



FINAL CITY OF SAN DIEGO VERNAL POOL HABITAT CONSERVATION PLAN

October 2017

City of San Diego
Planning Department
1010 Second Avenue, Suite 1200, MS 413
San Diego, California 92101



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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
GLOSSARY	ix
CHAPTER 1 – INTRODUCTION	1-1
1.1 Vernal Pool Habitat Conservation Plan Overview	1-1
1.1.1 Purpose and Need	1-2
1.1.2 Conservation Goals	1-3
1.1.3 Conservation Approach	1-4
1.2 Overview of Vernal Pools	1-4
1.3 Past and Current Vernal Pool Resource Planning Efforts	1-6
1.3.1 Vernal Pool Preservation Plan 1980	1-7
1.3.2 Multiple Species Conservation Program 1997	1-7
1.3.3 Vernal Pool Inventory 2002–2004	1-8
1.3.4 Updated Vernal Pool Database (2012)	1-9
1.3.5 Modeled Vernal Pool Habitat	1-9
1.3.6 Draft Vernal Pool Management and Monitoring Plan	1-9
1.3.7 Public Outreach	1-10
1.4 Regulatory Requirements	1-11
1.4.1 Federal Endangered Species Act	1-11
1.4.2 Migratory Bird Treaty Act	1-14
1.4.3 Bald Eagle and Golden Eagle Protection Act	1-15
1.4.4 National Historic Preservation Act	1-16
1.4.5 National Environmental Policy Act and California Environmental Quality Act	1-16
1.5 Incidental Take Permit	1-17
CHAPTER 2 – VERNAL POOL HCP PLAN AREA	2-1
2.1 Overview of VPHCP Plan Area	2-1
2.2 VPHCP Planning Units	2-4
2.2.1 North Planning Unit	2-4
2.2.2 Central VPHCP Planning Unit	2-10
2.2.3 South VPHCP Planning Unit	2-12
CHAPTER 3 – COVERED SPECIES	3-1
3.1 San Diego Fairy Shrimp	3-1
3.1.1 Species Biological Description	3-1

<u>Section</u>	<u>Page</u>
3.1.2 Listing Status	3-9
3.1.3 Status and Distribution.....	3-10
3.2 Riverside Fairy Shrimp	3-10
3.2.1 Species Biological Description	3-10
3.2.2 Listing Status	3-11
3.2.3 Status and Distribution.....	3-11
3.3 San Diego Button-celery	3-12
3.3.1 Species Biological Description	3-12
3.3.2 Listing Status	3-13
3.3.3 Status and Distribution.....	3-13
3.4 Spreading Navarretia	3-14
3.4.1 Species Biological Description	3-14
3.4.2 Listing Status	3-15
3.4.3 Status and Distribution.....	3-15
3.5 San Diego Mesa Mint	3-16
3.5.1 Species Biological Description	3-16
3.5.2 Listing Status	3-17
3.5.3 Status and Distribution.....	3-17
3.6 California Orcutt Grass	3-18
3.6.1 Species Biological Description	3-18
3.6.2 Listing Status	3-19
3.6.3 Status and Distribution.....	3-19
3.7 Otay Mesa Mint	3-20
3.7.1 Species Biological Description	3-20
3.7.2 Listing Status	3-21
3.7.3 Status and Distribution.....	3-21
3.8 Summary of Status Information for Covered Species	3-22
3.9 Threats and Pressures.....	3-26
CHAPTER 4 – COVERED PROJECTS AND ACTIVITIES.....	4-1
4.1 Covered Projects	4-1
4.1.1 Definition	4-1
4.1.2 List of Covered Projects.....	4-2
4.1.3 Future Development Projects.....	4-8
4.1.4 Maintenance, Development, and Expansion of Roads	4-9
4.1.5 Essential Public Projects.....	4-12
4.2 Covered Activities	4-12
4.2.1 Definition and Discussion.....	4-12

<u>Section</u>	<u>Page</u>
4.2.2 Operations for Public Safety and Fire Protection	4-12
4.2.3 Operations for Safety on Solid Waste Sites	4-14
4.2.4 Operations for Public Utilities	4-16
4.2.5 Preserve Management	4-17
4.2.6 Parks and Recreation	4-19
4.2.7 City of San Diego Airports	4-21
4.3 Planned Projects	4-22
4.3.1 Definition	4-22
4.3.2 List of Planned Projects	4-23
CHAPTER 5 – CONSERVATION STRATEGY	5-1
5.1 VPHCP Goal and Objectives	5-1
5.2 Conservation Measures	5-3
5.2.1 Avoidance and Minimization Measures	5-3
5.2.2 Habitat Protection	5-7
5.2.3 Species Protection	5-9
5.2.4 Protection of Designated Critical Habitat	5-14
5.3 Mitigation Framework	5-16
5.3.1 Compensatory Mitigation	5-16
5.3.2 General Conditions for Compensatory Mitigation	5-17
5.3.3 Mitigation Banking	5-24
CHAPTER 6 – IMPACT ANALYSIS	6-1
6.1 Direct Impacts to Vernal Pools and Modeled Habitat	6-4
6.2 Direct Impacts to Covered Species	6-6
6.2.1 Direct Impacts to Otay Mesa Mint	6-8
6.2.2 Direct Impacts to San Diego Mesa Mint	6-8
6.2.3 Direct Impacts to Spreading Navarretia	6-8
6.2.4 Direct Impacts to San Diego Button-celery	6-8
6.2.5 Direct Impacts to California Orcutt Grass	6-9
6.2.6 Take of Riverside Fairy Shrimp	6-9
6.2.7 Take of San Diego Fairy Shrimp	6-9
6.2.8 Direct Impacts to Critical Habitat	6-10
6.3 Indirect Impacts to Vernal Pools and Covered Species	6-16
6.4 Anticipated Impacts of the Taking	6-19
CHAPTER 7 – MANAGEMENT, MONITORING, AND REPORTING	7-1
7.1 Vernal Pool Conceptual Model	7-1

<u>Section</u>	<u>Page</u>
7.2 Overview of Adaptive Management.....	7-2
7.3 VPMMP Standards	7-5
7.4 Overview of VPHCP Monitoring and Management Strategy	7-6
7.5 Monitoring Approach.....	7-7
7.5.1 Monitoring Overview.....	7-11
7.5.2 Baseline Hydrologic Surveys.....	7-12
7.5.3 Qualitative Monitoring Methods.....	7-17
7.5.4 Quantitative Monitoring Methods.....	7-18
7.6 Management Approach.....	7-22
7.6.1 Management Action Triggers	7-23
7.6.2 Management Actions	7-24
7.7 VPMMP Data Collection, Analysis, and Reporting	7-29
7.8 Future Regional Population Trend Analysis.....	7-30
7.9 Opportunistic Management-Related Research	7-30
 CHAPTER 8 – IMPLEMENTATION.....	 8-1
8.1 Implementation Overview	8-1
8.2 MHPA Preserve Assembly	8-1
8.2.1 Implementation Tools.....	8-2
8.2.2 Implementation within Existing Conserved Lands.....	8-3
8.2.3 Discretionary Actions Required to Implement the VPHCP	8-3
8.3 Existing City MSCP NCCP Permit.....	8-5
8.4 Amendments	8-5
8.4.1 Mapping Corrections	8-5
8.4.2 Boundary Line Adjustments	8-6
8.4.3 Minor Amendments to the VPHCP	8-6
8.4.4 Major Amendments to the VPHCP.....	8-9
8.5 Transfer of Take Authorization and Annexations	8-10
8.6 Roles and Responsibilities	8-11
8.6.1 Permittee Responsibilities.....	8-11
8.7 Termination.....	8-14
 CHAPTER 9 – CHANGED AND UNFORESEEN CIRCUMSTANCES.....	 9-1
9.1 Unforeseen Circumstances.....	9-1
9.1.1 Assurances for Unforeseen Circumstances.....	9-1
9.1.2 Finding of Unforeseen Circumstances.....	9-2
9.1.3 Effects of Unforeseen Circumstances or Jeopardy on Take Authorization	9-3

<u>Section</u>	<u>Page</u>	
9.2	Changed Circumstances.....	9-3
9.2.1	Fire	9-5
9.2.2	Vandalism	9-7
9.2.3	Invasive Plants	9-7
9.2.4	Versatile Fairy Shrimp.....	9-9
9.2.5	New Listing or Designation of Critical Habitat.....	9-10
9.2.6	Climate Change.....	9-11
9.2.7	Plane Crash	9-13
CHAPTER 10 – VPHCP FUNDING		10-1
10.1	Funding Overview	10-1
10.1.1	General Fund.....	10-2
10.1.2	Enterprise Funds	10-2
10.1.3	Special Revenue Funds	10-3
10.1.4	Internal Service Funds	10-3
10.1.5	Capital Project Funds.....	10-3
10.1.6	Capital Improvements Program (CIP)	10-3
10.2	VPHCP Forecasted Costs	10-4
10.2.1	Preserve Assembly Costs.....	10-4
10.2.2	Management and Monitoring Costs.....	10-4
10.3	VPHCP Funding Mechanisms	10-8
10.3.1	Funding for One-Time Costs	10-9
10.3.2	Funding Mechanisms for Annual Costs.....	10-10
10.3.3	Annual Reporting of Funds.....	10-12
10.4	Funding Mechanisms for Changed and Unforeseen Circumstances	10-12
CHAPTER 11 – ALTERNATIVES TO TAKE		11-1
11.1	Alternatives to Take of San Diego Fairy Shrimp.....	11-1
11.1.1	Reduced Take Alternative.....	11-1
11.1.2	No Take Alternative.....	11-3
11.2	Alternatives to Take of Riverside Fairy Shrimp – No Take	11-4
CHAPTER 12 – REFERENCES		12-1
CHAPTER 13 – LIST OF PREPARERS		13-1

APPENDICES

- A Vernal Pool Indicator Species List
- B Vernal Pool Complex Data
- C Conservation Analysis Tables and Modeled Vernal Pool Habitat Data
- D Vernal Pool Management and Monitoring Plan (*Under Separate Cover*)
- E Cost Analysis
- F Model Certificate of Inclusion

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1-1 Schematic Cross-Section of a Vernal Pool	1-5
2-1 Vernal Pool HCP Plan Area.....	2-2
2-2 VPHCP Conservation Analysis Planning Unit North.....	2-5
2-3 VPHCP Conservation Analysis Planning Unit Central	2-6
2-4 VPHCP Conservation Analysis Planning Unit South.....	2-7
3-1 Location of Vernal Pools Occupied by San Diego Fairy Shrimp in the VPHCP Plan Area.....	3-2
3-2 Location of Vernal Pools Occupied by Riverside Fairy Shrimp in the VPHCP Plan Area.....	3-3
3-3 Location of Vernal Pools Occupied by San Diego Button-celery in the VPHCP Plan Area.....	3-4
3-4 Location of Vernal Pools Occupied by Spreading Navarretia in the VPHCP Plan Area.....	3-5
3-5 Location of Vernal Pools Occupied by San Diego Mesa Mint in the VPHCP Plan Area.....	3-6
3-6 Location of Vernal Pools Occupied by California Orcutt Grass in the VPHCP Plan Area.....	3-7
3-7 Location of Vernal Pools Occupied by Otay Mesa Mint in the VPHCP Plan Area.....	3-8
4-1 Covered Project VPHCP Tierra Alta	4-3
4-2 Covered Project VPHCP St. Jerome’s Church	4-4
4-3 Covered Project VPHCP Pasatiempo Parks	4-5
4-4 Covered Project VPHCP Pure Water.....	4-6
4-5 Planned Project VPHCP Castlerock	4-24
4-6 Planned Project VPHCP Rhodes Crossing	4-25
4-7 Planned Project VPHCP Candlelight.....	4-26
6-1 VPHCP Critical Habitat for Spreading Navarretia	6-12

<u>Figure</u>	<u>Page</u>
6-2 VPHCP Critical Habitat for Riverside Fairy Shrimp.....	6-13
6-3 VPHCP Critical Habitat for San Diego Fairy Shrimp	6-14
7-1 Vernal Pool Conceptual Model.....	7-3
7-2 HCP Adaptive Management Feedback Loop (Atkinson et al. 2004)	7-4
7-3 VPHCP Management and Monitoring Levels and Triggers.....	7-8
7-4 VPHCP Monitoring and Management Level Flow Chart.....	7-13
8-1 VPHCP Montgomery-Gibbs Executive Airport (Minor Amendment Area).....	8-8
10-1 City of San Diego Expenditures FY 2017 Adopted Budget: 3.4 Billion.....	10-2

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1-1 VPHCP Public Outreach/Input Opportunities	1-11
2-1 Existing Land Use and Land Cover in North VPHCP Planning Unit	2-4
2-2 Vernal Pool Resources in North VPHCP Planning Unit	2-9
2-3 Existing Land Use and Land Cover in Central VPHCP Planning Unit.....	2-11
2-4 Vernal Pool Resources in Central VPHCP Planning Unit.....	2-12
2-5 Existing Land Use and Land Cover in South VPHCP Planning Unit	2-13
2-6 Vernal Pool Resources in South VPHCP Planning Unit and Preserve.....	2-14
3-1 Vernal Pools Occupied with Covered Species in VPHCP Plan Area.....	3-1
3-2 Summary of Covered Species Key Information and Status in VPHCP Plan Area.....	3-23
4-1 Covered Road Projects.....	4-10
4-2 Covered Police and Fire Activities	4-13
4-3 Covered Solid Waste Activities	4-15
4-4 Public Utilities Covered Activities	4-17
4-5 Management Covered Activities.....	4-18
4-6 Parks and Recreation Covered Activities	4-20
4-7 Covered Airport Activities.....	4-22
5-1 VPHCP Conservation Objectives	5-2
5-2 Additional Conservation from Implementation of the VPHCP	5-9
5-3 Conservation of Vernal Pools Occupied with Covered Species (Total and % Pools Conserved)	5-11
5-4 Summary of Critical Habitat Conservation.....	5-14
6-1 Summary of Potential Vernal Pools Impacts in VPHCP Plan Area from Development	6-5

<u>Table</u>	<u>Page</u>
6-2 Summary of Covered Species Impacts Inside and Outside MHPA from Development.....	6-7
6-3 Summary of Designated Critical Habitat Conservation.....	6-10
6-4 Spreading Navarretia Critical Habitat Not Conserved.....	6-11
6-5 Riverside Fairy Shrimp Critical Habitat Not Conserved	6-15
6-6 San Diego Fairy Shrimp Critical Habitat Not Conserved.....	6-16
7-1 Monitoring Methods, Frequency, and Sample Size.....	7-15
7-2 Example Annual Schedule of Site Visits for Level 1 Monitoring and Management (Stewardship)	7-16
7-3 Monitoring Level 1 Example Vernal Pool Complex Sampling Selection.....	7-22
7-4 Weather Station and Mean Rainfall Information (1983 through 2013).....	7-23
7-5 Quantitative Management Triggers	7-23
7-6 Management Actions by Level	7-26
10-1 One-Time Costs (2014 dollars) to Restore and Enhance Vernal Pool Complexes within the VPHCP to Management Level 1	10-6
10-2 Annual Ongoing Costs (2014 dollars) for Management Level 1 Vernal Pool Complexes.....	10-6
10-3 Total One-Time and Annual Ongoing Costs (2014 dollars) for Vernal Pool Complexes within the VPHCP.....	10-7
11-1 Comparison of Conservation San Diego Fairy Shrimp VPHCP vs. Expanded Conservation Alternative	11-2

GLOSSARY

The following provides a list of terms that are used throughout the VPHCP (and definitions of the terms where appropriate) as well as the acronyms used for abbreviation of certain terms.

