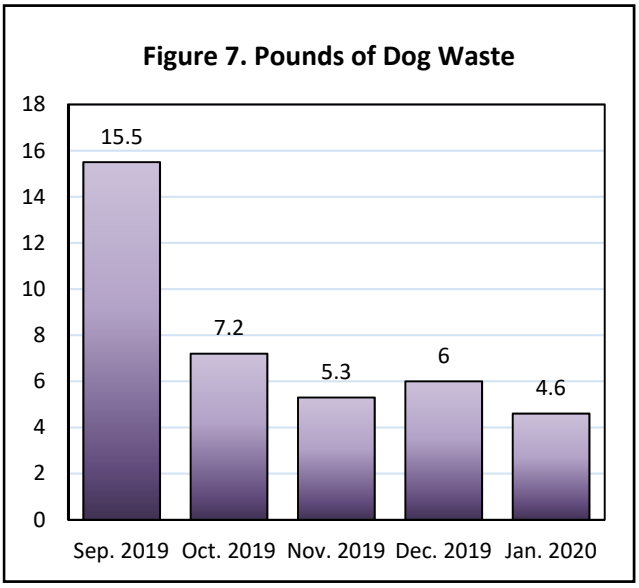
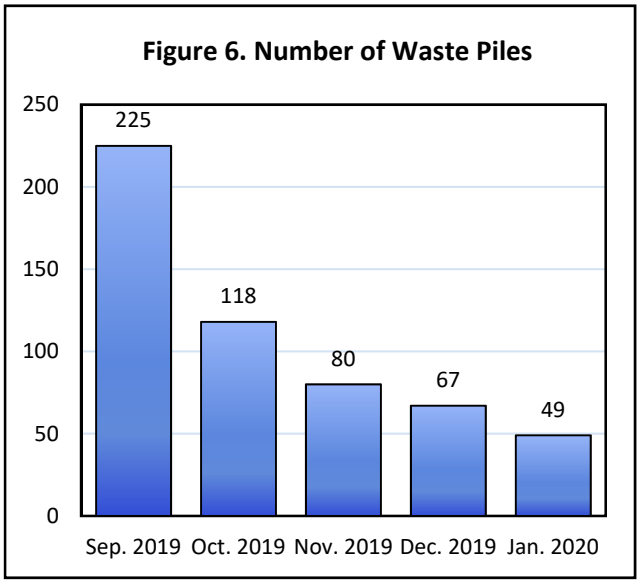
Date: 2/6/2020

Table 7. Dog Waste Study Results

Date	Pounds of Dog Waste	Number of Waste Piles	Number of Tennis Balls
Pre-Study Clean Up			
8/28/2019	**16**	**290**	48
Long-Term Study Period			
9/11/2019	5.5	84	41
9/25/2019	10	141	15
10/8/2019	4	53	5
10/23/2019	3.2	65	3
11/6/2019	5.3	80	7
12/18/2019	6	67	11
1/15/2020	4.6	49	2
TOTAL FOR STUDY PERIOD[1]	**38.6**	**539**	**84**

[1] Study period is September 11, 2019 – January 15, 2020





Management implications

Habitat fragmentation, roads and human use are major threats to wildlife by reducing suitable habitat and functional connectivity (movement of organisms across the landscape between core habitat areas). Functional connectivity allows for genetic flow between populations, preventing harmful genetic effects that may happen in small, isolated populations, and increases an animal's ability to adapt to environmental change. Bobcats, and to a lesser degree coyotes, are especially vulnerable to these effects. Although there is evidence that bobcats and coyotes may become

habituated to the presence of humans and dogs and may learn to move through urbanized areas in coastal areas of Southern California, they may still be at risk in the long-term through reduced survival, reproduction, genetic variability and opportunities for dispersal into new areas (George and Crooks 2006, Jennings and Lewison 2013, Ruell et al 2002). Therefore, it will be important to continue to monitor movement through Village H and other key areas of the city and reduce barriers to movement whenever possible.

Besides affecting the ability for mammals to move across the landscape, the presence of dogs on Village H has resulted in a significant amount of dog waste left behind. As the data shows, even though there are several dog waste stations onsite, many dog owners do not pick up after their pets, and many dogs are unleashed so the waste ends up well beyond the trail. Unlike wildlife waste, dog waste carries many types of bacteria, parasites, viruses and other diseases that can be transmitted to humans (Center for Disease Control 2019). Some of these microorganisms can survive in the soil for up to four years if the waste is not picked up (Baechler 2018). Dog waste also contains excess nutrients, which can cause algal blooms when draining into streams and ponds, depleting the water of oxygen that is vital for the survival of fish and other aquatic life. Some dog owners put their dog waste into plastic bags, but leave the bags on the ground (10 percent of the waste collected on Village H was bagged). This causes the additional problem of creating bits of microplastics as the bag breaks down over time. Plastic does not biodegrade, and the waste ends up in the soil anyway.

2.2 Invasive Species Early Detection and Rapid Response

Early Detection and Rapid Response (EDRR) is a management approach that looks for and targets new invasive species infestations in specific locations before they spread and cause harm. Regular surveillance monitoring identifies new threats while they are small, allowing for quick eradication and avoiding costly long-term control. The city coordinates with a number of regional EDRR organizations to stay up to date on the most current high priority species for surveillance and treatments, including San Diego Management and Monitoring Program, California Invasive Species Council, and San Diego County Department of Agriculture, Weights and Measures. This section summarizes the city's top four EDRR targets for surveillance and treatments.

2.2.1 Ward's weed

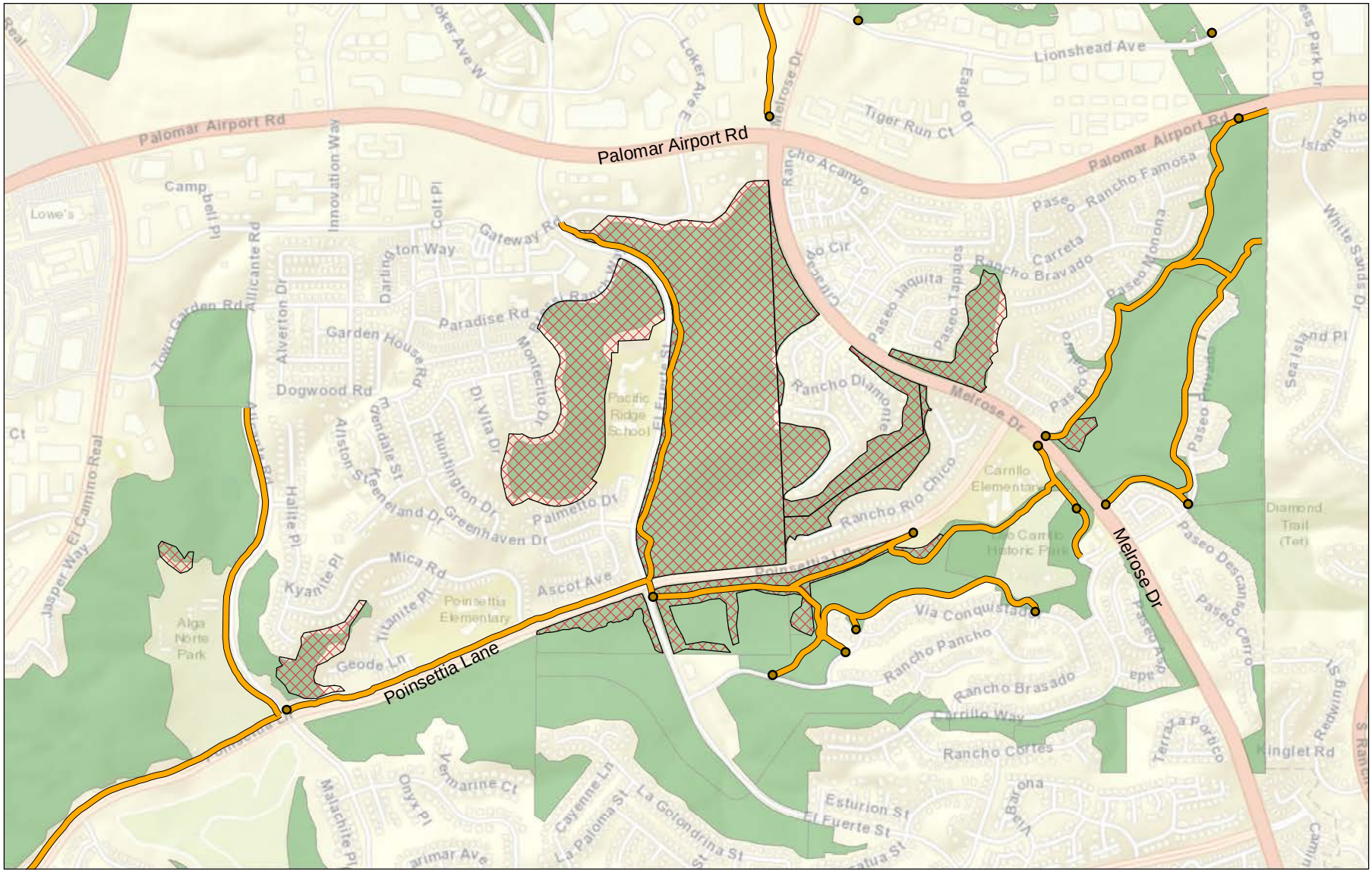
(Eduardo Contreras / San Diego Union-Tribune)

Ward's weed (*Carrichtera annua*) is a highly invasive Mediterranean species in the mustard family that threatens native habitats and species, and increases the wildfire fuel load. This species was discovered on Rancho La Costa Preserve in 2008. It has since been mapped on approximately 200 acres in the city, mostly on unmanaged preserves (Figure 8). Ward's weed has also been discovered in 3 other small locations in San Diego County; however, approximately 99% of the known infestation occurs in the Bressi Ranch and Rancho Carrillo areas of Carlsbad. Ward's weed does not occur anywhere else in North America.

In response to this threat, city HMP staff did the following in early 2019:

- Assembled a stakeholder group to coordinate a treatment plan, including EDRR organizations mentioned above, CNLM, San Diego Habitat Conservancy, the Nature Collective (formerly San Elijo Lagoon Conservancy), University of California Department of Agriculture and Natural Resources, Carlsbad Parks & Recreation Department, and the City of San Diego.
- Identified effective treatment methods and best management practices.
- Identified sources of funding for mapping and treatment.
- Initiated educational outreach, including:
    - Conducted media interviews (local newspapers and local news channels).
    - Hosted on-site workshops with vegetation management companies, city parks maintenance staff, land managers and other interested parties.
    - Developed pocket guides, fact sheets, and signage to provide identification information and Best Management Practices.
    - Gave presentations countywide at professional meetings for land managers, resource agencies and environmental scientists.

In October 2019, the City Council approved the Ward's Weed Eradication Program, which is funded by the city, Nature Collective, and County of San Diego. Ten years of field trials previously conducted in Carlsbad by CNLM and ACS Habitat Management determined that the best method of treatment for Ward's weed is the use of the pre-emergent herbicide Gallery prior to the first rains of the season. See City Council Resolution 2019-194 and associated Staff Report for more information, available on the city's website (City of Carlsbad 2019). Treatments, which are consistent with the city's Integrated Pest Management Plan, were initiated in November 2019 and

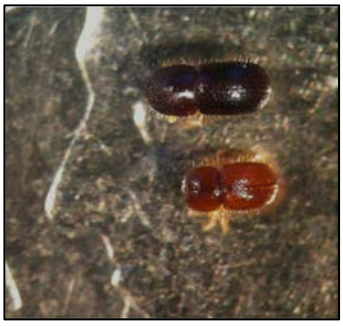


Wards Weed Infestation Area (October 2019)
Carlsbad HMP Preserve

Figure 8

completed for the season by the end of January 2020. Because of substantial early rain and early sprouting, only about half of the infested area was treated. The remaining area will be treated during the next rainy season (2020/2021).