Term	Acronym/Definition
Applicant	City of San Diego (City)
Biological Opinion	BO
California Department of Fish and Wildlife	CDFW
California Endangered Species Act	CESA
California Environmental Quality Act	CEQA
California Native Plant Society	CNPS
California Orcutt grass	ORCA
Capital Improvements Program	CIP
Certificate of Inclusion	A certificate issued by the City to a Third Party to ensure compliance with the terms and conditions of the VPHCP and Permit that extends the City's Take coverage to such parties for Covered Activities carried out in accordance with the Take Authorizations under the Permit and in accordance with the terms and conditions thereof. (See Appendix E).
City of San Diego	City
City of San Diego City Council	City Council
City of San Diego Environmentally Sensitive Lands Regulations	ESL Regulations
City of San Diego Land Development Code	LDC
City of San Diego Land Development Manual	LDM
City of San Diego Multiple Species Conservation Program Subarea Plan	MSCP SAP
City of San Diego Vernal Pool Habitat Conservation Plan	VPHCP
City of San Diego Vernal Pool Monitoring and Management Plan	VPMMP
Clean Water Act	CWA

Term	Acronym/Definition
Code of Federal Regulations	CFR
Conserved lands	Lands with 100% hardline conservation (no development is permitted)
Covered Activities	Activities and uses that will be authorized under the VPHCP and be specifically identified as compatible with the VPHCP.
Covered Projects	Land development projects that will be authorized under the VPHCP and be specifically identified as compatible with the VPHCP.
Covered Species	Those listed species identified in the approved VPHCP to be conserved and managed consistent with the approved VPHCP such that, through approval of the VPHCP, USFWS will exempt their take under Section 10 of the Endangered Species Act.
California Rapid Assessment Method	CRAM
Environmental Growth Fund	EGF
Environmental Impact Report	EIR
Environmental Impact Statement	EIS
Essential Public Projects	EPP
Federal Endangered Species Act	FESA
Federal Register	FR
fiscal year	FY
geographic information system	GIS
Habitat Conservation Plan	HCP; a conservation plan prepared pursuant to Section 10(a)(1)(B) of FESA.
Hydrogeomorphic Model	HGM
Implementing Agreement	An agreement that binds the permittee to the requirements and responsibilities of a HCP and Section 10 permit. It may assign the responsibility for planning, approving, and implementing the mitigation measures under the HCP.
Incidental Take	Take of any federally listed wildlife species that is incidental to, but not the purpose of, otherwise lawful activities.
Incidental Take Permit	An official certificate, pursuant to Section 10 of the FESA, that exempts take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

Term	Acronym/Definition
Listed Species	Those species designated as candidate, threatened, or endangered pursuant to CESA and or listed as threatened or endangered under FESA.
Marine Corps Air Station Miramar	MCAS Miramar
Marine Corp Base Camp Pendleton	MCB Camp Pendleton
Minor Amendment Area	Encompasses legal boundaries of Montgomery-Gibbs Executive Airport and Brown Field
Multi-Habitat Planning Area	MHPA – Area within which the Preserve will be established.
Multiple Species Conservation Program	MSCP
National Environmental Policy Act	NEPA
National Historic Preservation Act	NHPA
Natural Community Conservation Planning Act	NCCP Act; Fish and Game Code, Section 2800, et seq.
Natural Community Conservation Program Plan	NCCP; a conservation plan created pursuant to Fish and Game Code, Section 2801, et seq.
Natural Resource Management Plan	NRMP – Management Plans that have been prepared consistent with the MSCP Framework Management Plan.
off-highway vehicles	OHV
Otay Mesa mint	PONU
Preserve	Areas within the MHPA that have been conserved and existing baseline conservation areas.
primary constituent element	PCE
Real Estate Assets Department	READ
Recovery Plan for Vernal Pools of Southern California	Recovery Plan
right-of-way	ROW
Riverside fairy shrimp	STWO
San Diego Association of Governments	SANDAG
San Diego button-celery	ERAR
San Diego fairy shrimp	BRSA
San Diego County Water Authority	SDCWA
San Diego Gas & Electric	SDG&E
San Diego Mesa mint	POAB
spreading navarretia	NAFO
State Route	SR

Term	Acronym/Definition
Take	Under section 3(18) of FESA, "...to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" with respect to federally listed endangered species of wildlife. Federal regulations provide the same taking prohibitions for threatened wildlife species.
Third Party	Project proponents that receive coverage under the VPHCP
U.S. Army Corps of Engineers	USACE
U.S. Fish and Wildlife Service	USFWS
United States Code	U.S.C.
USFWS and CDFW, collectively	Wildlife Agencies
Vernal Pool	Seasonal, depression-type wetlands that result from a unique set of physical parameters and support a specific biological assemblage of plant and animal species. Functional vernal pool ecosystems form under specific physical conditions when small, shallow depressions collect precipitation to create a seasonally perched water table.
Vernal Pool Complex	A collection of vernal pools that occur in close proximity, on the same soil series and are typically biogeographically and hydrologically connected
Vernal Pool Watershed	A topographically defined catchment area from which surface water flows to a vernal pool.
VPI	Vernal Pool Inventory
VPHCP Plan Area	VPHCP Plan Area; the geographic areas proposed to be addressed in the VPHCP. Specifically; this refers to the private and City-owned land over which the City of San Diego has land use jurisdiction and for which the Section 10 permit will apply.
VPHCP Planning Units	Geographic planning units for the VPHCP Plan Area (North, Central, and South)
VPMMP	Vernal Pool Management and Monitoring Plan
Vernal Pool Preservation Program	VPPP

CHAPTER 1

INTRODUCTION

1.1 VERNAL POOL HABITAT CONSERVATION PLAN OVERVIEW

The City of San Diego (City) Vernal Pool Habitat Conservation Plan (VPHCP) is intended to provide an effective framework to protect, enhance, and restore vernal pool resources in specific areas within the City's jurisdiction, while improving and streamlining the environmental permitting process for impacts to threatened and endangered species associated with vernal pools.

In October of 2009, the City and U.S. Fish and Wildlife Service (USFWS) entered into a Planning Agreement for the development of a Habitat Conservation Plan (HCP) covering vernal pool habitats and associated species in the City. The California Department of Fish and Wildlife (CDFW) was named as an advisory agency in the development of the VPHCP and was consulted on the scope and analysis of this document for purposes evaluating MSCP consistency and any subsequent-related City and/or state actions that may be necessary to fully implement this VPHCP. The VPHCP is a conservation plan for vernal pools and seven threatened and endangered species that do not have federal coverage under the City's Multiple Species Conservation Program (MSCP) Subarea Plan (SAP), including five plant and two crustacean species (i.e., covered species):

- Otay Mesa mint (*Pogogyne nudiuscula*, PONU)
- San Diego mesa mint (*Pogogyne abramsii*, POAB)
- Spreading navarretia (*Navarretia fossalis*, NAFO)
- San Diego button-celery (*Eryngium aristulatum* var. *parishii*, ERAR)
- California Orcutt grass (*Orcuttia californica*, ORCA)
- Riverside fairy shrimp (*Streptocephalus woottoni*, RFS)
- San Diego fairy shrimp (*Branchinecta sandiegonensis*, SDFS)

The Planning Agreement originally identified eight species for inclusion in the VPHCP. One of the species, little mouse tail (*Myosurus minimus* ssp. *apus*), was subsequently excluded due to unresolved taxonomic issues, as it is expected that the same species occurs outside of San Diego County. The remaining seven vernal pool species are the focus of, and are being requested for, incidental take coverage under the VPHCP.

The VPHCP will expand the City's existing Multi-Habitat Planning Area (MHPA) established in the MSCP SAP to conserve additional lands with vernal pools that are occupied with the vernal

pool covered species. The vernal pool management and monitoring program will apply within the Preserve.

1.1.1 Purpose and Need

Implementation of the VPHCP will preserve a network of vernal pool habitat in a matrix of open space; protect the biodiversity of these unique wetlands; and define a formal strategy for their long-term conservation, management, and monitoring. The lands under the City’s jurisdiction contain valuable vernal pool resources. The vernal pools contain species that are protected, or may be protected in the future, under the California Endangered Species Act (CESA) and/or the Federal Endangered Species Act (FESA). The City developed this VPHCP to provide for the long-term conservation, management, and monitoring of these species and avoid costly delays and uncertainty associated with a project-by-project approach toward vernal pool conservation. This VPHCP was developed using the requirements of an HCP under Section 10(a)(1)(B) of FESA as the basis for take authorization for the seven covered vernal pools species (i.e., covered species), and as a long-term strategic plan for the protection of vernal pool resources within its jurisdiction. This VPHCP will complement, but be distinct from, the HCP prepared and adopted for the City’s MSCP SAP. Currently, the City still has state coverage for the seven vernal pool species addressed in this HCP under the City’s existing MSCP that was issued by CDFW in 1997. Part of the local action associated with this HCP includes the evaluation/processing of any required amendments to and/or findings of consistency with the City’s state incidental take authorization (California Endangered Species Act [CESA]/Permit No. PRT-830421) to maintain state coverage for vernal pool habitat and the seven covered vernal pool species addressed in the VPHCP. The VPHCP has been designed to meet the requirements under California Fish and Game Code Section 2800 *et seq.* for listed and nonlisted species conserved under a Natural Community Conservation Plan (NCCP).

Under FESA, an incidental take permit is required when activities may result in “take”¹ of threatened or endangered wildlife. An HCP must accompany an application for an incidental take permit when associated with nonfederal activities. The take prohibition under FESA does not apply to listed plants. Rather, Section 9(a)(2)(B) prohibits the removal of listed plants or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of listed plants on nonfederal areas in violation of state law or regulation. However, USFWS may include plants as covered species in an HCP for purposes of extending federal “no surprises” assurances for them provided that the HCP meets Section 10 issuance criteria and it provides conservation

¹ *Take*, as defined by FESA, means “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” *Harm* is defined as “any act that kills or injures the species, including significant habitat modification.”

benefits to the covered plant species. “Take” as applied to covered plant species in this HCP means impacts to plant species and their associated habitat.

The purpose of the HCP process associated with the permit is to ensure there is adequate minimization and mitigation for the effects of the authorized incidental take of state and federal protected vernal pool resources. It is expected that to fully implement the VPHCP and streamline existing state permits already in place, the information in this VPHCP would be used as a basis to evaluate and process/issue any necessary amendment(s) to and/or findings of consistency with the City’s existing MSCP SAP, IA and CDFW 2835 NCCP authorization to maintain state coverage for vernal pool habitat and the seven covered vernal pool species addressed in the VPHCP. Elements of the VPHCP that could require amending existing state permits include (but are not limited to) replacing the take/impact levels for vernal pool habitat and species, incorporate the covered projects and activities, including hardlined projects identified in Section 4 (Covered Projects and Activities) of the VPHCP, and adopt the adaptive management, monitoring and funding program identified in Sections 7 (Management, Monitoring, and Reporting) and 10 (Preserve Management and Funding Mechanisms) of the VPHCP. The management and monitoring provisions in the VPHCP, which are based on updated vernal pool mapping and surveying information, would replace the older MSCP provisions from the MSCP Framework Management Plan (FMP) for vernal pools and the seven covered subject species.

1.1.2 Conservation Goals

The specific conservation goals of the VPHCP, defined by the Planning Agreement, are as follows:

1. Provide for the conservation and management of covered species addressed by the VPHCP (covered species);
2. Preserve vernal pool resources through conservation partnerships between federal, state, local agencies, and private development partnerships;
3. Allow for appropriate and compatible economic growth and development that is consistent with applicable laws;
4. Provide a basis for permits necessary for lawful incidental take of vernal pool covered species;
5. Provide a comprehensive means to coordinate and standardize mitigation and compensation requirements of FESA, CESA, the California Environmental Quality Act (CEQA), the California Natural Community Conservation Planning (NCCP) Act of

1991, and the National Environmental Policy Act (NEPA) within the VPHCP Plan Area (defined in Chapter 2);

6. Provide a more efficient project review process that results in greater conservation values than project-by-project, species-by-species review; and
7. Provide clear expectations and regulatory predictability for persons carrying out covered activities within the VPHCP Plan Area.

These goals will be achieved through implementation of habitat-based and species-specific objectives (detailed in Chapter 5) that are consistent with the USFWS (1998) Recovery Plan for Vernal Pools of Southern California (Recovery Plan).

1.1.3 Conservation Approach

The overall approach to conservation of vernal pools and associated covered species within the VPHCP Plan Area is as follows. The VPHCP conservation strategy is detailed in Chapter 5.