2.2.2 Shot Hole Borers

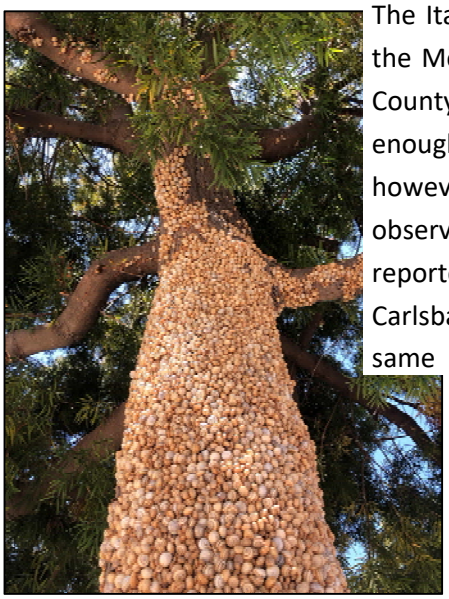


The non-native polyphagous shot hole borer (*Euwallacia* sp) and Kurushio shot hole borer (*Euwallacia* sp.) are relatively new invaders into southern California. Unlike most insect pests, which specialize on only a few tree species, these beetles can attack and kill over 110 tree species, including most of the tree species found in our native riparian habitat. The beetles tunnel into the tree, bringing a fungus with them that causes Fusarium Dieback disease, which can spread extremely rapidly. Symptoms include branch dieback or death of the entire tree. Ongoing surveillance monitoring is conducted by land managers at least annually. The shot hole borer was previously confirmed at The Crossings Preserve, Agua Hedionda Ecological Reserve, Robertson Ranch Preserve, Encinas Creek Preserve, and is suspected at Quarry Creek. No additional infestations have been reported. To prevent further spread, infestations on The Crossings and Encinas Creek Preserves were treated by pruning or tree felling, chipping the dead material and spreading out the small wood chips in a thin layer within the area of infestation. These actions were taken in coordination with the Eskalen Lab at University of California. Although the infestation is still present, it appears that the habitat is surviving (trees are resprouting) and the spread of the disease has slowed.

2.2.3 Gold-Spotted oak borer

Land managers in Carlsbad continued surveillance monitoring for the gold-spotted oak borer (*Agrilus auroguttatus*), an invasive beetle that attacks coast live oak (*Quercus agrifolia*), California black oak (*Q. kelloggii*), canyon live oak (*Q. chrysolepsis*), and, on rare occasions, Engelmann oak (*Q. engelmannii*). This species has not yet been documented in Carlsbad. Ongoing monitoring will help prevent extensive damage if this pest moves into this area. Oak symptoms include crown thinning and dieback, bark staining on the main stem and D-shaped emergence holes on the main stem and larger branches of the tree. These symptoms can mimic those of several other pests and diseases that affect oak trees, especially in stressful conditions, such as long-term drought or after a fire.

2.2.4 Italian white snail



Bressi Ranch Area, Carlsbad (Hannah Swarthout)

The Italian white snail (*Theba pisana*) is an invasive snail from the Mediterranean region. Although it has been in San Diego County for over 100 years, it has generally not occurred in large enough numbers to be considered a high priority threat; however, that has changed in recent years as several observations of very high-density occurrences have been reported (Cheryl Wilen, UCCE Riverside, pers. comm.). In Carlsbad, high numbers of white snails were reported from the same general area as Ward's weed, another Mediterranean species.

During dry weather, most snails spend their dormant period in moist places on the ground, such as under logs or rocks or buried in the dirt. However, the Italian white snail aestivates above ground on vertical surfaces such as fence posts, tree trunks, or other types of vegetation. The density and rapid rate of reproduction are the reasons this species is considered a threat (Deisler and Stange 2018). The San Diego Management and Monitoring Program is currently researching this species and developing Best Management Practices. In the meantime, the best way to deal with this threat may be to scrape and crush.

2.3 Poinsettia Station Vernal Pool Preserve

The 7.9-acre Poinsettia Station Vernal Pool Preserve (PSVPP) is located east of the tracks at Poinsettia Train Station, mostly in the railroad right-of-way. The HMP identifies the PSVPP as a Special Resource Area because, although this preserve is isolated from biological core and linkage areas by urban development, these pools are critical to the conservation of several narrow endemic plant and fairy shrimp species. Many of the species documented onsite are state, and/or federally listed as Threatened or Endangered, including San Diego button-celery (*Eryngium aristulatum* var. *parishii*), spreading navarretia (*Navarretia fossalis*), California Orcutt grass (*Orcuttia californica*), Riverside fairy shrimp (*Steptocephalus wootoni*), and San Diego fairy shrimp (*Branchinecta sandiegoensis*). Coverage of these species by the HMP is contingent upon the establishment of long-term management and protection of these pools. In addition to being identified as a critical location for vernal pool species, the PSVPP also serves as mitigation for the Poinsettia Station Improvements Project and the Waters End residential development.

During the reporting period, the city:

- Established an endowment account with the San Diego Foundation.

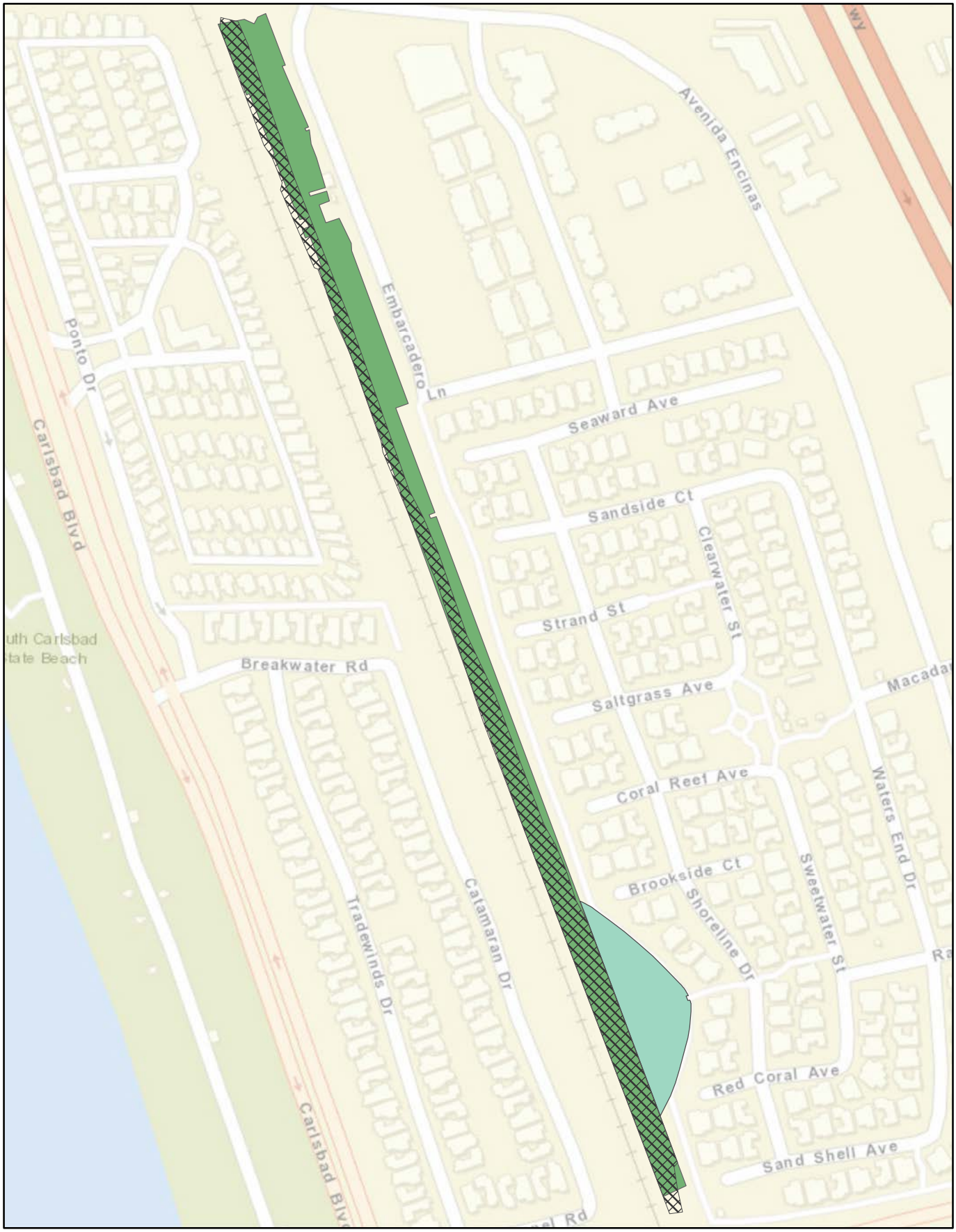
- Established a start-up fund for initial intensive management, allowing the endowment account to grow for 2 to 3 years.
- Recorded a conservation easement over the portion of the preserve owned by Water's End HOA.
- Obtained consensus from the resource agencies and North County Transit District (NCTD) regarding the corrected (resurveyed) boundary for the NCTD-owned parcel (Figure 9).
- Prepared a long-term management plan, which is one of the few plans in San Diego County to include a "climate smart conservation" strategy.
- Implemented baseline biological surveys and intensive invasive species removal.
- Submitted a request to the Wildlife Agencies for HMP coverage of five vernal pool species known to occur onsite.

Funding for the endowment came from the original long-term management funds provided (1) by NCTD to CDFW in 1994 for the Poinsettia Station Project, and (2) by Lang Homes to the city in 2004 for the Waters End residential development. Funding for the initial intensive management came from the HMP program and San Diego Association of Governments (SANDAG). SANDAG's funds were provided in 2019 as mitigation for improvements proposed for the Poinsettia Train Station as required by the 2018 USFWS Biological Opinion (FWS-SDG-16B0307-16F0764-R001). The funds are to be used for vernal pool habitat enhancement.

In early 2019, the city contracted with Dudek to conduct the following baseline biological surveys: rare plant surveys, presence/absence surveys for fairy shrimp, and hydrological monitoring. Intensive habitat enhancement was also performed at the appropriate time of year (when the soil was dry) to remove invasive species and broom baccharis (*Baccharis sarothroides*) that was invading the pools. This work was supervised by Scott Mcmillan, a local vernal pool expert. Long-term management will continue to focus on invasive species control; additional biological surveys will be conducted as funding permits.

2.4 Post-Fire Habitat Recovery Monitoring

Long-term drought and extreme Santa Ana conditions helped pave the way for the Poinsettia Fire, which burned over 300 acres in Carlsbad in May 2014, most of which was within the HMP hardline preserve. The city, preserve steward, and land managers have been working together over the last five years to monitor the recovery of native habitat within the burned areas of the preserve system using a protocol developed in 2014. A total of 26 transects were established within coastal sage scrub, southern maritime chaparral, southern mixed chaparral, vernal pools, and oak woodland to evaluate cover and density of native and non-native species (Figure 10). Land managers use this information to inform land management decisions. The final (fifth) year of monitoring was conducted in the spring of 2019 by Environmental Science Associates, CNLM, and



City of Carlsbad

Poinsettia Station Vernal Pool Preserve

Figure 9

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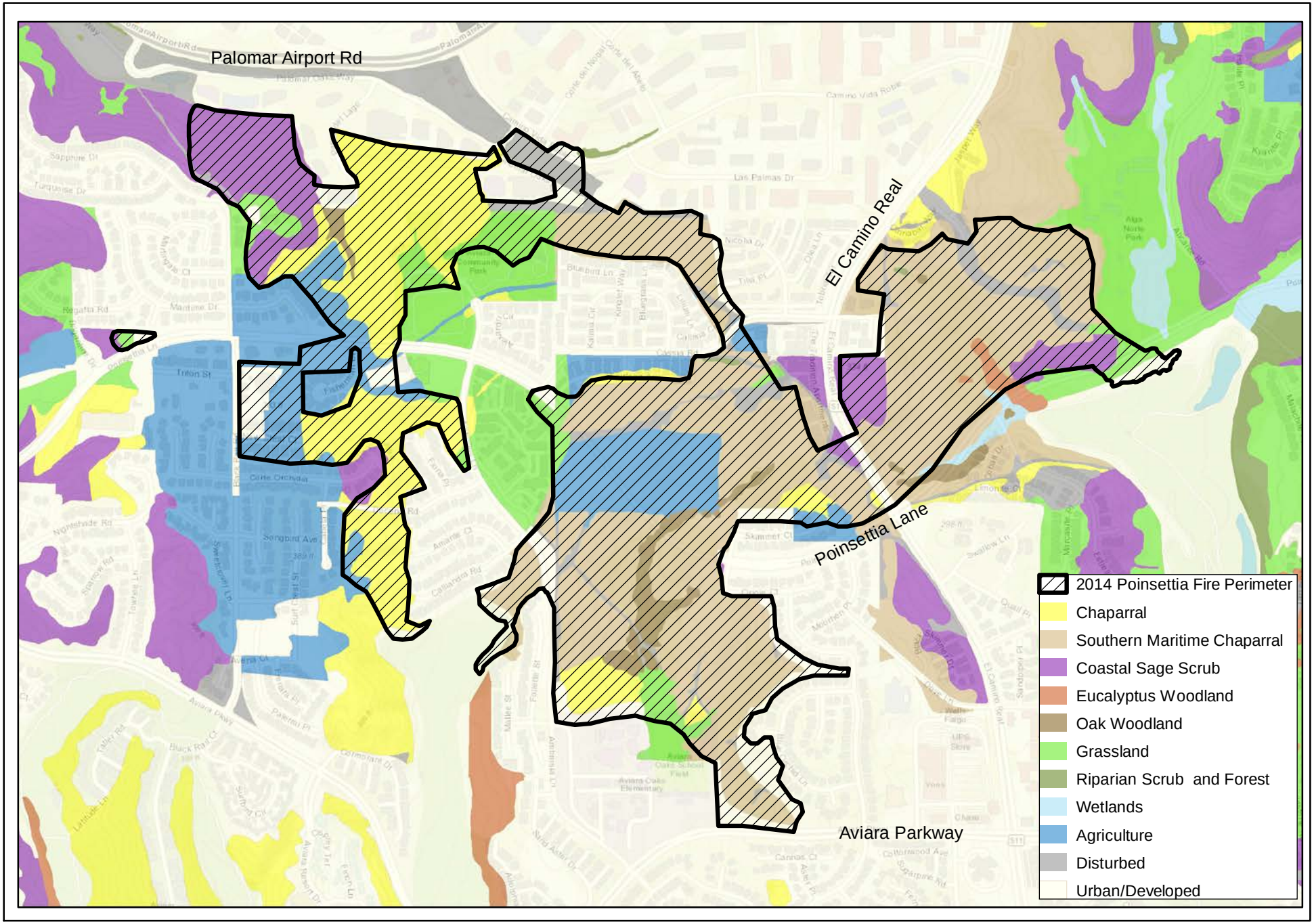
Date: 2/7/2020



Poinsettia Fire Perimeter
Post-Fire Habitat Recovery Study

Figure 10

City of Carlsbad

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Date: 2/7/2020

SDHC. The final monitoring report, summarized below, is in Appendix D, which includes a description of methods, results and photographs from Years 1 through 5 at each transect.

The three shrub communities have been recovering as expected, with most native shrub species showing good vigor, and the native herbaceous cover increasing and showing species diversity typical of the post-fire condition (Figure 11). Although nonnative plant species were observed, the cover and density are also as predicted and mostly not considered a long-term threat; however, drainage areas tend to have a much higher cover of nonnative plant species, and these areas will require more intensive management on actively managed preserves. Unmanaged preserves do not have funding for management.

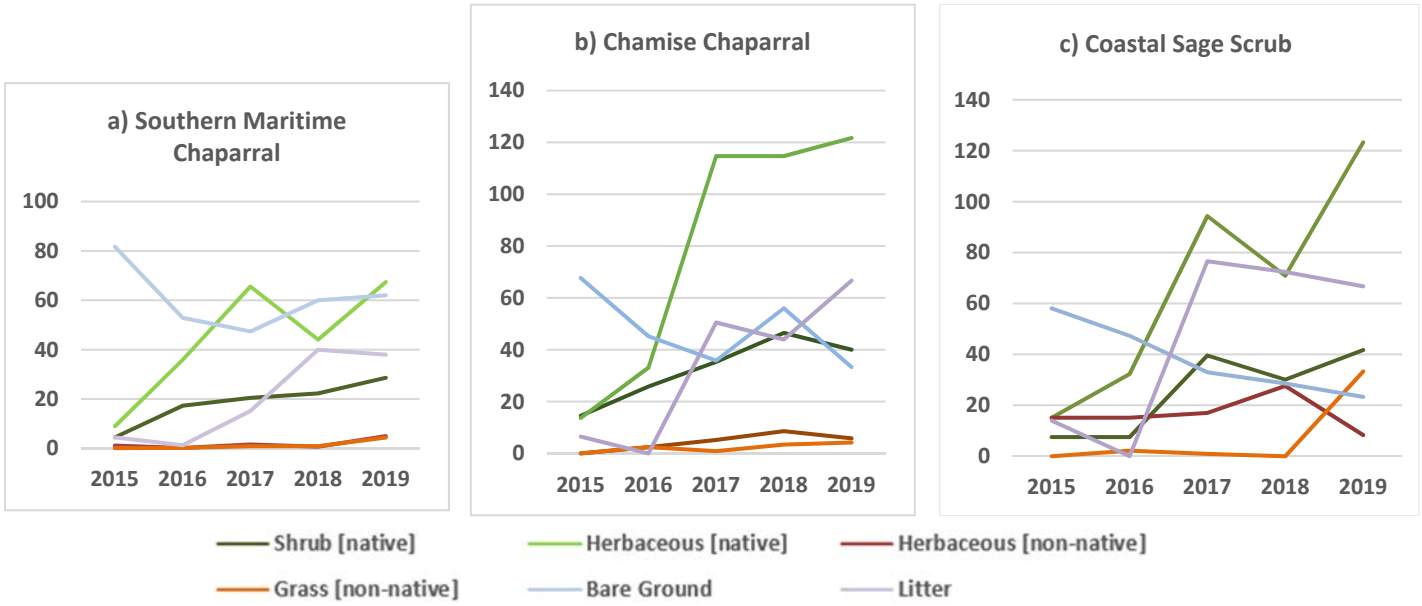

Figure 11. Trends in Functional Groups, Percent Cover within Shrub Communities (a) southern maritime chaparral, (b) chamise chaparral, and (c) coastal sage scrub.

The Poinsettia Fire has had a significant impact on the oak woodland habitat on the west side of El Camino Real; only 65 percent of the oak trees monitored over the five-year period survived; however, the shrub and subshrub vegetation appears to be recovering as expected with native plants such as bush mallow (*Malacothamnus fasciculatus*), laurel sumac (*Malosma laurina*), poison oak (*Toxicodendron diversilobum*), and black sage (*Salvia mellifera*) repopulating the area. In addition, invasive non-native grasses and forbs such as pampas grass (*Cortaderia* spp.) and black mustard (*Brassica nigra*) are also prevalent in this habitat at the bottom of the drainages. Most of the oak woodland in this area are within the newly established Poinsettia 61 Preserve, which is undergoing habitat restoration and enhancement throughout the preserve as a mitigation requirement for the Poinsettia 61 Project. Long-term management will include weed control and planting acorns to facilitate natural recruitment. The coast live oak trees (*Quercus agrifolia*) east of El Camino Real on the Rancho La Costa Preserve experienced a lower mortality rate, and the trees,

although not fully recovered, are healthy and continue to show healthy regrowth. The Engelmann oak (*Quercus engelmannii*) response varied, with larger trees dying, but smaller trees resprouting, and several new individuals, possibly from seedlings, were observed in 2019.

The vernal pools on the Manzanita Partners Preserve have been dominated by nonnative plant species throughout the habitat, including inside the basins which are dominated by longbeak stork's bill (*Erodium botrys*). Good rain years with substantial ponding is expected to drown out many of the invasive weeds over time. Substantial rainfall during the 2018-2019 winter resulted in ponding sufficient to sustain San Diego fairy shrimp (*Branchinecta sandeigoensis*) in three of the 14 pools. San Diego button-celery (*Eryngium aritulatum* var. *parishii*) is still present in three of the pools. Control of invasive species within the basins will continue to be the management focus of this habitat.

Habitat recovery monitoring is no longer needed; however, qualitative assessments should be performed periodically to ensure that new invasive species or erosion problems do not cause problems in the future. Habitat recovery can be a slow process. Post-fire recovery studies throughout San Diego County show that full recovery of coastal sage scrub can take as long as six or seven decades (Kus et al, 2017). However, climate change models predict that the region will experience 4-9^{o} F increase in average temperature, a 15-25% decrease in fall and spring rainfall, and greater rainfall variability, resulting in more intense droughts interspersed with rare but extreme precipitation and flooding. These changes could extend the fire season into the winter months, increasing the risk of Santa Ana wind-driven fires, making it more difficult for post-fire habitat to have enough time for full long-term recovery. Land managers should continue to prioritize weed control, which will have the added benefit of reducing flashy fuels across the landscape. When the next fire strikes, the city will coordinate with land managers for a rapid post-fire threat assessment and targeted management such as erosion control and access control.

3.0 Financial Summary

3.1 City Funding in Support of HMP

The city uses funding to support implementation of the HMP in two ways: (1) permanent funding allocated specifically for HMP coordination and management of city lands, and (2) existing resources, including administrative staff and staff from the Environmental Management Division, Planning Division, Parks and Recreation Department, and Police Department.

3.1.1 HMP Implementation

The majority of the city's ongoing costs to support HMP implementation are activities required by the HMP or the Implementing Agreement. Two of the city's main responsibilities are: (1) oversight of the HMP Preserve and (2) direct, active management of 600 acres of preserve land owned by the city.

To fulfill the first responsibility, the city dedicates a senior-level coordinator and provides other staff support for HMP implementation. The city also contracted with a biological consulting firm to serve as the city's preserve steward, coordinating management throughout the HMP preserve and evaluating management effectiveness. This reporting period, the city provided $95,000 in the annual budget to fund the contract for preserve steward costs.

The second responsibility is being accomplished through the city's contract with CNLM, a non-profit preserve management company for the management of city-owned HMP preserves. CNLM conducts regular biological monitoring and habitat management throughout the city's preserves, including maintenance fences and signage, closure of unauthorized trails, regular patrols, invasive species removal, and public outreach.

In addition, although not funded through the HMP Program, the city now has two permanent full time rangers who patrol open space areas, including parks, trails, and habitat preserves. The ranger program is administered by the Police Department, which allows the rangers to have citation authority and close contact with the Homeless Outreach Team, and police officers, which are often needed to deal with issues such as encampments and other unauthorized access.

3.1.2 Habitat Mitigation Fees

As described in Section 1.3.5, habitat mitigation fees are collected from developers for project-related impacts to certain types of native habitat and deposited into the Habitat Mitigation Fee Fund. Impacted habitats that require a fee include unoccupied coastal sage scrub, coastal sage/chaparral mix, and chaparral (except southern maritime chaparral) (Group C); occupied coastal sage scrub (Group D); non-native grassland (Group E); and disturbed lands, eucalyptus, or agricultural lands (Group F).