1. Expand the City's existing MHPA to conserve targeted vernal pool complexes in a configuration that maintains habitat function and viability of the seven covered species within the VPHCP Plan Area, consistent with the Recovery Plan (USFWS 1998a);
2. Implement a VPHCP Management and Monitoring Plan to provide for long-term protection, management, and enhancement of vernal pool habitat and the seven covered species;
3. Avoid and minimize impacts to vernal pools and mitigate unavoidable impacts consistent with the VPHCP and the City's Municipal Code;
4. Conduct compliance and effectiveness monitoring of vernal pools and covered species to evaluate implementation of the VPHCP and track the status of the vernal pools and seven covered species; and
5. Where appropriate, introduce covered species into restoration areas to expand/restore species populations in historically occupied complexes to maintain viability of the seven covered species.

1.2 OVERVIEW OF VERNAL POOLS

Vernal pools are seasonal, depression-type wetlands that result from a unique set of physical parameters and support a specific biological assemblage of plant and animal species. Functional vernal pool ecosystems form under specific physical conditions when small, shallow depressions

collect precipitation to create a seasonally perched water table. In San Diego County, these basins are generally oval to circular in shape and one to several hundred square feet in size (Zedler 1987). The features occur most often on level ground and are often associated with hillocks known as mima mounds; however, sometimes these wetlands can occur on former landslide areas and are then referred to as “slump” pools. Vernal pools in the City are primarily associated with Huerhuero, Stockpen, Redding, and Olivenhain soil series, and the basins are sealed either by subsurface layers of impervious hardpan, or clay that expands to seal the basin when saturated. The claypan or the hardpan subsurface creates the perched water table that is required for the presence of ponding (Greenwood and Abbot 1980). Figure 1-1 is a schematic cross-section of a vernal pool that illustrates the perched water table. From a geomorphological level, most of complexes associated with a hardpan are found in the central portions of the City in the Kearny Mesa, Claremont Mesa, and Mira Mesa areas. Claypan pools are mostly associated with Otay Mesa in the southern portion of the City. Vernal pools in the Del Mar Mesa area of the City are a mixture of claypan and hardpan substrates (Bauder and McMillan 1998).

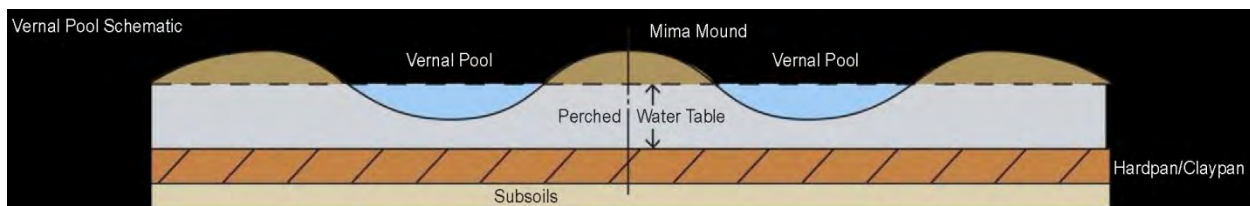


Figure 1-1. Schematic Cross-Section of a Vernal Pool

These ecosystems are defined by seasonal hydrologic extremes: desiccated pool basins during the dry months followed by variable lengths of saturation and inundation during the rainy season. In southern California, the interannual variation in precipitation augments the inconsistent moisture conditions. This drastic change between vegetated wetland and dry basin defines a vernal pool and separates vernal pools from other wetland ecosystems (Zedler 1987).

Although seasonal wetlands are found worldwide, vernal pools sharing physical and biological parameters occur within the Mediterranean climate zone of the western United States, from southern Oregon, to northern Baja California, Mexico. In southern California, remnants of historic vernal pools occur on coastal mesas in the counties of Santa Barbara, Los Angeles, Orange, and San Diego, as well as inland in the San Diego foothills and Riverside basalt terraces.

The VPHCP considers a seasonally flooded depression to be a vernal pool if it includes one or more of the vernal pool indicator species (USACE 1997; Bauder and McMillan 1998), which are listed in Appendix A. Consistent with Attachment II, A.3 of the City’s Land Development Manual (LDM) Biology Guidelines (2012a), depressions that are man-made, such as tire tracks or road ruts, may still be considered vernal pools if they contain at least one indicator plant

species. Road ruts and other seasonal depressions that are not vernal pools may contain wildlife associated with vernal pools, such as San Diego or Riverside fairy shrimp, but will not contain vernal pool plant indicator species. The VPHCP also applies to these man-made road ruts and other seasonal depressions if they contain one or more of the covered species.

For convenience of reference, groups of vernal pools are sometimes referred to as vernal pool complexes that may include two to several hundred individual vernal pools (Keeler-Wolf et al. 1998). Vernal pool complexes are defined as a series of vernal pool groups that are hydrologically connected with similar soil types and species compositions. Within San Diego County, vernal pool complexes were first described and surveyed by Beauchamp and Cass (1979) and subsequently updated in 1986 (Bauder) and 2004 (City of San Diego). Local upland vegetation communities associated with vernal pools include needlegrass grassland, annual grassland, coastal sage scrub, maritime succulent scrub, and chaparral (USFWS 1998a). Vernal pool habitat and species are considered sensitive because they have been greatly reduced due to land development, agricultural clearing, and other anthropogenic factors. Within the City, vernal pool complexes are found in the following areas: Del Mar Mesa, Mira Mesa, Carmel Mountain, Rancho Peñasquitos, Torrey Hills, Torrey Highlands, University, Kearny Mesa, Mission Trails Regional Park, East Elliott, Tierrasanta, Serra Mesa, Navajo, Otay Mesa, Otay Lakes, Proctor Valley, and Marron Valley.

A vernal pool series is a set of complexes located in a geographic area that can be related to a particular mesa top or similar geographic area. For example, the “J” series of vernal pools occur on lands in the Otay Mesa community of the City.

A vernal pool complex is a collection of vernal pools that occur in proximity on the same soil series and are typically hydrologically connected. The uses of complexes are a helpful tool for planning and management, but it is recognized that a complex can be subjective. For the VPHCP, all vernal pools have been assigned both a complex identification code and a subcomplex name (e.g., J14, Cal Terraces South).

1.3 PAST AND CURRENT VERNAL POOL RESOURCE PLANNING EFFORTS

Various vernal pool protection efforts have been implemented by the City over the last three decades. Protection mechanisms have increased in effectiveness and efficiency due to improved knowledge of these resources. This VPHCP, while building on previous efforts, is intended to further refine and improve vernal pool preservation strategies in the City with a focus on the seven covered vernal pool species and their habitats.

1.3.1 Vernal Pool Preservation Plan 1980

The Vernal Pool Preservation Program (VPPP) was adopted by the City Council on June 17, 1980 (Council Resolution R-252015), in an effort to balance conservation of the federally endangered San Diego mesa mint with public and private development concerns. The program developed a framework for protection of representative complexes by prioritizing vernal pool groups according to several factors such as disturbance, site defensibility, and the presence of sensitive species. The ranking system was used by a collaborative decision-making committee to determine regulatory procedures for specific vernal pools. This committee selected certain areas with high-quality vernal pools to be subject to individual Section 404 permits administered by the U.S. Army Corps of Engineers (USACE) under the Clean Water Act (CWA). Other areas, especially those with low-priority vernal pools, were included in the Section 404 nationwide permit to decrease the difficulty of development. Prior to project approval, all areas were subject to an environmental review process by the City under CEQA, which included mitigation of vernal pool impacts through preservation of resources on-site or contributions to the Vernal Pool Preservation Fund. This fund was designated for the purchase, research, and maintenance of vernal pools and their associated habitat in the City. The VPPP was marginal in its success due to several factors, including lack of oversight on the loss and conservation of vernal pools, single species focus, and continued reliance on project-by-project implementation. While the VPPP's preservation funds were used to purchase and preserve some lands with vernal pools, the area of vernal pools purchased was small compared to the area lost.

1.3.2 Multiple Species Conservation Program 1997

Starting in the early 1990s, the City and the other local jurisdictions included in the City's Metropolitan Wastewater District embarked on the MSCP, which is a multiple species, multihabitat planning effort for a 900-square-mile area in southwestern San Diego County. The City's MSCP SAP was completed in 1997 and allows the City incidental take for federally and state listed species in exchange for the preservation, management, and monitoring of large, contiguous open space areas. The City's SAP includes a mapped area called the MHPA, which is a planning area for core biological resources and corridors targeted for conservation. The existing MHPA encompasses 56,831 acres, of which 52,727 acres will be conserved. The type and extent of development allowed within the MHPA are limited. The MSCP and the City's SAP were prepared in conjunction with USFWS and CDFW (herein referred to as the "Wildlife Agencies") to meet the requirements of FESA and the NCCP. Together, these two documents implement the City's portion of the MSCP SAP. The City's permit initially covered 85 species, including the seven vernal pool species addressed in this plan.

In 1998, the City's SAP was subject to a lawsuit regarding coverage of the seven covered species for this VPHCP. In response to the lawsuit, the U.S. District Court for the Southern District of California issued an injunction in 2006 prohibiting the City from permitting projects that would impact the seven covered species under the City's SAP. After almost 2 years of mediation, the City decided in 2010 to relinquish federal coverage of these seven species under the City's SAP, which rendered the injunction moot. The VPHCP has been proposed to provide complete federal coverage of the seven covered species regardless of whether they are in areas that are inside or outside of USACE jurisdiction.

Although the City's federal permit does not cover the seven vernal pool species, the SAP does provide a Framework Management Plan that identifies both general Preserve-wide management guidelines and specific management policies and directives for various Preserve segments. The Framework Management Plan includes management consideration and specific directives regarding vernal pools and the seven covered species. The City's state NCCP permit is still valid and covers take/impacts to and conservation of vernal pool habitat and the seven vernal pool species addressed in this VPHCP.

1.3.3 Vernal Pool Inventory 2002–2004

In 2002, the City received funding from the State of California through a USFWS Traditional Section 6 Grant to complete an inventory and management plan of vernal pools within the City's jurisdiction. The Vernal Pool Inventory (VPI) was built on several previous studies and surveys, which were used to determine the general locations of individual vernal pools, complexes, and series. Beauchamp and Cass (1979) and Bauder (1986) covered the greater portion of San Diego County, and represent complexes as polygons. Villasenor and Riggan (1979) and Zedler et al. (1979) mapped the boundaries of individual vernal pool basins within Kearny Mesa and Del Mar Mesa, respectively. Much of the City and private lands had never been surveyed for specific vernal pools and, in many cases, historical maps did not accurately represent the existing basins. The VPI did not, however, include vernal pools known to occur on military lands (i.e., Marine Corps Air Station Miramar [MCAS] Miramar and Navy Chollas Heights, which are physically located within the City but not under City jurisdiction).

The VPI project utilized geospatial technology to update information on the location of individual vernal pools and complexes, including documentation of changes in vernal pool distribution due to development and restoration efforts subsequent to Bauder's report (1986). Specialized software combined with submeter global positioning system was used to precisely record each basin.² The inventory expanded and updated existing information and provides the basis for the analysis of vernal pool conservation efforts within the City.

² The term basin will be used in this HCP to denote the geographic limits of a vernal pool based upon ponding water, saturated clay soils, and/or vernal pool indicator plant species.

A comprehensive vernal pool survey was completed for areas known or expected to contain vernal pools for which access was permitted. City staff and/or their consultants identified the presence or absence of vernal pool flora and fauna, including the seven covered species being considered for inclusion in the VPHCP. Protocol surveys for the two fairy shrimp species were not conducted.

1.3.4 Updated Vernal Pool Database (2012)

Because of the time elapsed since completion of the VPI, additional information on vernal pools and the seven covered species, including lands not surveyed for the VPI, was then gathered from the Wildlife Agencies' databases and during public scoping meetings for the VPHCP. The resulting database, which includes the best available information for vernal pools and the seven covered species on private and public lands, was analyzed to determine the extent of vernal pool protection, as well as preservation and management needs. Source data for the vernal pool database is available on the Vernal Pool Interactive Map on the City's website, which can be found at <http://www.sandiego.gov/planning/programs/mscp/vphcp.shtml>.

1.3.5 Modeled Vernal Pool Habitat

In recognition that there could be additional pools that have not been mapped, potential impacts to modeled vernal pool habitat within the Plan Area from Planned Covered, and Future Projects were assessed. The model included soils that support vernal pools in the plan area, slope (<12%), and undeveloped land within the plan area (see Appendix C).

1.3.6 Draft Vernal Pool Management and Monitoring Plan

The historical surveys (Beauchamp 1979; RECON 1979; Bauder 1986), VPI (City of San Diego 2004), and updated vernal pool database served as the basis for developing the City's Vernal Pool Management and Monitoring Plan (VPMMP) (2012b). The primary purpose of the VPMMP was to expand on the MSCP Framework Management Plan to provide management strategies, directives, and recommendations for all lands containing vernal pools in the City to preserve and restore their physical function and biotic components, and promote the recovery of associated threatened and endangered species. The VPMMP presents management challenges and opportunities for vernal pools at both a general City-wide and a local site-specific scale. The regulatory requirement to comply with the VPMMP varies according to the status (e.g., ownership) of a given site and is noted in each site-specific discussion. Existing requirements and recommendations at various scales, such as USFWS Biological Opinions (BOs), also are included and referenced in the VPMMP.

The VPMMP is intended to guide vernal pool management on public and private, preserved and developable lands within the City. The history, issues, requirements, and goals for each site containing vernal pools are provided. The VPMMP has been reviewed and updated as part of this VPHCP effort but is a stand-alone document.

1.3.7 Public Outreach

The purpose of the VPHCP public outreach process is to:

- Inform the public and policy makers that the VPHCP is underway;
- Involve representatives of interested groups and individuals in the planning process; and
- Build a broad base of understanding and support for the VPHCP

The audiences selected for public outreach include all affected parties such as City departments and decision-makers, private property owners, environmental groups, developers, special interest groups, and interested individuals. The development of the VPHCP has included numerous opportunities for public input throughout the process, as listed in Table 1-1.