The purpose of the habitat mitigation fees is to fund the city's obligation to acquire, protect, and manage lands in the Gnatcatcher Core Area. Between 2011 and 2014, a total of 80.22 Gnatcatcher Core Area conservation credits were purchased by the city (one credit per acre of land in the Core Area). The cost of credits exceeded the available Habitat Mitigation Fee funds, requiring an advance of $2,221,812 from the General Fund. In-lieu fees will continue to be collected for habitat impacts, as appropriate, and will be used to reimburse the General Fund and to purchase the remaining required Core Area acreage.

As shown in Table 8, mitigation fees totaling $25,387.33 were collected during the current reporting period. Over the life of the fund, a total of $121,203.69 in interest has accrued (note that previous reports did not include interest earned). As of the end of the reporting period, the current balance of the Habitat Mitigation Fee Fund was -$169,600.19, reflecting the unpaid General Fund advance, which will be paid back with future Habitat Mitigation Fee Fund revenues.

Table 8. Habitat Mitigation Fee Fund Activity in RY 15 (2018–2019)

Date	Description	Habitat Impacted	Total[1]
11/01/18	**Beginning Fund Total**		**$-316,191.21 [1]**
Fees Collected 11/01/18 – 10/31/19			
11/01/18	Martin Residence	0.22 acre Type F (Ag, Dist, Eucalyptus)	$716.98
11/06/18	West Coast Self Storage	1.50 acres Type F (Ag, Dist, Eucalyptus)	$4,888.50
02/25/19	Magnolia-Brady Residence	1.05 acres Type F (Ag, Dist, Eucalyptus)	$3,517.50
02/27/19	Kenny Residence	0.35 acre Type F (Ag, Dist, Eucalyptus)	$1,72.50
03/19/19	Sehgal Residence	0.24 acre Type F (Ag, Dist, Eucalyptus)	$804.00
04/09/19	Newby-Puzo Residence	0.26 acre Type F (Ag, Dist, Eucalyptus)	$871.00
05/14/19	Chestnut Ave Residence	0.29 acre Type F (Ag, Dist, Eucalyptus)	$945.11
09/05/19	Summit Senior Carlsbad	0.13 acre Type D (coastal sage scrub) 2.67 acres Type F (Ag, Dist, Eucalyptus)	$4,467.45 $9,176.79
		Total Fees Collected 11/01/18 – 10/31/19	***$25,387.33***
Funds Expended for Core Area Conservation 11/01/18 – 10/31/19			
None			$0.00
		Total Funds Expended 11/01/18 – 10/31/19	***$0.00***
Cumulative Interest Earned[1]			
as of 10/31/19		***Total Cumulative Interest Earned***	***$121,203.69[1]***
10/31/19	**Account Balance**		**$-169,600.19**

[1] Previous reports did not include interest earned.

3.2 Status of Preserve Management Endowments

The endowment activity and status for preserves funded through endowments are given in Table 9. During the reporting period, a total of $777,599 was spent by the land managers on management and monitoring activities on 24 preserves and endowments for these properties (not including most lands owned by the city) totaled $15,813,003. CDFW's Carlsbad Highlands Ecological Reserve and Agua Hedionda Lagoon Ecological Reserve are funded through State Wildlife Grant funding. The Batiquitos Lagoon Ecological Reserve is funded through a mitigation account established by the Port of Los Angeles and held by CDFW.

Table 9. Endowment Status for HMP Preserves in RY 15 (2018–2019)

Preserve Name	Managing Entity[1]	Inception Date	Original Endowment	Inflation-Adjusted Original Endowment[2]	RY 18-19 Budget	RY 18-19 Expend.	Total Funds as of 9/30/19
Buena Vista Creek Ecological Reserve	CNLM[3]	April 2007	$776,644	$984,355	$42,537	$40,369	$1,365,823
Calavera Hills II/Robertson Ranch	CNLM[3]	June 2006	$1,834,813	$2,361,126	$102,032	$101,572	$3,443,142
Carlsbad Oaks North	CNLM[3]	March 2006	$1,020,311	$1,316,664	$56,897	$52,640	$1,785,997
Carlsbad Raceway	SDHC[5]	April 2014	Annual payments	Annual payments	$25,507	$23,526	$1,981
Cassia Professional Offices	CNLM[3]	Jan. 2007	$100,844	$130,953	$5,220	$5,566	$181,766
City-owned Preserves	City (CNLM)[3]	2009	Annual contract	Annual contract	Not reported	$200,000	N/A
Emerald Pointe	SDHC	August 2008	$194,948	$248,041	$11,950.00	$8,912	$219,425
Encinas Creek	CNLM[3]	May 2007	$427,004	$520,071	$22,474	$23,328	$768,433
Kelly Ranch	CNLM[3]	March 2002	$296,125	$451,389	$17,338	$15,207	$632,459
La Costa Collection	UC	July 2005	$378,756	$430,594	$17,648	$17,648	$409,782
La Costa Glen	CNLM[3]	Jan. 2013	$624,800	$724,654	$31,314	$31,505	$1,072,655
La Costa Villages	CNLM[3]	Feb. 2002	$1,364,400	$2,064,922	$98,680	$94,435	$2,531,915
Laurel Tree Lane Preserve	SDHC	Dec. 2017	$365,092	$379,951	$25,684	$16,397	$376,765
Manzanita Partners	HRS	October 2012	$51,000	$56,739	$1,600	$1,600	$61,395
Muroya	SDHC	Oct. 2015	$314,867	$347,674	$15,564.00	$13,089	$327,272
Nelson	CNLM[3]	June 2001	$72,180	$102,868	$4,934	$4,920	$127,909
New Crest Preserve	UC	May 2015	$91,393	$98,903	$3,868	$3,868	$92,499
North Coast Calvary Chapel	Helix	Sept 2001	Annual payments	Annual payments	$17,600	$17,600	N/A
Paseo Del Norte	UC	August 2016	$100,009	$106,860	$10,432	$10,432	$113,573
Poinsettia Place	UC	July 2011	$167,935	$190,183	$7,583	$7,583	$176,231
Poinsettia Station Vernal Pools	City (Dudek/HRS)	2019	$181,904	NA	TBD	$24,644	$181,904
Quarry Creek	SDHC	June 2015	$806,496	NA	$35,647	$25,680	$806,496
Sage Creek	SDHC	April 2016	$275,404	$297,992	$12,032.00	$14,476	$343,055
Southern	UC	Nov. 2013	$428,747	$471,957	$5,131	$5,131	$499,159
TOTAL 2018-2019			**$10,115,180**	**$16,957,687**	**$583,672**	**$777,599**	**$15,813,003**

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Appendix A

City Compliance with Terms and Conditions of Take Authorization and Zone-Wide Standards

November 1, 2018 - October 31, 2019

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City Compliance with Terms and Conditions of Take Authorization

To satisfy the terms and conditions of the state and federal take authorization, the city is required to fulfill the obligations outlined in Sections 10-14 of the IA, the Conditions of the State NCCP Permit, and Terms and Conditions of the Federal ESA Section 10(a)(1)(B) Incidental Take Authorization/Permit. Implementation tasks associated with these regulations are completed or ongoing, and are described in Tables 1 through 3.

City Compliance with HMP Zone-Wide Standards

The city is also required to ensure that all projects within Standards Areas comply with the zone-specific standards outlined in HMP Section D (Table 8). All projects that occur within a Standards Area are processed as a Consistency Finding. During this process, projects must demonstrate compliance with the standards before they receive concurrence from the Wildlife Agencies and are approved by the city; therefore, all approved development within Standards Areas is consistent with the HMP.

Upon commencement of the HMP, there was a total of 189.3 acres of coastal sage scrub within Standards Areas throughout the HMP. Zone-wide standards require at least 67 percent (126.8 acres) of the coastal sage scrub to be conserved. To date, 83.7 acres have been conserved (44.2 percent) and 27.9 acres have been lost (14.7 percent). Therefore, the city must conserve at least 43.1 more acres of the remaining 77.7 acres of coastal sage scrub within the Standards Areas. Table 4 summarizes property-specific and linkage-related standards and current status. Refer to HMP Section D pp. D-73 through D-82 for additional zone-specific standards.

Table 1. Summary of City Compliance with HMP Implementing Agreement Requirements through RY 15 (2018–2019)

IA Section[1]	Obligation	City Compliance
10.10	**Duty to Enforce:** To enforce the terms of the Take Authorization, HMP, and IA and ensure HMP lands are conserved in perpetuity.	▪ The city requires compliance with the HMP as a condition of approval for new development projects, which includes conservation in perpetuity, a non-wasting endowment, and a management agreement with a preserve manager. ▪ On March 14, 2006, the city passed the Habitat Preservation and Management Requirements Ordinance (Carlsbad Municipal Code Section 21.210), which includes a section on enforcement (Section 21.210.19) for violations of the HMP. ▪ The city council approved the permanent continuation of the ranger program in December 5, 2017, which includes two full-time rangers patrol preserves, lagoons, beaches, and parks and they have the authority to issue citations for any violations to posted regulations. Complaints made by citizens regarding possible violations of the HMP within preserves are investigated on a case-by-case basis.
11.1	**Preserve System:** To ensure the establishment and management in perpetuity of a 6,757-acre preserve system.	▪ The city has currently gained 6,189 acres of habitat within the HMP planning area and 294.67 acres of habitat within the MHCP Gnatcatcher Core Area (96% of the overall target acreage).
11.2	**Project Mitigation Measures:** To require additional mitigation measures to mitigate impacts to covered species in all future development projects.	▪ As a condition of approval for new development projects, the city requires that all potential impacts to HMP-covered species be avoided, minimized, and/or mitigated.
11.3	**Regulatory Implementation:** A. Urgency Ordinance – interim HMP enforcement B. Amend Open Space and Conservation Element of General Plan to incorporate HMP C. Amend Open Space Ordinance to incorporate Conserved Habitat Areas D. Amend Municipal Code to incorporate Standards Area compliance E. Amend General Plan to identify HMP as priority use for open space lands F. Wetlands Protection Program	A. The Emergency Ordinance was approved by the City Council in November 9, 2004. B. Revisions to the policy statements regarding the HMP were approved by the City Council in July 2005. C. Revisions were made to Carlsbad Municipal Code Chapter 21.33 and approved by the City Council in March 2006. Conserved Habitat Areas were included as undevelopable open space lands preserved exclusively and in perpetuity for conservation purposes consistent with the HMP. D. A new chapter (Section 21.210) was added to the Zoning Ordinance to address habitat preservation and management requirements. Section 21.210.040 B. specifically addresses Standards Area compliance. The section was approved by the City Council in March 2006. The new chapter will be included in the implementation plan portion of the Local Coastal Program update, currently under way. E. The General Plan was revised to make conservation of habitat a priority use for the 15% of otherwise developable land which the Growth Management Plan already requires to be set aside for open space purposes (the city defines five categories of open space). This revision was approved by the City Council in July 2005, and carried through into the updated General Plan (2015). F. New subsections (Section 21.210.040 D.5 and Section 21.210.070 A.5) were added to the Municipal Code to address the protection of wetland habitat. The ordinance states that wetlands impacts will be avoided, minimized, or mitigated (in that order). These new subsections were approved by the City Council in March 2006. The sections will be included in the implementation plan portion of the Local Coastal Program update, currently under way. Compliance is enforced on a project-by-project basis during environmental review and in conjunction with other wetland permitting agencies such as the Coastal Commission, CDFW, and USACE.

IA Section	Obligation	City Compliance
11.4	**Additional Implementation Measures:** To implement measures included in MHCP.	▪ The MHCP, HMP, and Open Space Management Plan (OSMP) conservation measures are currently being implemented during the approval process for all development projects and preserve management activities.
11.5	**Regional Conservation:** To effectuate the conservation of 307.6 acres of land within the MHCP Gnatcatcher Core Area, and convey the property to a qualified preserve manager.	▪ The city has met 294.67 acres of its coastal sage scrub conservation obligation through acquisition (80.22 acres), project mitigation (150.26 acres), and habitat enhancement credit (64.19 acres). ▪ The city reimbursed Lennar (developer) for the 50.13 acres that were purchased up-front (see above) on April 26, 2011. ▪ The city entered into an agreement on July 26, 2011, with the Wildlife Agencies and Conservation Fund to acquire 30.09 acres of conservation credit over 4 years. The city made the final payment on October 22, 2014. ▪ The Core Area properties are protected under a conservation easement, and are being monitored and managed by the CNLM.
11.6	**Cooperative Regional Implementation:** To participate in MHCP Elected Officials Committee.	▪ To date, the city is the only MHCP jurisdiction with an approved subarea plan, so this is not applicable at this time; however, the city participates in meetings to discuss MHCP-wide issues with other MHCP jurisdictions and SANDAG as needed.
12.1 **12.2** **12.4** **12.5**	**Monitoring and Reporting:** To track habitat gains and losses within the HMP area (which should occur in rough step with one another); to maintain its database of biological resources; to submit an annual report by December 1 of each year; to hold a public meeting to discuss HMP implementation; to provide the Wildlife Agencies with additional reports if necessary for compliance monitoring; and to certify all reports.	▪ Habitat gains and losses are being tracked through Habitrak. Rough step preserve assembly is built into the city's permitting process. ▪ Currently, the city is working with the Preserve Steward, preserve managers, city GIS staff, and SDMMP to determine the best approach to collect and manage monitoring data. ▪ Protocols and standards have been developed with regard to baseline surveys and monitoring (survey methods and data format), entry and attributing of GIS data, and data management. ▪ Annual public HMP workshops are held every year to give participants an opportunity to learn about current HMP preserve assembly, management, and monitoring, and to ask questions and provide comments. ▪ Annual HMP status reports are submitted to Wildlife Agencies each year. The public also has an opportunity to view these reports prior to the annual meeting and provide comments.
12.3	**Preserve Management and Monitoring Plan:** To prepare a preserve management and monitoring plan that will detail recommendations in HMP Section F.	▪ The OSMP is the Preserve Management and Monitoring Plan described in IA Section 12.3, and the subarea framework management plan described in MHCP Vol. III, Section 1.2. The first complete draft was finalized in May 2004. The document was completed in September 2004 and accepted by the Carlsbad City Council in December 2005.

IA Section	Obligation	City Compliance
13.0	**Adaptive Management:** To ensure that adaptive management actions do not result in less mitigation than provided for the HMP Covered Species under the original terms of the HMP, unless approved by the Wildlife Agencies.	▪ The city complies with this policy by having ongoing discussions with preserve managers on management activities and by requiring adaptive management within all actively managed preserves and annual reporting. ▪ The city is coordinating with the regional adaptive management and monitoring efforts through the San Diego Management and Monitoring Program. ▪ The city has developed Guidelines for Preserve Management (TAIC 2009), which include monitoring and management priorities and a monitoring report checklist (Appendix C).
14.0	**Funding:** 14.1 MCHP Core Area Participation 14.2 Preserve Management and Monitoring Plan 14.3 Management of city-owned public lands 14.4 Management of private lands in HMP area 14.5 Management of Existing Hardline areas 14.6 Program Administration 14.7 Habitat In-Lieu Mitigation Fees	14.1 The city has met 294.67 acres of its 307.6-acre coastal sage scrub conservation obligation. The city must cause conservation of an additional 12.93 acres; this obligation will be funded through habitat mitigation fees. 14.2 The Preserve Management and Monitoring Plan (known as the Open Space Management Plan, or OSMP) was completed in September 2004 using city funds and a Local Assistance Grant from CDFW. 14.3 City-owned preserves are currently being actively managed and monitored by CNLM. 14.4 The city requires all private development projects within the HMP to fully fund perpetual management of associated preserve land prior to issuing a grading permit. 14.5 Hardline preserves in existence before final HMP approval are owned and managed by several other entities, including the CDFW, private HOAs, University of California, SDG&E, Cabrillo Power, and San Dieguito Union High School District. 14.6 The HMP program is overseen by Rosanne Humphrey (City of Carlsbad Environmental Management Division). In addition, the city has contracted with Environmental Science Associates to serve as the city's Preserve Steward, who coordinates management throughout the HMP Preserve and monitors HMP compliance and management effectiveness. 14.7 The city has implemented a habitat mitigation fee program for new development that will fund the city's remaining Gnatcatcher Core Area obligations.

[1] IA – Implementing Agreement

Table 2. Summary of City Compliance with Terms and Conditions of CDFW Permit through RY 15 (2018–2019)

CDFW NCCP Permit Terms and Conditions (T&C)	Description of City Compliance
Section 6.1 Conditions A through F are the same as those stated in A through F of the Implementing Agreement (IA), Section 11.3 (See Table 12). They are summarized below. A. Urgency Ordinance – interim HMP enforcement. B. Amend Open Space and Conservation Element of General Plan to incorporate HMP. C. Amend Open Space Ordinance to incorporate Conserved Habitat Areas. D. Amend Municipal Code to incorporate Standards Area compliance. E. Amend General Plan to identify HMP as priority use for open space lands. F. Wetlands Protection Program.	See Table 5, IA Section 11.3.
G. This permit is subject to compliance with the MHCP Volumes I–III, HMP, including Addenda 1 and 2, and the IA.	All project approvals within the city are subject to these requirements as a condition of approval.
H. Coverage for thread-leaved brodiaea (*Brodiaea filifolia*) and approval of the Fox-Miller Project. The conditions are as described in the USFWS 10(a) Permit Condition 7 (Table 12).	See Table 7, USFWS 10(a) Permit Condition 7 for a description of compliance.
I. All monitoring and reporting must comply with MHCP Vol. I and III, and IA Section 12. Annual reports are due no later than December 1 of each year. MHCP Volume II includes the following policies and conditions: • Standard Best Management Practices (Appendix B) • General Outline for Revegetation Plans (Appendix C) • Narrow Endemic Species and Critical Population Policies (Appendix D) • Conditions for Estuarine Species (Appendix E) • CEQA requirements for quantifying and mitigating impacts	See description for Condition G. MHCP Vol. II policies and conditions are reviewed during regular HMP compliance review for all new projects within Carlsbad. In addition, these policies have been integrated and/or referenced in the city's Guidelines for Biological Studies.

Table 3. Summary of City Compliance with the Terms and Conditions of USFWS Permit through RY 15 (2018–2019)

Federal ESA 10(a) Permit Terms and Conditions (T&C)	Description of City Compliance
1. All sections of Title 50 Code of Federal Regulations (CFR) 13, 17.22, and 17.32 are conditions of this permit.	Appropriate language has been integrated into the HMP and IA; therefore, compliance with these documents ensures compliance with Title 50 CFR sections.
2. The permittee is subject to compliance with the MHCP, HMP, and IA.	The city complies with all regulations as described in Tables 5 and 6.
3. The amount and form of take are authorized as described below. Referenced tables are from Attachment 2 of the T&C, and are the same as List 1-3 Species in HMP Section C. Coverage for species in HMP Tables 2 and 3 below require the city to submit in writing a request for coverage, including documentation showing compliance. Table 1. (a) No take authorized for the following species: *Chorizanthe orcuttiana* – Orcutt's spineflower *Dudleya blochmaniae* ssp. *blochmaniae* – Blochman's dudleya *Euphorbia misera* – Cliff spurge *Hazardia orcuttii* – Orcutt's hazardia *Quercus dumosa* – Nuttall's scrub oak *Pelecanus occidentalis californicus* – California brown pelican *Falco peregrinus* – American peregrine falcon *Rallus longirostris levipes* – Light-footed Ridgway's rail *Sterna antillarum browni* – California least tern *Charadrius alexandrinus nivosus* – Western snowy plover *Sterna elegans* – Elegant tern Table 1. (b) Take authorization is or will be (upon listing) granted for: **Listed species:** *Empidonax traillii extimus* – Southwestern willow flycatcher *Vireo bellii pusillus* – Least Bell's vireo *Polioptila californica californica* – Coastal California gnatcatcher	Table 1 (a). No take of these species has been authorized by the city. Table 1 (b). No Incidental Take Permits have been issued by the city for these species.

Federal ESA 10(a) Permit Terms and Conditions (T&C)	Description of City Compliance
Not yet listed: *Panoquina errans* – Salt marsh skipper *Euphyes vestris harbisoni* – Harbison's dun skipper *Plegadis chihi* – White-faced ibis *Accipiter cooperii* – Cooper's hawk *Pandion haliaetus* – Osprey *Icteria virens* – Yellow-breasted chat *Aimophila ruficeps canescens* – So. California rufous-crowned sparrow *Passerculus sandwichensis beldingi* – Belding's savannah sparrow *P.s. rostratus* – Large-billed savannah sparrow *Aspodoscelis hyperythrus beldingi* – Orange-throated whiptail	Table 1 (b). No Incidental Take Permits have been issued by the city for these species.
Table 2. Take authorization contingent upon other MHCP subarea plans being permitted for the following species: *Acanthomintha ilicifolia* – San Diego thornmint *Ambrosia pumila* – San Diego ambrosia *Ceanothus verrucosus* – Wart-stemmed ceanothus *Dudleya viscida* – Sticky dudleya *Ferocactus viridescens* – San Diego barrel cactus *Quercus engelmannii* – Engelmann oak	Table 2. No other MHCP subarea plans have been permitted, and thus take authorization for these species has not been granted by the city.
Table 3. (a) Take authorization contingent upon adequate funding and legal access to manage and monitor the following species: *Arctostaphylos glandulosa* ssp. *crassifolia* – Del Mar manzanita *Baccharis vanessae* – Encinitas baccharis *Brodiaea filifolia* – Thread-leaved brodiaea *Comarostaphylis diversifolia* ssp. *diversifolia* – Summer-holly *Corethrogyne filaginifolia* var. *linifolia* – Del Mar sand aster *Pinus torreyana* ssp. *torreyana* – Torrey pine	Table 3 (a). Take authorization for thread-leaved brodiaea was granted by the Wildlife Agencies to the city on December 2, 2005, based upon the management required for Fox-Miller property. Take of this species was not granted during the reporting period. No take of any other species from this list has been granted by the city.

Federal ESA 10(a) Permit Terms and Conditions (T&C)	Description of City Compliance
Table 3. (b) Take is contingent upon (a), described above, *and* the city receiving legal control over the vernal pools adjacent to the Poinsettia Train Station. *Eryngium aristulatum* var*. parishii* – San Diego button-celery *Myosurus minimus* ssp. *apus* – Little mousetail *Navarretia fossalis* – Spreading navarretia *Orcuttia californica* – California Orcutt grass *Streptocephalus woottoni* – Riverside fairy shrimp *Branchinecta sandiegonensis* – San Diego fairy shrimp Table 3. (b) Take is contingent upon (a) and (b), described above, and upon other MHCP subarea plans being permitted. *Iva hayesiana* – San Diego marsh-elder	Table 3 (b). The city received legal control over the vernal pools by accepting the Coastal Commission's Irrevocable Offer to Dedicate a Conservation Easement in 2015. Take for vernal pool species has not been requested. No other take authorizations have been requested.
4. The FESA Section 10(a) constitutes a Special Purpose Permit for the take of HMP covered species which are listed as threatened or endangered under the FESA, and which are also protected by the Migratory Bird Treaty Act of 1918, as amended. The Special Purpose Permit will be valid for three years after effective date and may be renewed as long as 10(a) permit conditions are being met. *Sterna antillarum browni* – California least tern *Empidonax traillii extimus* – Southwestern willow flycatcher *Vireo bellii pusillus* – Least Bell's vireo *Passerculus sandwichensis beldingi* – Belding's savannah sparrow	The Special Purpose Permit has been in effect during the current reporting period. No take of these species has been granted.
5. The Permittee shall not allow clearing and grubbing in known or potentially occupied California gnatcatcher habitat between February 15 and August 31.	This requirement is included in Municipal Code 21.210.040 and HMP Table 9. Compliance is a condition of approval for every new development project.
6. Specific standards (described in the T&C) must be met if the city proceeds with any of the following plans: (a) Cannon Road Reach 4 (b) Extension of Melrose Drive through the Shelley Property (c) Marron Road through Buena Vista Creek Ecological Reserve	None of these projects have been proposed at this time.