The City published a preliminary draft VPHCP on its website to provide the public an opportunity to review and provide comments prior to the completion of the public review draft VPHCP. A total of 15 comments were submitted. The City reviewed public comments in coordination with the Wildlife Agencies and made changes that are reflected in the VPHCP.

During preparation of the VPHCP, the City also met with several landowners and City Departments and developed hardlines for their properties in coordination with the Wildlife Agencies that will be included in the VPHCP.

As part of the planning and approval process, additional meetings and opportunities for public input will occur. These include the following:

- 60-day Public Review of the Draft VPHCP
- 60-day Public Review of the Draft Environmental Impact Report (EIR)/Environmental Impact Statement (EIS)
- City of San Diego City Council Committee
- Wetland Advisory Board meeting
- City of San Diego Planning Commission recommendation for the VPHCP
- City Council hearing for the adoption of the VPHCP

**Table 1-1
VPHCP Public Outreach/Input Opportunities**

Public Outreach/Input Opportunity	Date
Initial VPHCP Workshop	January 14, 2011
Initial workshop materials posted on City website with email link for comments	January, 2011
Scoping Meeting	December 12, 2011
Notice of Preparation and Scope of Work distributed for 30-day public review	December 20, 2011
Notice of Issuance distributed for 30-day public review	December 20, 2011
Otay Mesa Community Planning Meeting	February 15, 2012
Otay Mesa Property Owner's Association meeting	March 1, 2012
Second VPHCP Workshop	March 15, 2012
Second workshop materials posted on City website with email link for comments	March/April 2012
Property Owner's meeting	June 26, 2012
Technical White Papers (TWPs) 1 through 6 posted on City's website with email link for comments	August 2012
Third VPHCP Workshop	August 30, 2012
Third workshop materials posted on City website with email link for comments	September 2012
Vernal Pool Information Workshop	December 12, 2013
Preliminary Draft Vernal Pool HCP and interactive vernal pool map posted on website for 30-day comment review period	March 10, 2015
Wetland Advisory Board meeting	February 1, 2016
Otay Mesa Community Planning Group meeting	February 17, 2016
Community Planners Committee meeting	February 23, 2016
Otay Mesa Property Owner's meeting	May 5, 2016
Code Monitoring Team (CMT) meeting	May 11, 2016
Technical Advisory Committee (TAC) meeting	May 11, 2016
Building Industry Association meeting	May 20, 2016
Kearny Mesa Community Planning Group	September 21, 2016
Draft EIR/EIS released for CEQA Public Review	September 30, 2016
Otay Mesa Community Planning Group	December 14, 2016
Draft EIR/EIS released for NEPA Public Review	December 23, 2016
Kearny Mesa Community Planning Group	January 18, 2017
Kearny Mesa Community Planning Group	August 16, 2017

1.4 REGULATORY REQUIREMENTS

1.4.1 Federal Endangered Species Act

FESA provides for the protection and conservation of fish, wildlife, and plants that have been federally listed as threatened or endangered. Activities otherwise prohibited by Section 9 of FESA may be allowed pursuant to the requirements of Section 7 and/or Section 10 of FESA. Section 9 prohibits the “take” of listed animal species and the “removal or reduction to possession” of any listed plant species “under federal jurisdiction” (e.g., on federal land). Even though under FESA there is no prohibition for take of plants, this VPHCP includes five covered plants. The plants are covered to meet regulatory obligations under FESA Section 7 and to be

consistent with the existing State NCCP permit. Coverage is also requested for plants to provide no-surprises assurances for these species (see Chapter 9).

Section 10(a)(2)(A) of FESA states that no permit may be issued authorizing any taking referred to in Section 10(a)(1)(B) unless the applicant (in this case, the City) submits to the Secretary of the Interior an HCP that specifies:

1. The impact that will likely result from such taking;
2. What steps the applicant will take to minimize and mitigate such impacts, and the funding that will be available to implement such steps;
3. What alternative actions to such taking the applicant considered and the reasons why such alternatives are not being utilized; and
4. Such other measures that the Secretary may require as being necessary or appropriate for purposes of the plan.

Under Section 10(a)(2)(B) of FESA, USFWS may permit the incidental take of species only after finding that the HCP meets the following issuance criteria:

- The taking will be incidental;
- The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking;
- The applicant will ensure that adequate funding for the plan will be provided;
- The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and
- Other measures, if any, which USFWS requires as being necessary or appropriate for purposes of the plan will be met.³

The VPHCP is intended to meet all regulatory requirements necessary for USFWS to issue a Section 10(a)(1)(B) permit to allow incidental take of the two fairy shrimp species as a result of covered activities undertaken by the City or their third-party beneficiaries. For purposes of extending “no surprises” regulatory assurances to the five covered plant species, the VPHCP treats impacts to plant species as equivalent to “take” under ESA Section 10(a)(2)(B).

In June 2000, USFWS adopted a five-point policy initiative designed to clarify elements of the HCP program as they relate to measurable biological goals, adaptive management, monitoring,

³ 16 U.S.C. Section 1539(a)(2)(B)(2010).

permit duration, and public participation. The VPHCP satisfies the goals and objectives of the five-point policy as described below.

Biological Goals and Objectives

HCPs must include biological goals and objectives that set out specific measurable targets that the plan is intended to meet. These targets are based on the best scientific information available and are used to guide conservation strategies for species covered by the VPHCP. Specifically, the biological goals and objectives of the VPHCP are described in Chapter 5. Both habitat-based and species-specific objectives have been identified that will achieve the biological goal to “contribute to the recovery and ensure continued persistence of the VPHCP covered vernal pool species populations.” As stated in the USFWS Five-Point Policy, the biological goals of an individual HCP are not necessarily equivalent to the range-wide recovery goals and conservation of a species. However, if viewed collectively, an HCP’s biological goals and objectives should support the recovery goals and conservation for a species (USFWS 2000). In the case of the City’s VPHCP, the goals and objectives are specific conservation and management of the covered species populations within the City’s jurisdiction because the City does not have jurisdiction over the entire distribution range for any of the covered species.

Adaptive Management

The five-point policy encourages the development of adaptive management plans as part of the HCP process under certain circumstances. Adaptive management provides a means to address biological uncertainty and to devise alternative strategies for meeting biological goals and objectives. Adaptive management is important in instances where significant data or information gaps exist, particularly with respect to the ecology of the species or its habitat, habitat or species management techniques, or the potential effect of an activity on covered species. The framework for an adaptive management program for the VPHCP is set forth in Chapter 7. As discussed throughout Chapter 7, there is inherent uncertainty in the available scientific data and understanding of covered species population ecology. It is expected that, over time, as additional research is conducted and data are collected on the covered species in the City, the management program (triggers and/or actions) can and will be adjusted to reflect new information and understanding of population function and dynamics. For example, it is anticipated that the methods for management of fairy shrimp will be modified over time as additional understanding is obtained regarding hybridization.

Monitoring

Monitoring is a mandatory element of all HCPs under the five-point policy. The VPHCP shall institute a monitoring program to gauge the effectiveness of the plan in meeting the biological goals and objectives and to verify that the minimization and mitigation measures identified in the plan are being properly implemented. The biological and compliance monitoring provisions of the VPHCP are found in Chapter 7. The monitoring program in the VPMMP has been developed to gather the information necessary to determine if the standards are being met and, if not, directives are provided to adjust management actions so that the standards are achieved. The monitoring program will allow the City to track compliance with the VPHCP on an annual basis, and make adjustments in management according to monitoring observations so that the VPHCP goal and objectives are achieved.

Permit Duration

Under the five-point policy, several factors are used to determine the duration of an incidental take permit, including the timeframe of the City's proposed activities and the expected positive and negative effects on covered species associated with the proposed duration. In addition, USFWS considers the level of scientific and commercial data underlying the proposed operating conservation program, the length of time necessary to implement and achieve the benefits of the operating conservation program, and the extent to which the program incorporates adaptive management strategies. The duration of the permit issued under the VPHCP is anticipated to be consistent with the City's MSCP permit, which expires in 2047.

Public Participation

Under the five-point policy guidance, USFWS sought to expand public participation in the HCP process to provide greater opportunity for the public to assess, review, and analyze HCPs and associated NEPA documentation. As part of this effort, USFWS has expanded the public review process for most HCPs. The VPHCP process has provided extensive opportunities for public involvement and input during development, as described in Section 1.3.7.

1.4.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918, as amended, implements various treaties and conventions between the United States, and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the MBTA, taking, killing, or possessing migratory birds is unlawful as is taking of any parts, nests, or eggs of such birds (United States Code [U.S.C.], Title 16, Section 703). The definition of taking is different under the MBTA than under

the ESA and includes only the death or injury of individuals of a migratory bird species or its eggs. Take under the MBTA does not include the concepts of harm and harassment as defined by the ESA.

USFWS provides guidance regarding the incidental take of FESA-listed migratory birds. According to these guidelines, an incidental take permit can function as a Special Purpose Permit under the MBTA (50 Code of Federal Regulations [CFR] 21.27) for the take of all FESA-listed covered species in the amount and/or number and subject to the terms and conditions specified in an HCP. Any such take will not be in violation of the MBTA of 1918, as amended (16 U.S.C. 703-12). The VPHCP does not seek coverage for migratory bird species.

1.4.3 Bald Eagle and Golden Eagle Protection Act

The Bald Eagle and Golden Eagle Protection Act prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions. Under the Eagle Act, it is a violation to "...take, possess, sell, purchase, barter, offer to sell, transport, export or import, at any time or in any manner, any bald eagle commonly known as the American eagle, or golden eagle, alive or dead, or any part, nest, or egg, thereof..." Here, take is defined as to include pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, and disturb. Disturb is further defined in 50 CFR 22.3 as follows: to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

Recent revisions to regulations implementing the Eagle Act authorize take of bald eagles and golden eagles under the following conditions: (1) the take is compatible with the preservation of the bald eagle and golden eagle, (2) the take is necessary to protect an interest in a particular locality, (3) the take is associated with but not the purpose of an otherwise lawful activity, (4) for individual instances of take where the take cannot be avoided, or (5) for programmatic take where the take is unavoidable even though advanced conservation practices are being implemented (50 CFR 22.26). Permits issued under this regulation usually authorize disturbance only; however, in limited cases, a permit may authorize lethal take that results from, but is not the purpose of, an otherwise lawful activity.

Neither the bald nor the golden eagle is a covered species under the VPHCP. The VPHCP does not seek a permit under the Eagle Act because direct injury or death of eagles, eggs, or disturbance of nests is not anticipated in association with implementation of the VPHCP.

1.4.4 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. 470 et seq.), requires federal agencies to take into account the effects of their actions proposed on properties eligible for inclusion in the National Register of Historic Places. “Properties” are defined as “cultural resources,” which includes prehistoric and historic sites, buildings, and structures that are listed in or eligible to the National Register of Historic Places. An undertaking is defined as a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency, including those carried out by or on behalf of a federal agency; those carried out with federal financial assistance; those requiring a federal permit, license or approval; and those subject to state or local regulation administered pursuant to a delegation or approval by a federal agency. The issuance of an incidental take permit is an undertaking subject to Section 106 of the NHPA. The USFWS has determined that the area of potential effects for the present undertaking is that area where on-the-ground project activities will result in take of species. The NHPA and the potential effects of the conservation strategy on resources subject to the NHPA are discussed in detail in the EIR/EIS.

1.4.5 National Environmental Policy Act and California Environmental Quality Act

NEPA was enacted by Congress in 1969 to ensure that federal agencies consider the environmental impacts of their actions and decisions. NEPA requires the federal government to use all practicable means and measures to protect environmental values and makes environmental protection a part of the mandate of every federal agency and department. NEPA requires analysis and a detailed statement of the environmental impact of any proposed federal action that significantly affects the quality of the human environment.

CEQA (California Public Resources Code, Section 21000 et seq.) requires the preparation of an EIR for any project that a lead agency determines may have significant impact on the environment. According to Section 21002.1(a) of the CEQA statutes, “The purpose of an environmental impact report is to identify the significant effects on the environment of a project, to identify alternatives to the project, and to indicate the manner in which those significant effects can be mitigated or avoided.” CEQA also establishes mechanisms whereby the public and decision-makers can be informed about the nature of the project being proposed, and the extent and types of impacts that the project and its alternatives could have on the environment if they were to be implemented.

A joint EIS and EIR in accordance with NEPA and CEQA (14 California Code of Regulations 15000 et seq.) has been prepared for this VPHCP and is incorporated by reference herein. The EIR/EIS (1) identifies the purpose and need for a federal Section 10(a)(1)(B) permit;

(2) describes the environment that would be affected by the proposed VPHCP; (3) discusses alternatives considered; (4) describes plans to mitigate impacts to federally listed species and their habitats; and (5) identifies possible environmental consequences of the proposed VPHCP and mitigation measures. The City and USFWS also coordinated with CDFW on the scope and analysis of this EIR/EIS for purposes of any subsequently-related City and/or state actions that may be necessary to fully implement this VPHCP.

1.5 INCIDENTAL TAKE PERMIT

The City and all its departments, as well as private and public organizations that receive discretionary permits from the City, shall be subject to the VPHCP and its corresponding ITP once executed. Other local jurisdictions and state agencies that engage in activities within the VPHCP plan area that are identified as covered activities under the plan are not covered under the VPHCP unless they voluntarily subject themselves to the City's authority through the City's land entitlement and permitting process and apply for a Certificate of Inclusion.

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CHAPTER 2 VERNAL POOL HCP PLAN AREA

This chapter presents a description of the VPHCP Plan Area including acreage, land use, and number of vernal pools.