Federal ESA 10(a) Permit Terms and Conditions (T&C)	Description of City Compliance
7. To receive coverage for thread-leaved brodiaea, the city must demonstrate that: (a) The Fox-Miller project meets the narrow endemic standards for this critical location and major population of this species. (b) The proposed hardline shown in Addendum 2 (2003) of the HMP is not permitted (it does not meet the MHCP standards). (c) The Wildlife Agencies must concur with the Fox-Miller project proposal, and the conserved area must be managed and monitored to MHCP standards in perpetuity. (d) If all conditions are met, the Fox-Miller project can be permitted under the HMP through the HMP amendment process.	(a) The NE standards have been met. (b) The boundary was expanded to meet MHCP standards. (c) The Wildlife Agencies approved the Fox-Miller project. Mitigation requirements have not been completed. Interim management is conducted by Helix via annual contract with the landowner. Long-term management will be provided by SDHC upon mitigation signoff. (d) Brodiaea coverage was granted by the Wildlife Agencies through a minor amendment December 2, 2005.
8. To minimize impacts to the California gnatcatcher, rufous-crowned sparrow, and orange-throated whiptail, the city must: (a) Maintain and/or widen the habitat corridor between the city and Oceanside as much as feasible. (b) If the driving range adjacent to the Kelly/Bartman property is proposed for a different use, the city will ensure that an onsite corridor is established on the driving range property.	(a) The corridor on the NE boundary of Carlsbad is conserved. Along the northern boundary, the Buena Vista Creek ER was acquired in 2007, resulting in 100% conservation, and the Summit (Kelly-Bartman) property was acquired by CDFW in 2010. (b) No other uses for this property have been proposed at this time.
9. As part of the project review process, a qualified biologist shall survey for all species with immediate and conditional coverage.	The city has included this as a condition of approval for all new projects.
10. The city will contact the USFWS Carlsbad Office immediately regarding any violations or potential violations of the FESA or the Migratory Bird Treaty Act.	The city regularly communicates with the USFWS on regulatory issues, and contacts the appropriate personnel immediately upon learning of any potential problems.
11. The city will notify the USFWS within one working day of finding any dead, injured, or sick threatened/endangered species.	No such individuals have been reported to or observed by the city.
12. All monitoring and reporting for this permit shall be in compliance with the MHCP (Vol. I and III) and the IA (Section 12).	See IA Section 12 discussion in Table 10 above for compliance information.
13. A copy of this permit must be on file with the city, its authorized agents, and third parties under the jurisdiction and direct control of the city.	A copy of this permit is on file with the city and is available to any interested parties.

Table 4. Compliance with Zone-Wide Standards through RY 15 (2018–2019)

Zone	Zone-Specific Standard	Current Status
All Zones	A minimum of 67% of coastal sage scrub and 75% of the gnatcatchers shall be conserved overall within the Standards Areas.	Baseline acres of coastal sage scrub habitat within Standards Areas: 189.3. Coastal sage scrub gains = 83.7 acres (44.2%). Coastal sage scrub loss = 27.9 acres (14.7%). An additional 43.1 acres must be conserved to meet 67% conservation in the Standards Areas (126.8 acres). Occupied gnatcatcher habitat is mitigated at 2:1; therefore, there will be no net loss of gnatcatcher habitat within Standards Areas. The 75% standard is applied to every project individually.
Zone 1	Preserve at least 50% of coastal sage scrub and avoid areas occupied by gnatcatchers. Applies to several vacant lots on north shore of Agua Hedionda Lagoon and a larger, vacant in-fill lot SW of El Camino Real and Kelly Drive.	Vacant lots on the north shore of Agua Hedionda Lagoon: no projects have been finalized for these parcels. In-fill parcel (Aura Circle): property changed to a Proposed Hardline preserve during Coastal Commission processing of the HMP. A tentative map conserving the Proposed Hardline preserve was approved; however, no grading permit has been issued.
Zone 2	1. Kelly/Bartman property: 50% of this property shall be conserved and must form a continuous corridor from the SE corner of the property to the northern edge. 2. Spyglass property: grasslands impacted on this property shall have offsite mitigation at 2:1 ratio.	Kelly-Bartman property (Summit): Existing Hardline preserve approved with 50% conservation, including an open space corridor from the southeast to the northern site boundary. Spyglass property: has been developed and grassland impacts were mitigated at a 2:1 ratio through restoration at Carlsbad Highlands Mitigation Bank.
Zone 8	1. Kirgis property: a maximum of 25% can be developed. 2. Callaghan property: a maximum of 50% can be developed. No impacts to narrow endemic species on either property.	Kirgis property: tentative map approved with 75% percent conservation; however, no grading permit has been issued. Callaghan property: no tentative map has been approved for this property.
Zone 14	Areas of upland habitat outside Linkage B may be taken in exchange for restoration and enhancement inside of the linkage as long as the result is conservation of at least 67% coastal sage scrub and associated gnatcatcher populations within southern portions of the zone.	Robertson Ranch encompasses the entirety of Zone 14. Due to agricultural activities, very little coastal sage scrub existed in the southern portion of the zone. The Existing Hardline Preserve, as approved by the Wildlife Agencies in 2005, 2007, and 2012, preserves 70% of the coastal sage scrub throughout the zone.
Zone 15	Maintain and enhance habitat linkages across Linkage C and adjoining Cores 3 and 5. Areas of upland habitat outside Linkage C may be taken in exchange for restoration and enhancement inside of the linkage as long as there is a no net loss of coastal sage scrub and associated gnatcatcher populations within southern portions of the zone.	Terraces at Sunny Creek and Rancho Milagro occur within Core Area 5 in the southern portion of Zone 15. No net loss of coastal sage scrub has occurred.
Zone 20	Create continuous habitat through Linkage F between Core Areas 4 and 6. No net loss of coastal sage scrub or maritime succulent scrub within standards areas of the zone.	Projects: Emerald Pointe, North Coast Calvary Chapel, and Muroya. All three projects were processed through a Consistency Finding and approved by the city and Wildlife Agencies. No net loss of coastal sage scrub or maritime succulent scrub occurred.
Zone 21	Ensure habitat connectivity and wildlife movement east-west across the zone.	Projects: Poinsettia Place, Manzanita Partners, and Poinsettia 61 Preserves provide east-west connectivity from El Camino Real to the Local Facilities Management Zone boundary.
Zone 25	At least 75% of the Sherman property must be conserved.	As of March 2007, 100% of the Sherman property (Buena Vista Creek Ecological Reserve) has been conserved.

Appendix B

Summary of Management and Monitoring Activities within HMP Management Units

November 1, 2018–October 31, 2019

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Summary of HMP Management and Monitoring Activities, Nov 2018–Oct 2019

Preserve Area	Management Entity	Management and Monitoring Activities
Agua Hedionda Lagoon area	**Agua Hedionda Lagoon Foundation**	▪ Continued Environmental Stewardship School field trips for all of the Carlsbad Unified School District, and 12 surrounding districts totaling 8,750 students ▪ Organized free public education events including: Astronomy Night, Wolves of the West, Raptor Reflections, Bat Chats and Friends, Native American Gathering Night and lectures ▪ Hosted Composting workshops for the City of Carlsbad's Composting Program led by Re-Earth Consulting ▪ Removed 767.8lbs of trash debris and 135.8lbs of invasive species and weeds through our Corporate Clean-Up and Fundraising Event, Lagoona Kahuna Team Challenge, which hosted 15 companies and non-profits. ▪ Used a student-created bio survey application for community monitoring of flora/fauna species ▪ Conducted weekly inspections to monitor trails and easements ▪ Worked with the City of Carlsbad's Trail Rangers program for better enforcement and hiker awareness ▪ Worked with the City and the California Coastal Commission to ensure public safety on 3.1 miles of public access easements ▪ Hosted approximately 650 volunteers through trail maintenance events, and the Agua Hedionda Lagoon Discovery Center ▪ Monitored 132 acres of open space in the Coastal Zone ▪ Removed and monitored invasive plant species along trails and preserved areas ▪ Installed preventative measures for coastal bluff erosion ▪ Hosted monthly community bird walks and guided hikes around the lagoon ▪ Worked with the California Department of Fish and Wildlife (CDFW) Coastal Program and the Nature Collective to address infestations of Algerian sea lavender (*Limonium ramosissimum*) in the preserve and lay tarping to eradicate the species through solarization ▪ Created a thriving Pollinator Garden at the Discovery Center to create much needed habitat for migrating pollinators such as the monarch butterfly
	Preserve Calavera	▪ Conducted bi-monthly water quality and stream condition evaluations at three locations in sub-watershed. ▪ Initiated monthly volunteer sessions restoring two sites at La Costa Canyon
Agua Hedionda Lagoon Ecological Reserve	**CDFW**	▪ Treated invasive Algerian sea lavender and continued solarization study with Agua Hedionda Lagoon Foundation ▪ Removed invasive plants within reserve ▪ Conducted weekly inspections to monitor trails and easements ▪ Trimmed hazardous trees along property boundary ▪ Maintained boundary fencing and signage ▪ Conducted western snowy plover (*Charadrius alexandrinus nivosus*) winter window surveys and light-footed Ridgway's rail (*Rallus longirostris levipes*) breeding surveys ▪ Continued restoration efforts at Park Drive Restoration site (1.25 acres) ▪ Installed chain across creek mouth at property boundary to prevent trespass

Summary of HMP Management and Monitoring Activities, Nov 2018–Oct 2019
continued

Preserve Area	Management Entity	Management and Monitoring Activities
Arroyo La Costa area	**HOAs**	▪ Property-level management
Batiquitos Lagoon area	**Batiquitos Lagoon Foundation**	▪ Managed Restoration and Trail Maintenance program for general public, colleges, high schools, elementary schools, scouting organizations, corporations and other groups, which takes place twice a month. During this last reporting period, volunteers performed nearly 1,509 hours of work for this task ▪ Held fourteenth annual Kayak Batiquitos Lagoon Clean-Up two-day event in which over 1,000 pounds of trash were removed from the lagoon ▪ Conducted monthly bird counts ▪ Conducted educational public walks and talks ▪ Hosted many visitors (over 25,000) at the Nature Center with dedicated children's area, monthly talks, educational exhibits, and a large deck for bird watching ▪ Hosted City of Carlsbad Arts Council Club Pelican art and environmental education program ▪ Continued to work with Preserve Calavera in North County and participating in events such as King Tide presentations and hosting a Naturalist class ▪ Hosted numerous high school and college interns, as well as Eagle Scout projects ▪ Operated educational nature center, open to the public. Over 2,100 volunteer host hours were provided during this reporting period ▪ Installed a people and pet water fountain ▪ Installed 26 trail markers with QR codes, as part of an Eagle Scout project and donors ▪ Reviewed results from climate change workshops on potential impacts to the lagoon—will prepare an action plan to present to stakeholders (e.g., USFWS, CDFW, City of Carlsbad) ▪ Partnered with The Pacific Ridge School to study wildlife movement within the lagoon via 8 wildlife movement cameras ▪ Trimmed trees along portions of the lagoon's North Shore Trail ▪ Performed invasive plant removal and restoration in and adjacent to the San Pacifico Community as part of grant award