2.1 OVERVIEW OF VPHCP PLAN AREA

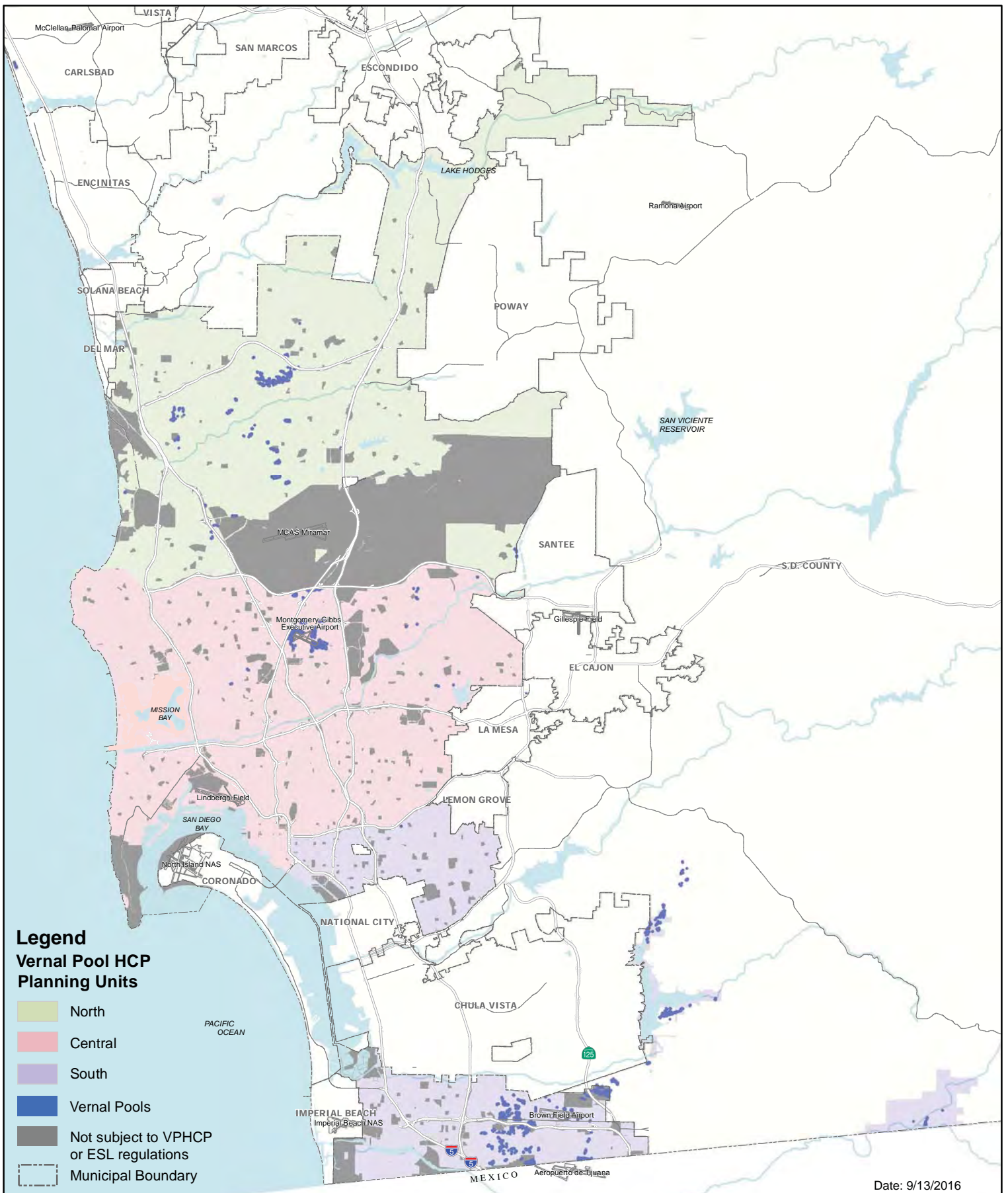
The VPHCP Plan Area is the geographical area for which the protections provided under the VPHCP are afforded to the seven covered species and for which the Section 10 permit applies. The VPHCP Plan Area includes lands subject to the City's jurisdiction or leased by the City within the jurisdictional boundary of the City, as well as three areas owned by the City's Public Utilities Department in the unincorporated portion of San Diego County. The VPHCP Plan Area also includes conserved lands within the City that may be owned by other entities (e.g. not subject to City's land use jurisdiction), where certain covered activities (i.e., restoration, enhancement, management, and/or monitoring activities) may occur if the land owner receives a Certificate of Inclusion. The VPHCP Plan Area's extent is, by design, the same area covered by the City's MSCP SAP; however, the VPHCP is a separate but complementary conservation plan for vernal pools and the seven covered species not covered under the City's federal permit for the MSCP SAP.

Figure 2-1 depicts the VPHCP Plan Area. The VPHCP Plan Area encompasses 206,124 acres in the southwestern portion of San Diego County. The VPHCP Plan Area is characterized by urban land uses covering approximately 55.4% (Tables 2-1, 2-3, and 2-5) of the area with the remainder as open space/park system or undeveloped vacant land. The 2010 population within the VPHCP Plan Area was approximately 1.37 million (SANDAG 2010).

Appendix B⁴ includes detailed information for each vernal pool complex within the VPHCP Plan Area, including:

- Complex name
- Planning Unit (North, Central, or South; refer to Section 2.2 of this HCP)
- Total number of pools within the complex
- Land ownership

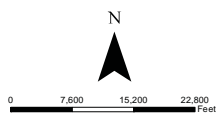
⁴ For reference, vernal pools that occur on lands that are not subject to the City's land use jurisdiction (i.e., owned by other entities) but are within the broader plan area, are also included in Appendix B. These pools are included for reference because they may be targeted for management and monitoring.



Path: S:\ERAMSCP\VP\HCP\Vernal Pool HCP.DRAFT VPHCP 2016\MapFigures\MXD\VP_HCP_PlanArea_FINAL_2016.mxd



Note:
 Vernal pool symbols on this map have been enlarged to help identify their locations and are not to scale and do not represent the exact limits of the vernal pool basins.



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Figure 2-1
Vernal Pool HCP
Plan Area

- Surface area of vernal pools within the complex
- Underlying soils
- Vernal pool geomorphology (hardpan, claypan)
- Presence of covered species Critical Habitat
- Number of vernal pools occupied by each covered species

Certain lands included within the jurisdictional boundary of the City are not under the local land use jurisdiction of the City. These lands include, but are not limited to, school districts, state lands, and other lands shown as not a part (Figures 2-2 through 2-4). Federal lands have an ESA Section 7 nexus and would not seek incidental take coverage from the City. The regulatory requirements of the VPHCP are not applicable to lands not under the land use jurisdiction of the City. However, restoration, enhancement, management, and/or monitoring activities on these lands may be covered by the VPHCP if landowners seek coverage from the City through a Certificate of Inclusion.

In certain areas, the VPHCP Plan Area overlaps with the plan areas for the San Diego Gas & Electric (SDG&E) and/or San Diego County Water Authority (SDCWA) HCPs. Due to the small scale of the SDG&E and SDCWA rights-of-way (ROWs), the City is unable to identify which vernal pools occur within these utility ROWs and may be covered under the SDG&E and/or SDCWA HCPs.

Within the VPHCP Plan Area, many vernal pool complexes have been subject to enhancement and restoration activities as mitigation for approved projects within the City. Of the 54 vernal pool complexes within the VPHCP Plan Area, the majority have had some type of restoration and/or enhancement. Restoration and enhancement activities may have included, but are not limited to, access control, erosion control, weed control, seed bank reestablishment, and upland habitat improvements to provide watershed protection and to attract pollinators of covered species. An important component of the VPHCP conservation strategy is the restoration and enhancement activities proposed for the remaining degraded vernal pools as detailed in Chapter 5. Implementation would be via the VPHCP VPMMP (see Chapter 7).

Based on over 30 years of vernal pool studies in San Diego (Beauchamp and Cass 1979; Bauder 1986; City of San Diego 2004; and others) all major vernal pool complexes have been identified and no new complexes are likely to be located in the City. However; vernal pools are highly affected by interannual variability of precipitation. It is understood that vernal pool basins may not fill up during dry years, and some pools may combine together into one large pool during wet years. As such, the number of mapped vernal pools within the VPHCP Plan Area is representative of data collected over multiple years from multiple sources and is not necessarily an absolute value during any given year. Therefore, in addition to analyzing the impacts and

conservation by basin and species, the VPHCP also includes an estimate of the areas that are suitable (i.e., slope and soils) to support vernal pool basins.

2.2 VPHCP PLANNING UNITS

For planning and management purposes, the VPHCP Plan Area is divided into three “planning units.” North, Central, and South. These planning units were selected for convenience of management due to the proximity of vernal pools within each unit.

The following sections describe the North, Central, and South planning units of the VPHCP (Figures 2-2 through 2-4). Each section includes a description of the planning unit, including the number of vernal pools.

2.2.1 North Planning Unit

Figure 2-2 depicts the North VPHCP planning unit, which includes the City jurisdiction north of State Route (SR) 52. Mesa tops containing vernal pools in this area include Carmel Mountain, Del Mar Mesa, and Mira Mesa. In addition, a small area of pools is located on the coastal bluffs. This planning unit contains tracts of interconnected existing and planned open space, interlaced with urban development.

Table 2-1 includes acreage of generalized land use category within the North VPHCP planning unit. This planning unit includes 110,891 acres, or 48%, of the total VPHCP Plan Area. Approximately 43% of the land use within the North VPHCP planning unit is categorized as urban and 57% as open space.

**Table 2-1
Existing Land Use and Land Cover in North VPHCP Planning Unit**

Generalized Land Use	Acreage	% of Total
Residential	17,677	16
Commercial	2,411	2
Industrial	5,331	5
Other	18,907	17
Conserved Natural Lands	22,350	20
Lands Planned for Conservation	25,459	23
Agriculture	3,833	3
Active Parks	942	1
Vacant	8,696	8
Water	2,150	2
Total North Planning Unit	110,891	100%

Source: SANDAG Land Use Database

Note: The “other” category includes developed land uses not specified above, such as public or institutional uses including schools, hospitals, and road rights-of-way.



**Figure 2-2
VPHCP
Conservation Analysis
Planning Unit
North**

Vernal Pools

Note:
Vernal pool symbols on this map have been enlarged to help identify their locations and are not to scale and do not represent the exact limits of the vernal pool basins

Not subject to VPHCP or ESL regulations

Municipal Boundary

**Baseline Conservation
Conservation Level**

100%

75%

Note:
The Baseline Conservation is defined as the MHPA boundary plus conserved lands, approved projects, projects with approved USFWS Biological opinions, and/or pipeline projects (i.e., in a stage of project approval where conservation and loss of lands have been determined).

VPHCP Conservation Level

100%

75%

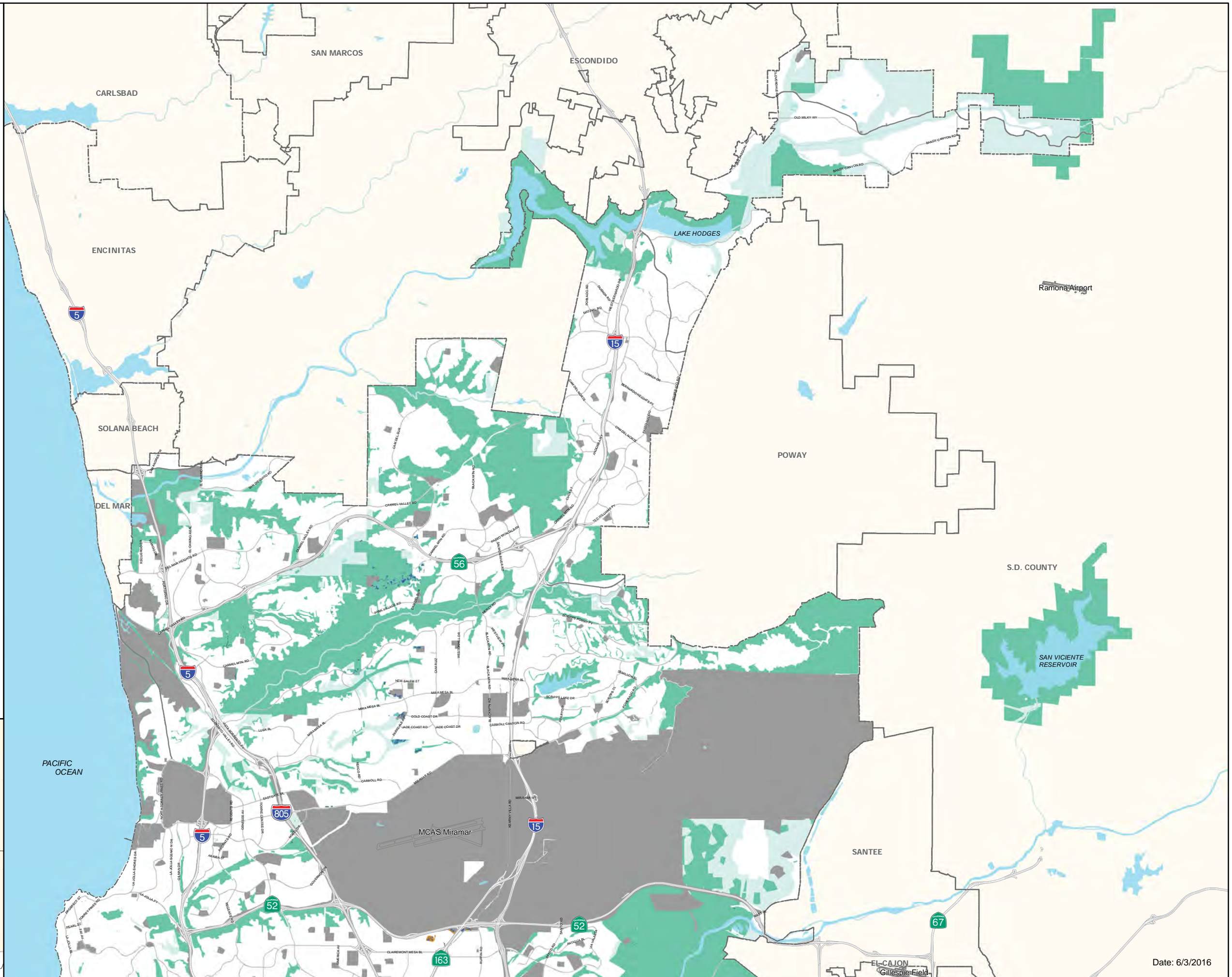
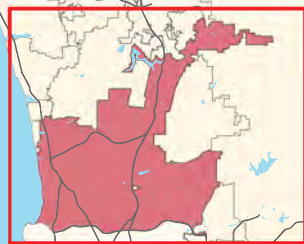
Note:
The VPHCP Conservation builds on the Baseline Conservation. It includes all areas in Baseline Conservation plus additional selected lands.



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0 1,900 3,800 5,700 Feet





**Figure 2-3
VPHCP
Conservation Analysis
Planning Unit
Central**

Vernal Pools

Note:
Vernal pool symbols on this map have been enlarged to help identify their locations and are not to scale and do not represent the exact limits of the vernal pool basins

Not subject to VPHCP or ESL regulations

Municipal Boundary

**Baseline Conservation
Conservation Level**

100%
 75%

Note:
The Baseline Conservation is defined as the MHPA boundary plus conserved lands, approved projects, projects with approved USFWS Biological opinions, and/or pipeline projects (i.e., in a stage of project approval where conservation and loss of lands have been determined).

VPHCP Conservation Level

100%
 75%

Note:
The VPHCP Conservation builds on the Baseline Conservation. It includes all areas in Baseline Conservation plus additional selected lands.

*The Minor Amendment Process has been identified for Montgomery-Gibbs Executive Airport and Brown Field Airport, which would allow impacts to vernal pool habitat and VPHCP covered species located within the legal boundaries of the airport properties while meeting airport safety requirements.



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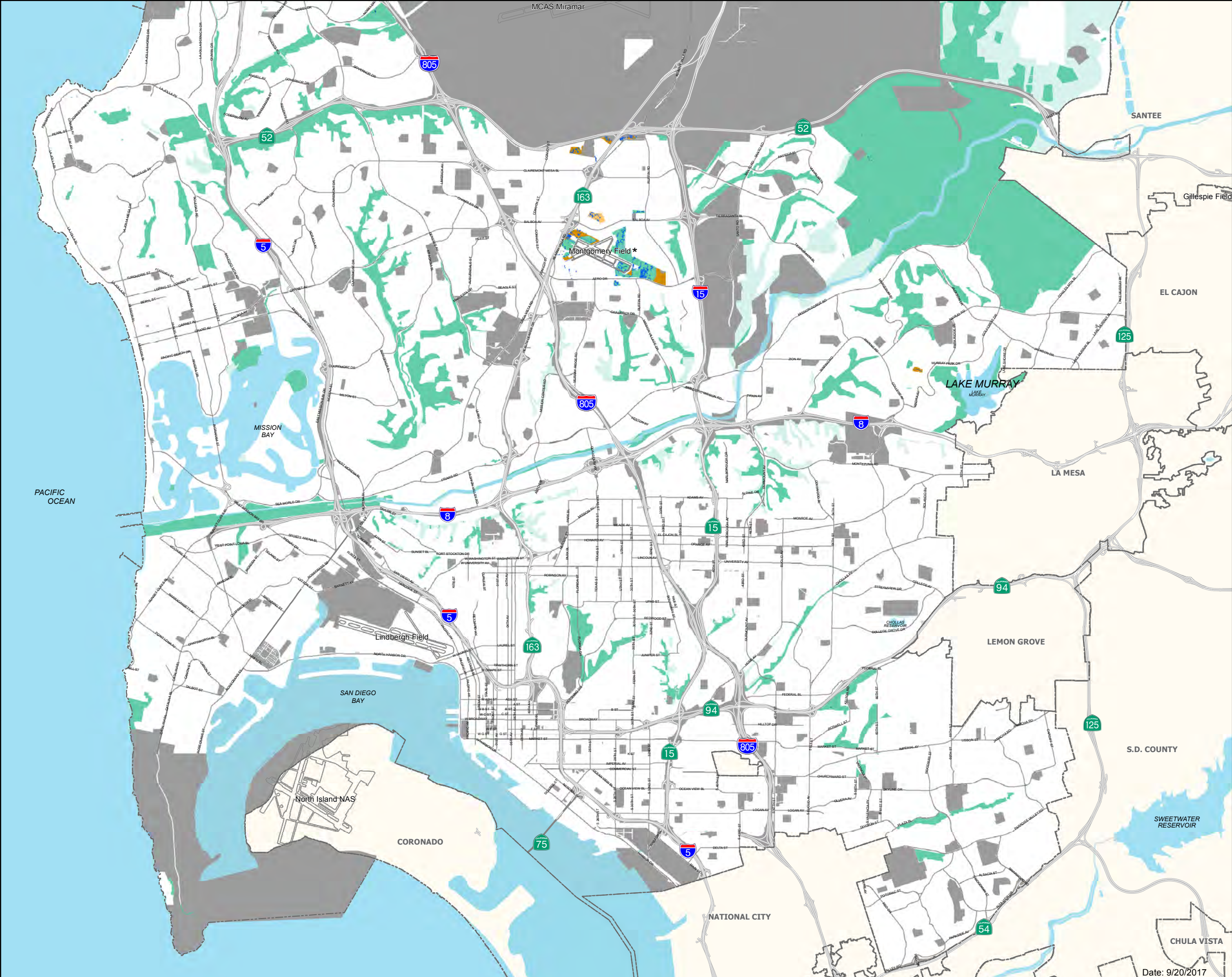
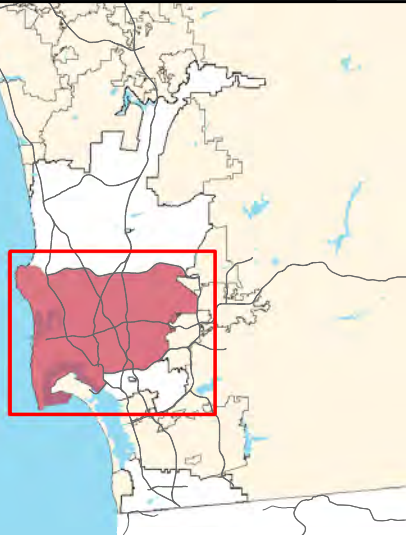
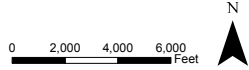




Figure 2-4 VPHCP Conservation Analysis Planning Unit South

Vernal Pools

Note:
Vernal pool symbols on this map have been enlarged to help identify their locations and are not to scale and do not represent the exact limits of the vernal pool basins

Not subject to VPHCP or ESL regulations

Municipal Boundary

Baseline Conservation Conservation Level

100%

75%

Note:
The Baseline Conservation is defined as the MHPA boundary plus conserved lands, approved projects, projects with approved USFWS Biological opinions, and/or pipeline projects (i.e. in a stage of project approval where conservation and loss of lands have been determined).

VPHCP Conservation Level

100%

75%

Note:
The VPHCP Conservation builds on the Baseline Conservation. It includes all areas in Baseline Conservation plus additional selected lands.

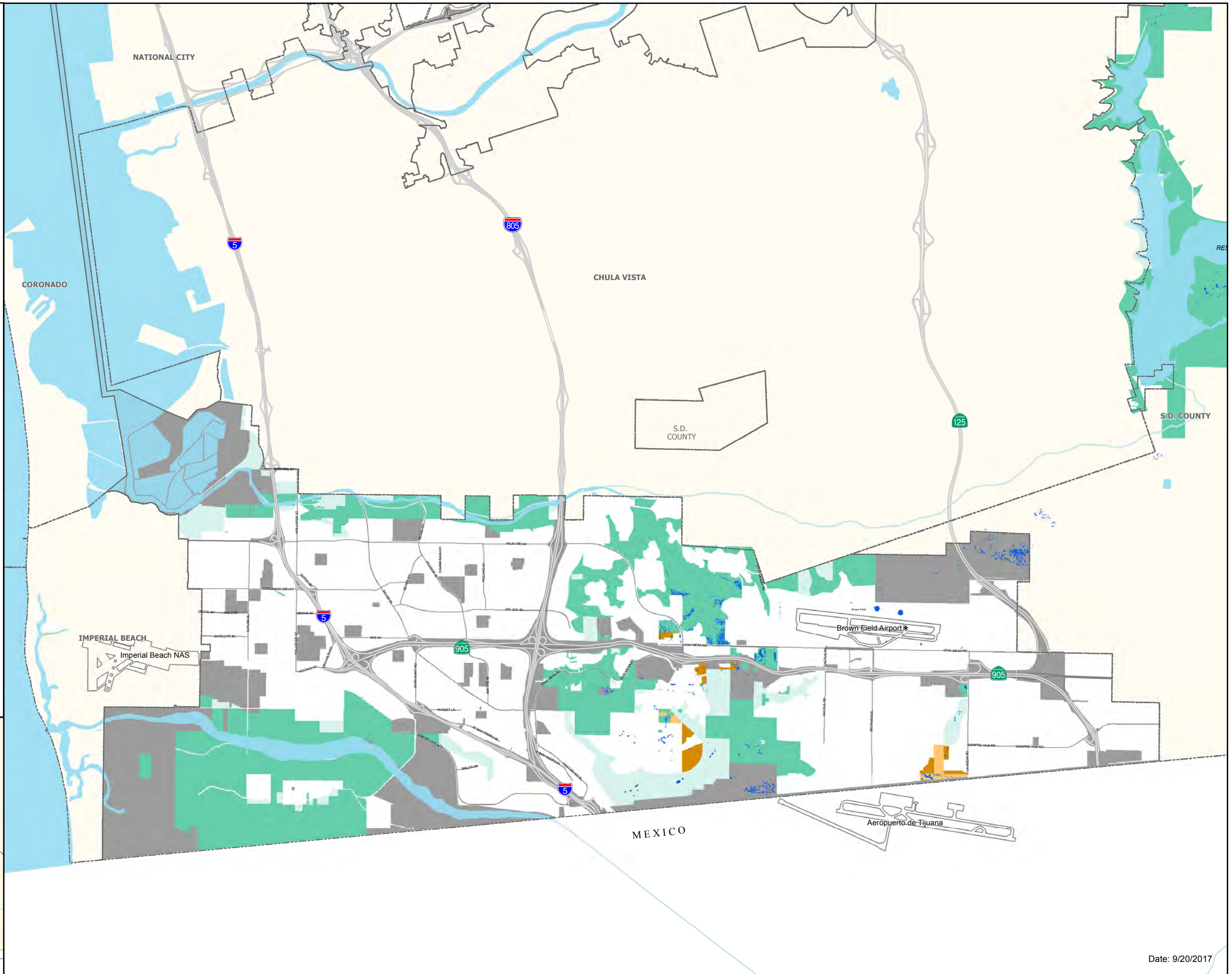
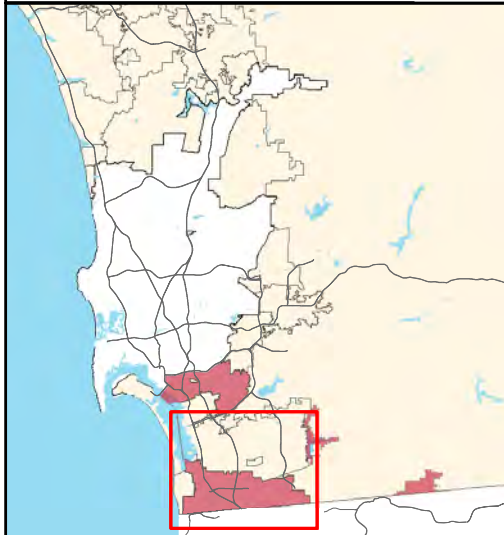
* The Minor Amendment Process has been identified for Montgomery-Gibbs Executive Airport and Brown Field Airport, which would allow impacts to vernal pool habitat and VPHCP covered species located within the legal boundaries of the airport properties while meeting airport safety requirements.



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Table 2-2 lists the vernal pools that occur within the North VPHCP planning unit. Vernal pools are listed by series name, complex names within each series, and site names within each complex. As shown in Table 2-2, 933 vernal pools exist within the North VPHCP planning unit.

The North VPHCP planning unit contains vernal pools within the B, C, D, H, I, N, O, Q, and X vernal pool complex series (refer to Chapter 1 for a definition of vernal pool complex series). Vernal pool soils include clay and fine, coarse, sandy, and cobbly loam soil from the, Chesterton, Huerhuero loam, Redding, and Diablo-Olivenhain soil series.

Vernal pool resources are present in varying conditions within the North VPHCP planning unit. Carmel Mountain is owned by the City with the exception of two private inholdings. A few vernal pools also occur south of Carmel Mountain near the SDG&E electrical substation. Del Mar Mesa is split among various public agencies, including the City, CDFW, and USFWS. Each of these entities has mandates that direct their management of open space preserves. Del Mar Mesa also is part of the San Diego National Wildlife Refuge Vernal Pool Complex. Mira Mesa is predominately developed, but some vernal pools remain on isolated parcels throughout the mesa. Additional vernal pool areas that occur within the North VPHCP planning unit include pools adjacent to the Salk Institute in La Jolla and on the City's eastern boundary, adjacent to the City of Santee.

Table 2-2
Vernal Pool Resources in North VPHCP Planning Unit

Series Name Complex Name Site Name	Total Pools
B Total	64
B11	44
Mesa Norte	44
B5	1
Tierra Alta	1
B6	1
Lopez Ridge (CDFG)	1
B7-8	17
Crescent Heights	7
Lopez Ridge (City)	10
C Total	10
C17-18	9
Fieldstone	9
C27	1
Mira Mesa Market Center	1
D Total	123
D5-8	123
Carroll Canyon	119
Parkdale Carroll Canyon	4

Series Name Complex Name Site Name	Total Pools
H Total	610
H1-10, 13-15, 18-26	497
Del Mar Mesa (City/County)	92
Del Mar Mesa (Private)	5
Del Mar Mesa (State/Federal)	244
Rhodes	156
H17	28
Shaw Lorenz	28
H33	2
East Ocean Air Drive	2
H38	64
Carmel Mountain	64
H39	19
Greystone Torrey Highlands	19
I Total	64
I1	34
Arjons	34
I12	7
Pueblo Lands	7
I6 B	8
Ford Leasing (Bob Baker)	8
I6 C	15
Facilities Development (Eastgate Miramar Assoc.)	15
N Total	3
NC N	3
Kelton	3
O Total	15
OO	15
Salk Institute	15
Q Total	5
Q3	5
Castlerock	5
X Total	39
X5	11
Nobel Drive	11
X7	28
Nobel Research	28
Grand Total North Planning Unit	933

Source: City of San Diego Vernal Pool Inventory Database 2012

2.2.2 Central VPHCP Planning Unit

Figure 2-3 depicts the Central VPHCP planning unit, which is located generally south of SR 52 and north of SR 94. Mesa tops that support vernal pools in this planning unit include Clairemont Mesa, Kearny Mesa, and Serra Mesa. Vernal pools are also found in portions of Mission Trails Regional Park.