Summary of HMP Management and Monitoring Activities, Nov 2018–Oct 2019
continued

Preserve Area	Management Entity	Management and Monitoring Activities
Batiquitos Lagoon Ecological Reserve	**CDFW**	▪ Performed habitat management and breeding season surveys for California least tern, western snowy plover breeding season and wintering window surveys, and light-footed Ridgway's rail breeding surveys ▪ Maintained nesting sites ▪ Released 6 light-footed Ridgway's rails from breeding program ▪ Conducted Nuttall's acmispon (*Acmispon prostratus*) monitoring following San Diego Management and Monitoring Program's (SDMMP) inspect and manage protocol ▪ Collected Acmispon prostratus seeds to spread on other dune sites in the lagoon. ▪ Controlled invasive plant species within the preserve ▪ Cleaned up 1 homeless encampment ▪ Conducted weekly inspections to monitor trails and easements ▪ Worked with the city on La Costa Ave Storm Drain improvement project ▪ Completed invasive algae (*Caulerpa taxifolia*) survey in all three basins ▪ Conducted surveys of sand deposits and lagoon shoreline ▪ Removed hazard trees along north shore trail ▪ Maintained boundary fencing and signage ▪ Completed Surf Monitoring at South Ponto State beach
Buena Vista Creek Ecological Reserve	**Landowner: CDFW** **Preserve Manager: CNLM**	▪ Completed 6 years of thread-leaved brodiaea (*Brodiaea filifolia*) population monitoring and life-history analysis ▪ Conducted thread-leaved brodiaea pollination monitoring ▪ Conducted shot hole borer monitoring, none were detected ▪ Treated and removed non-native plant species (fennel [*Foeniculum vulgare*], black mustard [*Brassica nigra*], castor bean [*Ricinus communis*], and pampas grass [*Cortaderia selloana*]) ▪ Mowed fuel zones in May 2019 ▪ Mapped special-status wildlife observations ▪ Conducted weekly patrols (trespass is common but no major issues) ▪ Updated kiosk materials quarterly ▪ Routinely maintained gates and fences and picked up trash as needed ▪ Completed annual work plan, budget, and annual report
Buena Vista Lagoon Ecological Reserve	**CDFW**	▪ Performed western snowy plover wintering window surveys and light-footed Ridgway's rail breeding surveys ▪ Controlled invasive plant species within the preserve ▪ Cleaned up 4 homeless encampments ▪ Removed 17 feral cat feeding stations ▪ Conduct trail maintenance activities ▪ Performed fire fuel reduction along north shore ▪ Conducted weekly inspections to monitor trails and easements

Summary of HMP Management and Monitoring Activities, Nov 2018–Oct 2019
continued

Preserve Area	Management Entity	Management and Monitoring Activities
Buena Vista Lagoon/Watershed	**Buena Vista Audubon Society**	▪ Conducted monthly bird counts, birding walks, and classes ▪ Conducted school tours and preschool story-time ▪ Conducted native plant club, outreach, and gardening
	Preserve Calavera	▪ Continued bi-monthly water quality and stream condition evaluations at three locations in sub-watershed. ▪ Engaged adjacent development to take action to reduce edge effects at El Salto falls, and in Buena Vista Creek Ecological Reserve
Calavera Area	**Preserve Calavera**	▪ Continued enhanced monitoring of Carlsbad Highlands Ecological Reserve wildlife impacts ▪ Continued monitoring of wildlife movement corridors and pinchpoints ▪ Supported city program for National Public Lands Day ▪ Continued bi-monthly volunteer work sessions as part of Village H restoration ▪ Supported wildlife movement-related data collection efforts at Village H
Calavera Hills Phase II/Robertson Ranch	**CNLM**	▪ Completed 6 years of thread-leaved brodiaea population monitoring and life-history analysis ▪ Completed 11th year of coastal sage scrub monitoring (native shrub and forb cover high with higher than average rain) ▪ Monitored Village H grassland ▪ Monitored wildlife movement, with a focus on reptiles, via camera in College Boulevard tunnel ▪ Surveyed for San Diego horned lizard (*Phrynosoma coronatum blainvillii*) ▪ Repaired minor fence breaks/issues ▪ Treated and removed non-native plant species (eucalyptus (*Eucalyptus* spp.), pampas grass, and black mustard) ▪ Maintained the old Village H restoration area; the new Village H restoration area was maintained and prepared for planting and seeding in future years ▪ Updated kiosks regularly ▪ Raked eucalyptus leaves at Village H bi-monthly (performed by Preserve Calavera) ▪ Mapped special-status wildlife observations ▪ Completed annual work plan, budget, and annual report; completed Conservation Easement (CE) compliance report ▪ Performed weekly patrols, site enforcement, and trash pickup

Summary of HMP Management and Monitoring Activities, Nov 2018–Oct 2019
continued

Preserve Area	Management Entity	Management and Monitoring Activities
Carlsbad Highlands Ecological Reserve	**CDFW**	▪ Conducted protocol-level coastal California gnatcatcher (*Polioptila californica californica*) surveys ▪ Remove unauthorized signage ▪ Removed 10 unsafe trail features and conducted trail maintenance ▪ Performed habitat restoration on 2 acres ▪ Conducted weekly inspections to monitor trails and easements ▪ Conduct fire fuel reduction along property boundary ▪ Controlled invasive plant species within the preserve ▪ Maintain boundary fencing and signage ▪ Engaged in Public Education efforts concerning allowed activities
Carlsbad Oaks North Preserve	**CNLM**	▪ Performed least Bell's vireo (*Vireo bellii pusillus*) monitoring (one observed incidentally) ▪ Completed 6 years of thread-leaved brodiaea population monitoring and life-history analysis ▪ Completed 11th year of coastal sage scrub monitoring (native shrub cover remains stable) ▪ Recorded presence of Argentine ants (*Linepithema humile*) in conjunction with coastal sage scrub monitoring ▪ Assessed Blochman's dudleya (*Dudleya blochmaniae* spp. *blochmaniae*) index plots ▪ Performed census of San Diego thornmint (*Acanthomintha ilicifolia*) population, visited all potential locations for future San Diego thornmint, and assessed habitat conditions (3 suitable locations) ▪ Removed non-natives, including pampas grass and fountain grass (*Pennisetum setaceum*) ▪ Maintained planting area adjacent to the El Fuerte trail ▪ Performed soil sampling to determine best locations for out-seeding new locales, seeded two new areas, assessed habitat and counted plants ▪ Assessed mule deer use of Faraday Avenue undercrossing via wildlife cameras ▪ Mapped special-status wildlife observations ▪ Conducted CE compliance monitoring and reporting ▪ Documented wildlife movement through Faraday undercrossing; motion-sensing camera ▪ Patrolled weekly ▪ Completed annual work plan, budget, and annual report; completed habitat management plan

Summary of HMP Management and Monitoring Activities, Nov 2018–Oct 2019
continued

Preserve Area	Management Entity	Management and Monitoring Activities
Carlsbad Raceway Preserve	**San Diego Habitat Conservancy (SDHC)**	▪ Conducted quarterly property inspections to assess the condition of the preserve, removed trash, flagged non-native plants, mapped graffiti and unauthorized dirt bike track, and reported homeless encampments ▪ Documented quarterly inspection, including observations and activities using quarterly log reports ▪ Installed traps to detect invasive shot hole borer (*Euwallacea* spp.) ▪ Inspected and replaced signs ▪ Monitored San Diego thornmint population ▪ Met with Pacific Ecological Foundation to discuss restoration of San Diego thornmint area ▪ Assessed vernal pool on preserve ▪ Removed non-native plant species (pampas grass, tocalote (*Centaurea melitensis*), fountain grass, fennel, natal grass (*Melinis repens*), black mustard, and sweet clover (*Melilotus officinalis*)). Performed weed removal in San Diego thornmint area ▪ Provided public outreach and education in the form of an annual newsletter ▪ Coordinated an educational nature walk and weed removal with prAna volunteers ▪ Hosted I Love a Clean San Diego Event and removed 1,300 pounds of trash and debris
City of Carlsbad Preserves	**CNLM**	▪ Performed habitat assessments and counts of thread-leaved brodiaea at Lake Calavera ▪ Monitored for Least Bell's vireo (at Poinsettia Park, Lake Calavera, and The Crossings Golf Course) and southwestern willow flycatcher (*Empidonax traillii extimus*) at (at Lake Calavera and The Crossings Golf Course) ▪ Trapped brown-headed cowbird (*Molothrus ater*) at The Crossings Golf Course ▪ Conducted coast live oak tree (*Quercus agrifolia*) assessments ▪ Assessed habitat for invasive shot-hole borer and signs of Fusarium (*Fusarium* sp.) dieback and gold-spotted oak borer (*Agrilus coxalis*) ▪ Treated or removed non-native species considered to be zero or moderate-tolerance plants ▪ Conducted routine patrols to protect the preserve, maintained fences, and provided information to visitors ▪ Participated in volunteer events organized by the city ▪ Maintained and frequently updated kiosk with new materials
Dawson-Los Monos Canyon Reserve	**UCSD**	▪ Basic stewardship-level management ▪ Educational programs and scientific research
Emerald Pointe Preserve	**SDHC**	▪ Performed quarterly inspections to document habitat composition and needs, remove trash, and flag non-native plants ▪ Installed two signs and repaired barbed wire fencing in two areas ▪ Met with Pacific Ecological Foundation to discuss pollinator habitat in Carlsbad ▪ Performed non-native plant flagging, mapping, and removal, primarily of tocalote and black mustard ▪ Weed-whacked the area around the San Diego thornmint population ▪ Monitored San Diego thornmint population and Palmer's grapplinghook (*Harpagonella palmeri*)
Encinas Creek/North County Habitat Bank	**CNLM**	▪ Performed surveys for least Bell's vireo and coastal California gnatcatcher (neither detected)

Summary of HMP Management and Monitoring Activities, Nov 2018–Oct 2019
continued

Preserve Area	Management Entity	Management and Monitoring Activities
Preserve		▪ Performed wildlife camera surveys to determine presence and use of the preserve by large mammals and human trespass ▪ Cut and chipped 24 trees infected with Kuroshio shot-hole borer and Fusarium fungus to reduce spread ▪ Mapped special-status wildlife observations ▪ Controlled and removed non-native plant species (pampas grass, Mexican fan palm [*Washingtonia robusta*], and black mustard) ▪ Continued habitat restoration in the southeastern area of the property ▪ Conducted biweekly patrols, site enforcement, and trash pickup ▪ Composed annual work plan, budget, and annual report
Fox-Miller Preserve	**Helix**	▪ Monitored thread-leaved brodiaea for peak bloom and conducted annual assessment ▪ Managed non-native plants, primarily including black mustard, sow thistle (*Sonchus oleraceus*), bristly ox tongue (*Helminthotheca echioides*), and scarlet pimpernel (*Lysimachia arvensis*) ▪ Conducted monthly monitoring visits ▪ Mapped occurrences of sensitive species ▪ Monitored gopher burrows ▪ Performed maintenance and trash removal
Kelly Ranch Preserve	**CNLM**	▪ Noted and mapped sensitive plants and animals when observed ▪ Counted Orcutt's hazardia (*Hazardia orcuttii*), Del Mar manzanita (*Arctostaphylos glandulosa* spp. *crassifolia*), California desert thorn (*Lycium californicum*), and cliff spurge (*Euphorbia misera*) populations ▪ Removed or treated non-native plant species (pampas grass, natal grass, Russian thistle (*Salsola tragus*), and tree tobacco [*Nicotiana glauca]*) ▪ Performed regular patrol, site enforcement, and trash removal ▪ Conducted annual conservation easement compliance visit ▪ Contacted neighbors and Home Owner's Association (HOA) regarding issues of concern ▪ Completed annual work plan, budget, annual report
La Costa Collections Preserve	**San Diego Urban Corps Habitat Services**	▪ Assumed management of wetland mitigation area. ▪ Monitored health of the Nuttall's scrub oak (*Quercus dumosa*) and southern maritime chaparral. ▪ Removed trash along El Camino Real ▪ Conducted photo documentation at established photo points ▪ Conducted general biological monitoring ▪ Conducted biannual site monitoring to inspect signs, map non-native plants and trash for subsequent removal ▪ Removed fountain grass ▪ Observed coastal California gnatcatcher incidentally within preserve ▪ Mapped and inventoried sensitive plant species Del Mar sand aster (*Corethrogyne filaginifolia* var. *linifolia*) ▪ Within 0.13-acre restoration area, removed persistent non-natives such as crown daisy (*Glebionis coronaria*) and crystalline ice plant (*Mesembryanthemum crystallinum*).