Table 2-3 lists acreage by generalized land use category. The Central VPHCP planning unit includes 81,296 acres, or 35%, of the total VPHCP Plan Area. Approximately 70% of the land use within the Central VPHCP planning unit is categorized as urban and 30% as open space. With the exception of Mission Trails Regional Park, the majority of this planning unit is heavily urbanized.

Table 2-3
Existing Land Use and Land Cover in Central VPHCP Planning Unit

Generalized Land Use	Acreage	% of Total
Residential	25,101	31
Commercial	3,974	5
Industrial	2,273	3
Other	24,168	30
Conserved Natural Lands	8,485	10
Lands Planned for Conservation	4,871	6
Agriculture	14	0
Active Parks	1,996	2
Vacant	1,685	2
Water	7,337	9
Total Central Planning Unit	81,296	100%

Source: SANDAG Land Use Database

Note: The “other” category includes developed land uses not specified above, such as public or institutional uses including schools, hospitals, and road rights-of way.

The Central VPHCP planning unit contains 620 mapped vernal pools (Table 2-4). Vernal pools in the Central VPHCP planning unit occur within the F, K, N, Q, and U vernal pool complex series. Vernal pool soils include clay and fine, coarse, sandy, and cobbly loam soil from the Bosanko, Chesterton, Diablo, Huerhuero, Olivenhain and Redding, series.

Vernal pool resources are present in varying conditions within the Central VPHCP planning unit. Mission Trails Regional Park contains high-quality pools in two locations within the park. Several vernal pool series continue to persist in Kearny Mesa south of SR 52 on property owned by the City and under private ownerships. Large concentrations of vernal pools occur on Montgomery-Gibbs Executive Airport and on isolated private parcels near the airport. Smaller locations of vernal pools occur in the Central VPHCP planning unit near Lake Murray and Tecolote Park.

**Table 2-4
Vernal Pool Resources in Central VPHCP Planning Unit**

Series Name Complex Name Site Name	Total Pools
F Total	12
F16-17	12
Menlo KM Parcel	12
K Total	96
K5	85
Otay Lakes	85
KK1	1
Lake Murray	1
KK2	10
Pasatiempo	10
N Total	424
N1-4	43
Teledyne Ryan	43
N5-6	333
Montgomery-Gibbs Executive Airport	333
N7	26
Serra Mesa Library	26
N8	22
General Dynamics	22
Q Total	26
Q2	17
Mission Trails Regional Park	17
QQ	9
Tecolote Canyon	9
U Total	62
U15	39
SANDERS	39
U19	24
Cubic	23
Magnatron	1
Grand Total	620

Source: City of San Diego Vernal Pool Inventory Database 2012

2.2.3 South VPHCP Planning Unit

Figure 2-4 depicts the South VPHCP planning unit, which is located generally south of SR 94, and north of the international border between the United States (U.S.) and Mexico. Areas containing vernal pools include Otay Mesa, Proctor Valley, Otay Lakes, and Marron Valley.

Table 2-5 shows acreage by generalized land use category for the South VPHCP Planning Unit. The South VPHCP planning unit includes 38,742 acres, or 17%, of the total VPHCP Plan Area.

Approximately 53% of the land use within the South VPHCP planning unit is categorized as urban and 47% as open space.

**Table 2-5
Existing Land Use and Land Cover in South VPHCP Planning Unit**

Generalized Land Use	Acreage	% of Total
Residential	9,103	24
Commercial	693	2
Industrial	1,904	5
Other	8,692	22
Conserved Natural Lands	10,157	26
Lands Planned for Conservation	2,125	5
Agriculture	681	2
Active Parks	420	1
Vacant	2,754	7
Water	1,994	5
Total South Planning Unit	38,742	100%

Source: SANDAG Land Use Database

Note: The “other” category includes developed land uses not specified above, such as public or institutional uses including schools, hospitals, and road ROWs.

The South VPHCP planning unit includes the majority of the vernal pools in the VPHCP Plan Area. Table 2-6 lists the 1,038 mapped vernal pool resources in the South planning unit. The South VPHCP planning unit contains vernal pools within the J, K, M, N, and R vernal pool complex series. Vernal pool soils include clay and fine, coarse, sandy, and cobbly loam soil from the Diablo, Gravel, Huerhuero, Linne, Olivenhain, Redding, San Miguel, and Stockpen series.

The Otay Mesa community in this planning unit contains the largest tracts of vernal pools that have been conserved and restored.

Otay Mesa also contains the largest area of vernal pool resources that still retains development potential. Multiple private property owners control areas of vernal pool resources, especially south of SR 905 where planned urban development has not yet occurred. Vernal pools located on the mesa to the west of Spring Canyon and along the drainage swale adjacent to La Media Road are notable examples of vernal pool resources. In addition, vernal pool resources are located on Brown Field Metropolitan Airport, which is owned and operated by the City.

Table 2-6
Vernal Pool Resources in South VPHCP Planning Unit and Preserve

Series Name Complex Name Site Name	Total Pools
J Total	892
J11 E	2
Slump Block Pools	2
J11 W	5
J11W	5
J12	5
J12	5
J13 E	8
South Otay J13E	8
J13 N	37
NDU 1 & 2	13
South Otay 1 acre (City)	17
South Otay 1 acre (Private)	7
J13 S	45
Bachman	2
NDU 1 & 2	4
South Otay J13S	39
J14	105
Anderprises (City)	2
Bachman	2
Brown Field Basins	4
Cal Terraces (South)	73
Handler	24
J16-18	23
Goat Mesa	15
Goat Mesa (Private)	2
Wruck Canyon	6
J2	363
Cal Terraces (North), Otay Mesa Road Parcels	304
Clayton Parcel	35
St. Jerome's	24
J20-21	33
La Media ITS	33
J21	7
La Media Swale South	7
J27	10
Empire Center	10
J28 E	5
La Media Swale North	5
J31	66
Hidden Trails	66
J32	25
West Otay A	3
West Otay B	15
West Otay C	7

Series Name Complex Name Site Name	Total Pools
J34	25
Bachman	15
Candlelight	10
J35	17
Brown Field	17
J36	17
Southview	17
J4-5	94
California Crossings	11
Robinhood Ridge	83
M Total	18
MM1	18
Marron Valley	18
N Total	2
NC S	2
Li Collins	2
R Total	126
R1	126
Proctor Valley	126
Grand Total	1,038

Source: City of San Diego Vernal Pool Inventory Database 2012

Proctor Valley, Otay Lakes, and Marron Valley are owned and managed by the City's Public Utilities Department. These areas have been obligated as open space as part of the MSCP Cornerstone Lands Bank Agreement and are included in the MHPA (City of San Diego 1997). Vernal pools in all three locations have received varying levels of enhancement. Otay Lakes has limited public access and contains some of the largest pools in the VPHCP. Until recently, Proctor Valley encountered high disturbance levels due to illegal off-highway vehicles (OHVs). Recent signage and fencing have reduced these activities. Proctor Valley is currently being restored to repair the historic damage of OHV use. Marron Valley is isolated from public access with the biggest threat being frequent fires and errant grazing by cattle crossing from Mexico. The Marron Valley pools have been signed, fenced, and enhanced.

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CHAPTER 3 COVERED SPECIES

This chapter presents a biological description of the seven VPHCP covered species (covered species). It includes a summary of the life cycle, distribution, and status of each species within the VPHCP Plan Area. Detailed information on the covered species by vernal pool complex is included in Appendix B.

Table 3-1 summarizes the total number of vernal pools occupied with each of the seven covered species within the VPHCP Plan Area. The general locations of the seven vernal pool species are shown in Figures 3-1 through 3-7. A discussion of each covered species is provided in the sections that follow.

**Table 3-1
Vernal Pools Occupied with Covered Species in VPHCP Plan Area**

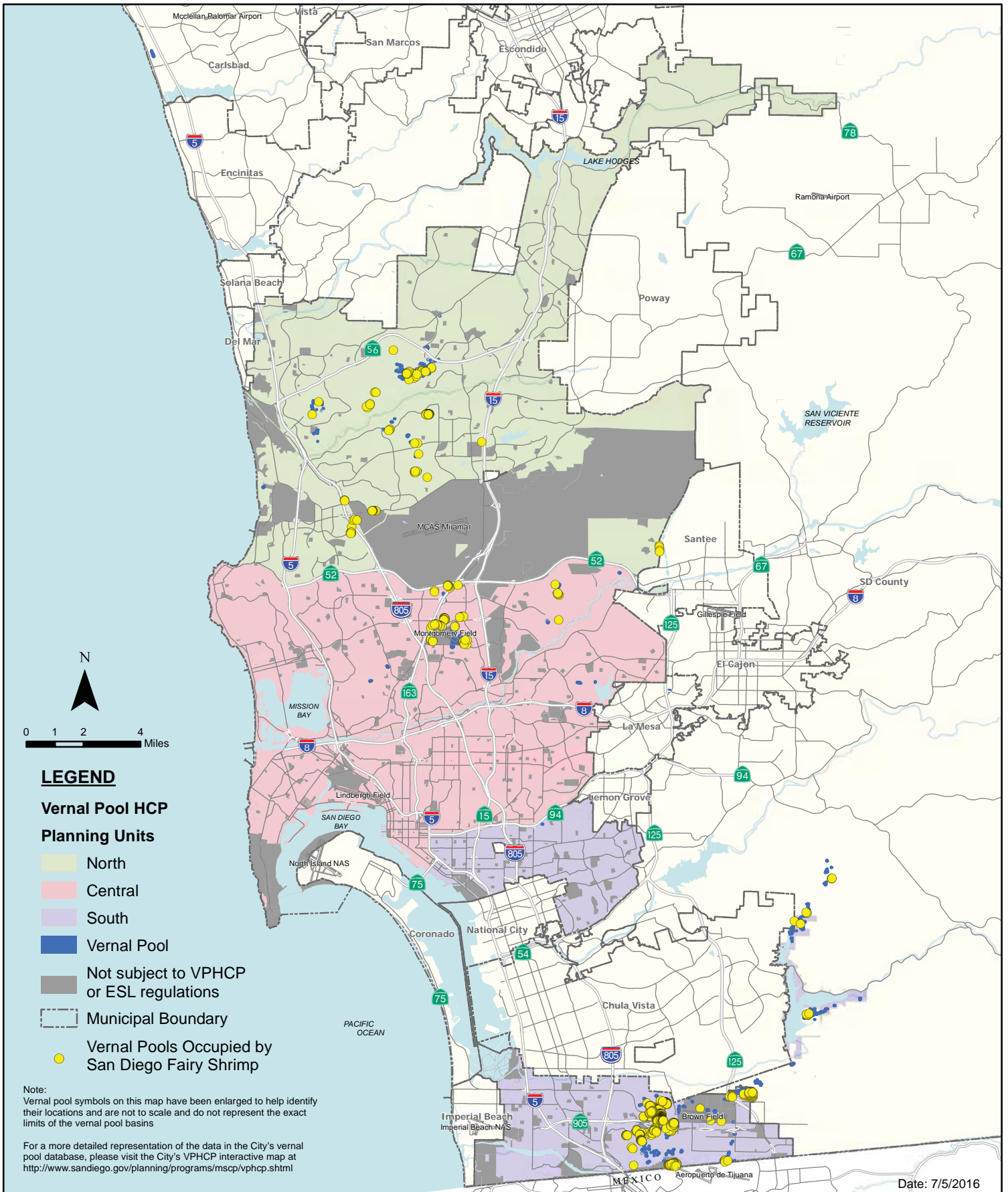
Covered Species	Total Occupied Pools	Number of Complexes with Occupied Pools
San Diego fairy shrimp	517	35
Riverside fairy shrimp	131	6
San Diego button-celery	732	20
Spreading navarretia	95	8
San Diego Mesa mint	337	16
California Orcutt grass	58	3
Otay Mesa mint	369	4