Summary of HMP Management and Monitoring Activities, Nov 2018–Oct 2019
continued

Preserve Area	Management Entity	Management and Monitoring Activities
		▪ Monitored one vegetation transect to act as a reference for year 5 post-fire monitoring
La Costa Glen Preserve	**CNLM**	▪ Located new occurrences of seaside calandrinia (*Cistanthe maritima*). ▪ Performed wildlife movement monitoring and management using motion sensing cameras ▪ Cut and treated thousands of individuals of veldt grass (*Erhardta calycina*), and other invasive plant species ▪ Assessed vegetation health and composition ▪ Conducted bi-weekly patrols to deter homeless encampments from being established ▪ Removed trash from preserve and adjacent wildlife tunnels; similarly, vagrant populations were deterred and removed repeatedly from the tunnel ▪ Completed annual work plan, budget, and annual report ▪ Mapped all sensitive flora and fauna encountered
Laurel Tree Lane Preserve	**SDHC**	▪ Installed and monitored shot hole borer bait stations ▪ Performed quarterly monitoring to map and remove non-native plant species including onionweed (*Asphodelis fistulosus*), shortpod mustard (*Hirschfeldia incana*), pampas grass, looked for signs of trespass and assessed need for remedial measures ▪ Removed trash within preserve and abandoned homeless encampment ▪ Reported broken trail fence and homeless encampment to City ▪ Maintained wildlife monitoring camera ▪ Provided annual newsletter to property manager for neighboring 24 Hour Fitness corporate office for electronic distribution to tenants, landowner, and maintenance contractor
Manzanita Partners Preserve	**Habitat Restoration Sciences**	▪ Patrolled and conducted site enforcement ▪ Inspected vernal pools for overall health and species occurring ▪ Removed non-native plant species, including mustard tree tobacco, and castor bean; removed trash ▪ Noted all animal species observed and mapped locations of any sensitive species ▪ Conducted post-fire recovery transects per CNLM methods and oak tree post-fire recovery ▪ Conducted survey for potential invasive shot hole borer and goldspotted oak borer ▪ Reported and described data collected and management actions taken on the preserve to the City
Morning Ridge Preserve	**Dudek**	▪ Conducted qualitative biological monitoring: note non-native invasive plant species cover, trash and debris accumulation, and other changes in the habitat composition ▪ Performed transect monitoring to assess post-fire habitat recovery ▪ Provided guidance to Green Valley Landscape. Landscape crew removed trash and debris, treated and removed invasive species, installed additional erosion control (silt fencing, sand bags, etc.), and controlled rodent problems through trapping
Muroya Preserve	**SDHC**	▪ Conducted quarterly monitoring, mapped invasives, removed trash, assessed need for remedial measures;

Summary of HMP Management and Monitoring Activities, Nov 2018–Oct 2019
continued

Preserve Area	Management Entity	Management and Monitoring Activities
		provided quarterly log ▪ Performed invasive treatments on tree tobacco, fennel, poison hemlock (*Conium maculatum*), and black mustard ▪ Performed protocol coastal California gnatcatcher survey ▪ Repaired gate ▪ Surveyed trees for invasive shot hole borer
New Crest Preserve	**Urban Corps of San Diego County**	▪ Conducted annual biological monitoring, including photo documentation ▪ Removed non-native plant species, primarily black mustard and crown daisy ▪ Completed annual report, annual work plan, and budget
North Coast Calvary Chapel Preserve	**Helix Environmental (*interim management*)**	▪ Treated non-native invasive species, including black mustard, Russian thistle, tree tobacco, and pampas grass ▪ Conducted monthly monitoring visits to check on biological resources; inspected signs; monitored for unauthorized access; monitored for erosion ▪ Performed wart-stemmed ceanothus (*Ceanothus verrucosus*) inventory ▪ Noted presence of coastal California gnatcatcher ▪ Replaced damaged sign ▪ Removed trash as encountered
Paseo del Norte Preserve	**San Diego Urban Corps Habitat Services**	▪ Performed quarterly biological monitoring and conducted photo documentation ▪ Patrolled the preserve; removed trash ▪ Removed drying ice plant (*Carpobrotus edulis*) that was previously pulled; removed other non-native plant species focusing on pampas grass ▪ Completed annual report, annual work plan, and budget
Poinsettia Place Preserve	**San Diego Urban Corps Habitat Services**	▪ Performed annual biological monitoring and post-fire monitoring ▪ Conducted general quarterly monitoring to survey for signs of trespass, breaks in the fence, and non-native plant invasions ▪ Replaced vandalized sign along eastern boundary ▪ Observed coastal California gnatcatcher incidentally within the preserve ▪ Removed non-native crown daisy along the trail in the middle portion of the site ▪ Mapped and removed trash and non-native plant species on-site
Poinsettia/Aviara area	**Aviara Master HOA**	▪ Property-level management
	Other HOAs	▪ Property-level management
Poinsettia Station Vernal Pools	**City of Carlsbad (Dudek/HRS)**	▪ Performed baseline biological surveys, included mapping San Diego button celery (*Eryngium aristulatum*) and spreading navarretia (*Navarretia fossalis*) ▪ Monitored hydrology and inundation of vernal pools, ▪ Conducted vernal pool floral surveys, as well as a survey for fairy shrimp species ▪ Oversaw SANDAG pot-holing and subsequent restoration and weed removal

Summary of HMP Management and Monitoring Activities, Nov 2018–Oct 2019
continued

Preserve Area	Management Entity	Management and Monitoring Activities
Quarry Creek Preserve	**SDHC**	▪ Repaired permanent preserve signs and broken fence in two locations ▪ Removed targeted invasive plants such as tree tobacco, fennel, black mustard, and castor bean ▪ Performed monthly inspections and log reports to record wildlife, flag non-natives for removal, and report and remove homeless encampments and associated trash—removed trash on many occasions ▪ Hosted volunteer cleanup events ▪ Monitored for signs and symptoms of invasive shot hole borer, used bait stations ▪ Conducted presence/absence surveys for least Bell's vireo (protocol-level) and brown-headed cowbird ▪ Performed outreach and education: attended one meeting with HOA and provided annual brochure to homeowners ▪ Completed annual report
Rancho La Costa Preserve	**CNLM**	▪ Completed 6-year monitoring and life-history analysis of thread-leaf brodiaea ▪ Completed 11th year of coastal sage scrub monitoring ▪ Assessed Argentine ants' presence/absence within coastal sage scrub monitoring plots ▪ Conducted focused surveys for sensitive plants: San Diego thornmint, Orcutt's brodiaea, Orcutt's hazardia, and sticky dudleya (*Dudleya viscida*) ▪ Counted flowering thread-leaved brodiaea and performed pollinator study ▪ Performed soil sampling to determine best locations for San Diego thornmint out-seeding, performed seeding in two locations, assessed habitat, and counted plants ▪ Conducted post-fire monitoring using established transects and oak tree assessments at Poinsettia Fire burn areas. These areas were also frequently managed for invasive plant species ▪ Performed monitoring for least Bell's vireo ▪ Conducted 5th year of post-fire monitoring of Poinsettia fire habitat recovery ▪ Treated and removed hundreds of non-native plant species including Eucalyptus, perennial veldt grass, onionweed, perennial pepperweed (*Lepidium latifolium*), Ward's weed (*Carrichtera annua*), fountain grass, and pampas grass ▪ Planted coastal sage scrub demonstration garden, maintained non-native plant species within, and improved adjacent grassland with assistance from preserve Calavera and neighbors. ▪ Conducted patrols multiple times weekly ▪ Maintained kiosk information ▪ Hosted outreach meetings regarding Ward's weed identification and control ▪ Hosted events to maintain restoration plots and sow seed ▪ Hosted volunteer trail work day events in collaboration with San Diego Mountain Biking Association (SDMBA) ▪ Completed annual work plan, budgeting, annual report, and conservation easement compliance monitoring and reporting
Sage Creek High School Preserve	**SDHC**	▪ Performed quarterly patrols and associated reports to observe and document the biodiversity of the site and substantial changes in the habitat composition, remove trash, remove and/or map non-native plant species,

Summary of HMP Management and Monitoring Activities, Nov 2018–Oct 2019
continued

Preserve Area	Management Entity	Management and Monitoring Activities
		look for signs of trespass, and assess the need for remedial measures ▪ Treated and removed non-natives, primarily black mustard, artichoke thistle (*Cynara cardunculus*), Russian thistle, and castor bean ▪ Installed native coastal sage scrub plant seed with Sage Creek High School students
Southern Preserve	**San Diego Urban Corps Habitat Services**	▪ Monitored fence installation along the trail, repaired broken fence rail, and amended fence design ▪ Performed annual biological monitoring to assess biological resources and document the locations of sensitive plants: California adolphia (*Adolphia californica*), San Diego goldenstar (*Bloomeria clevelandii*), and ashy spike-moss (*Selaginella cinerascens*) ▪ Removed non-native species, primarily artichoke thistle (*Cynara cardunculus*), tamarisk (*Tamarix ramosissima*), and palms ▪ Conducted site monitoring and enforcement once a month; patrolled for unauthorized use of closed trails and off-leash dogs ▪ Documented coastal California gnatcatcher incidentally within preserve ▪ Participated in wildlife movement study to note signs of southern mule deer ▪ Prepared an informational poster on sensitive species and keeping dogs leashed for kiosk display
Multiple areas	**Preserve Calavera**	▪ Supported community education on native plants, wildlife, and preserve management issues at various fairs and outreach events ▪ Continued several Citizen Scientist projects including roadkill monitoring, water quality testing, grunion reporting, King tides event ▪ Supported improvements to preserve monitoring/enforcement
Throughout the HMP Preserve system	**City Parks and Recreation Department**	▪ Conducted trail clean up and maintenance biyearly via volunteers ▪ Hosted quarterly trail volunteer meetings ▪ Hosted public outreach events such as National Trails Day and National Public Lands Day

Appendix C

Sample Photos (Stills Taken from Videos) of Wildlife at Village H Property

June 25, 2019–December 31, 2019

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Wildlife Captured by Trail Cameras on Village H Property (2019)

Photos 1-6: Bobcats. Top left – bobcat watching joggers up on sidewalk at VH1; top center and top right – two juvenile bobcats playing together at VH7; bottom left – bobcat crossing under Tamarak west to east just one day after gate was opened at VH6; bottom center – three young bobcats crossing under Tamarak east to west at VH16; bottom right – bobcat traveling north along concrete v-ditch.

Wildlife Captured by Trail Cameras on Village H Property (2019)

Photos 7-8, coyotes: top left VH13, top right VH1. Photos 9-10, raccoons: middle left VH7, middle right VH17. Photos 11-12, striped skunks: bottom left VH15, bottom right VH7. Photos 13-14, great-horned owls: center right and bottom right VH1.

Appendix E

Poinsettia Fire Post-Fire Habitat Recovery

Final Report

2015-2019

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