3.1 SAN DIEGO FAIRY SHRIMP

3.1.1 Species Biological Description

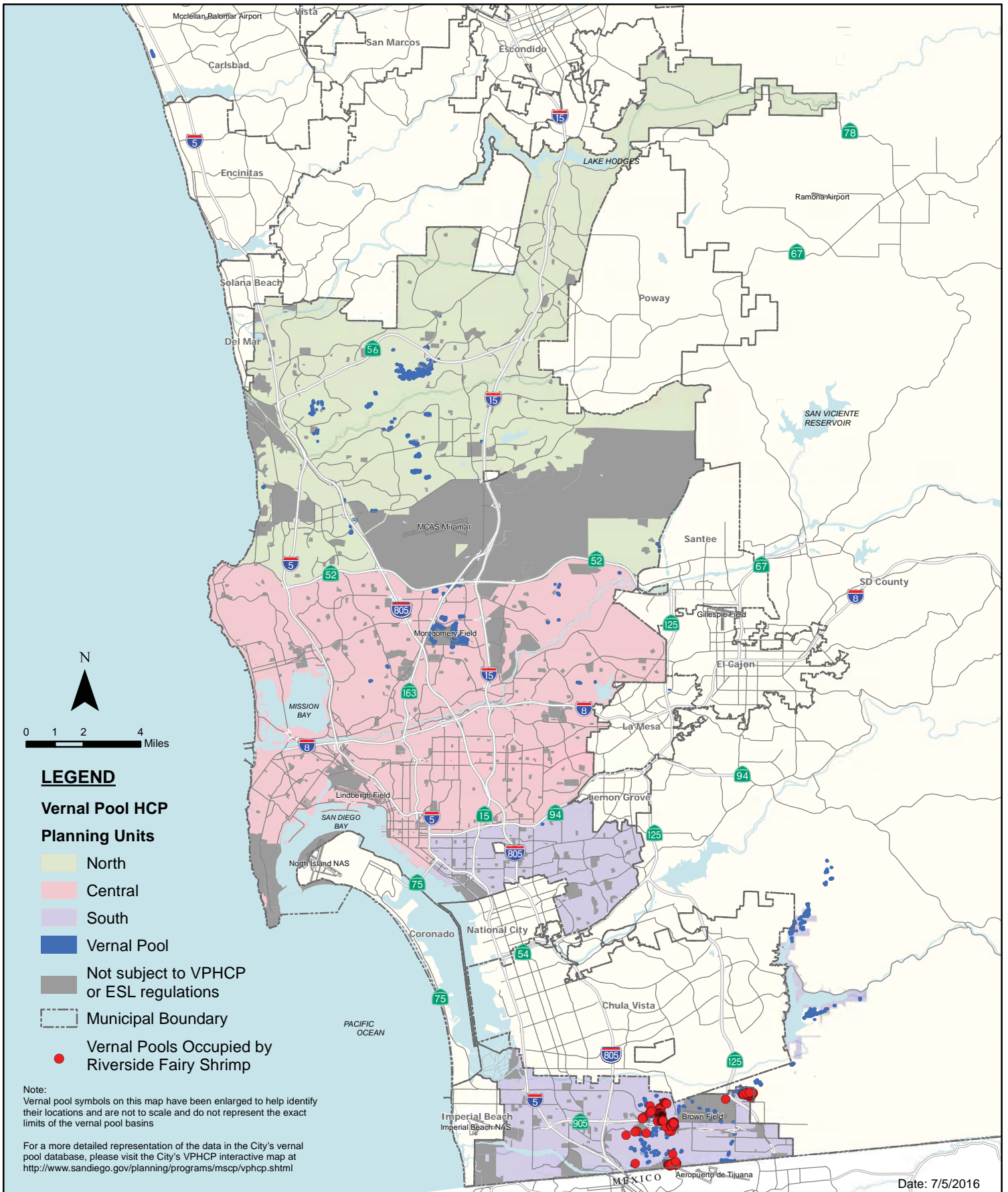
San Diego fairy shrimp is a small aquatic crustacean in the family Branchinectidae, in the order Anostraca. San Diego fairy shrimp were described by Fugate in 1993 and have been found in coastal areas of Santa Barbara, Los Angeles, Riverside, and San Diego counties, and northwestern Baja California, Mexico (USFWS 2008a).

This species is restricted to vernal pools and other nonvegetated ephemeral pools from 2 to 12 inches in depth. The San Diego fairy shrimp is similar in appearance to the versatile fairy shrimp (*Branchinecta lindahli*) (Fugate 1993), which is native to and commonly found throughout western North America (Eng et al. 1990; Simovich 1998).



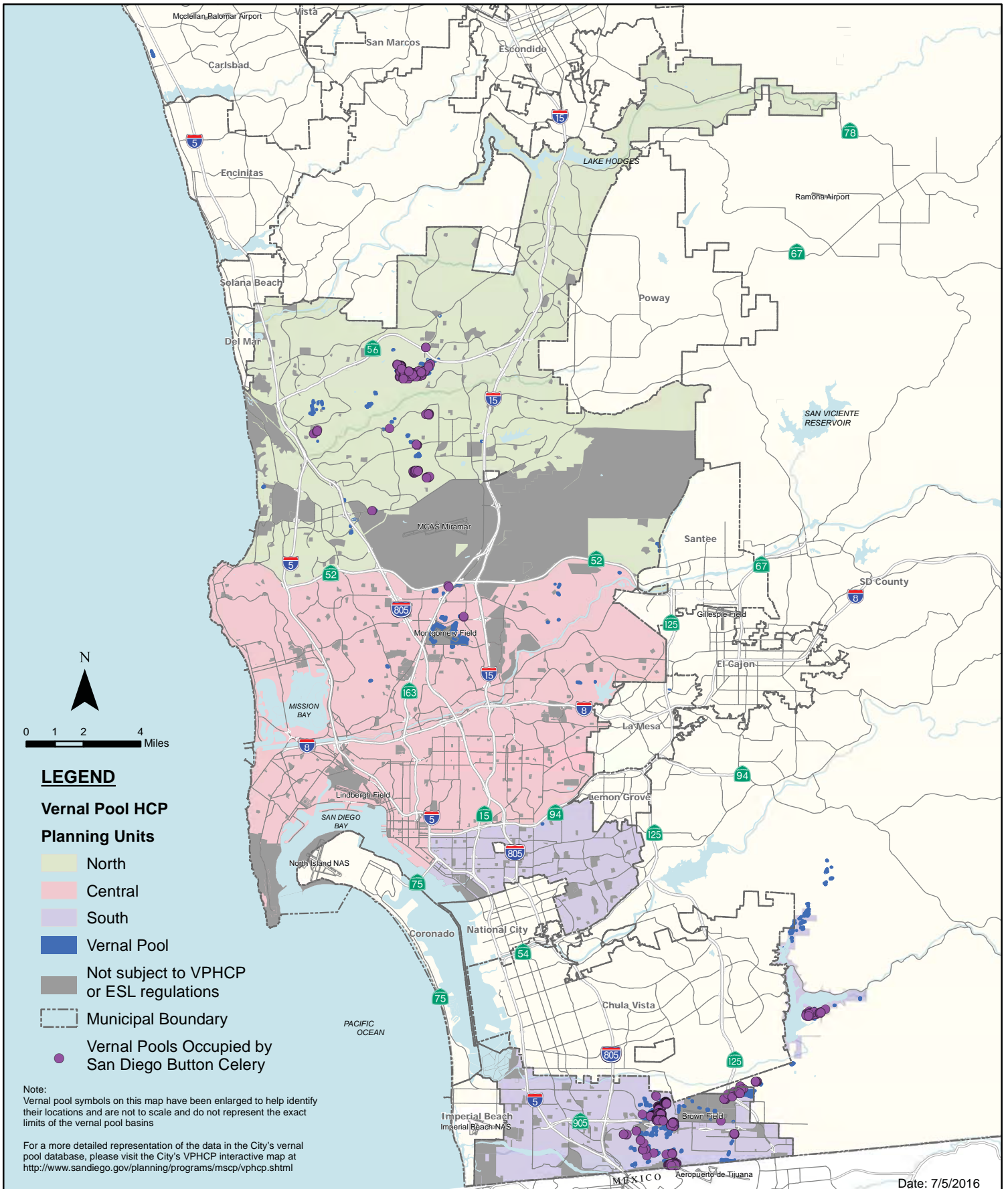
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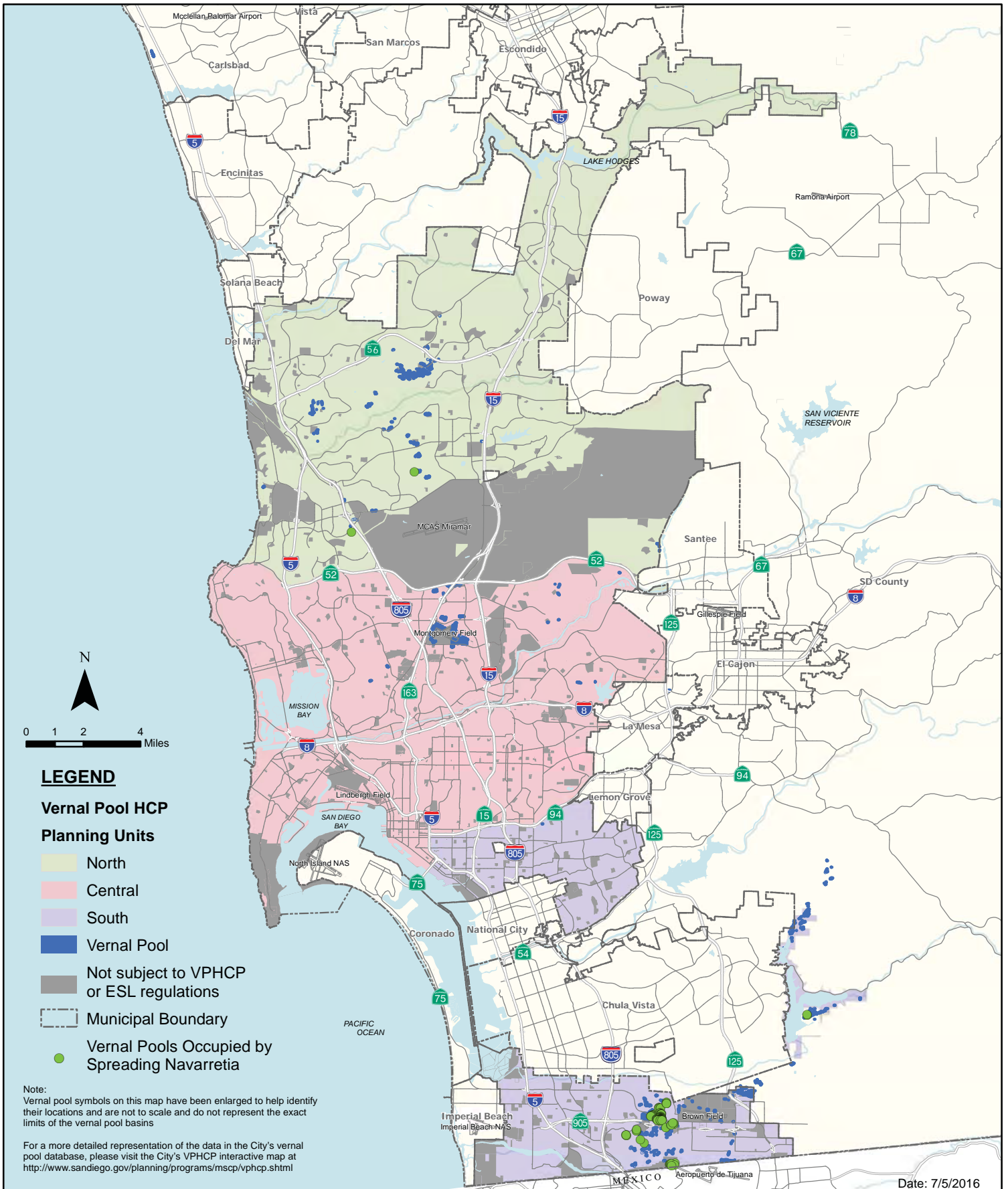
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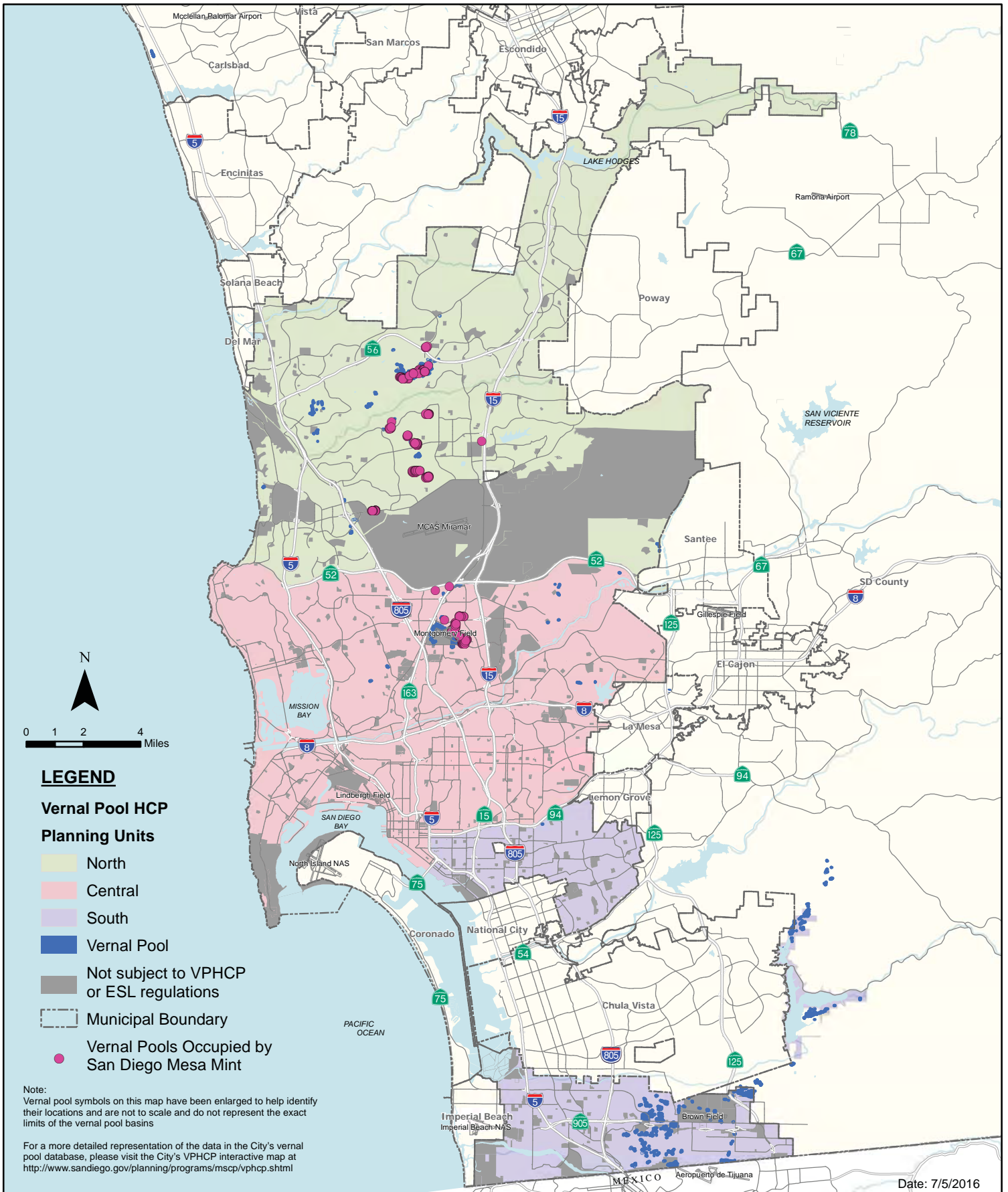
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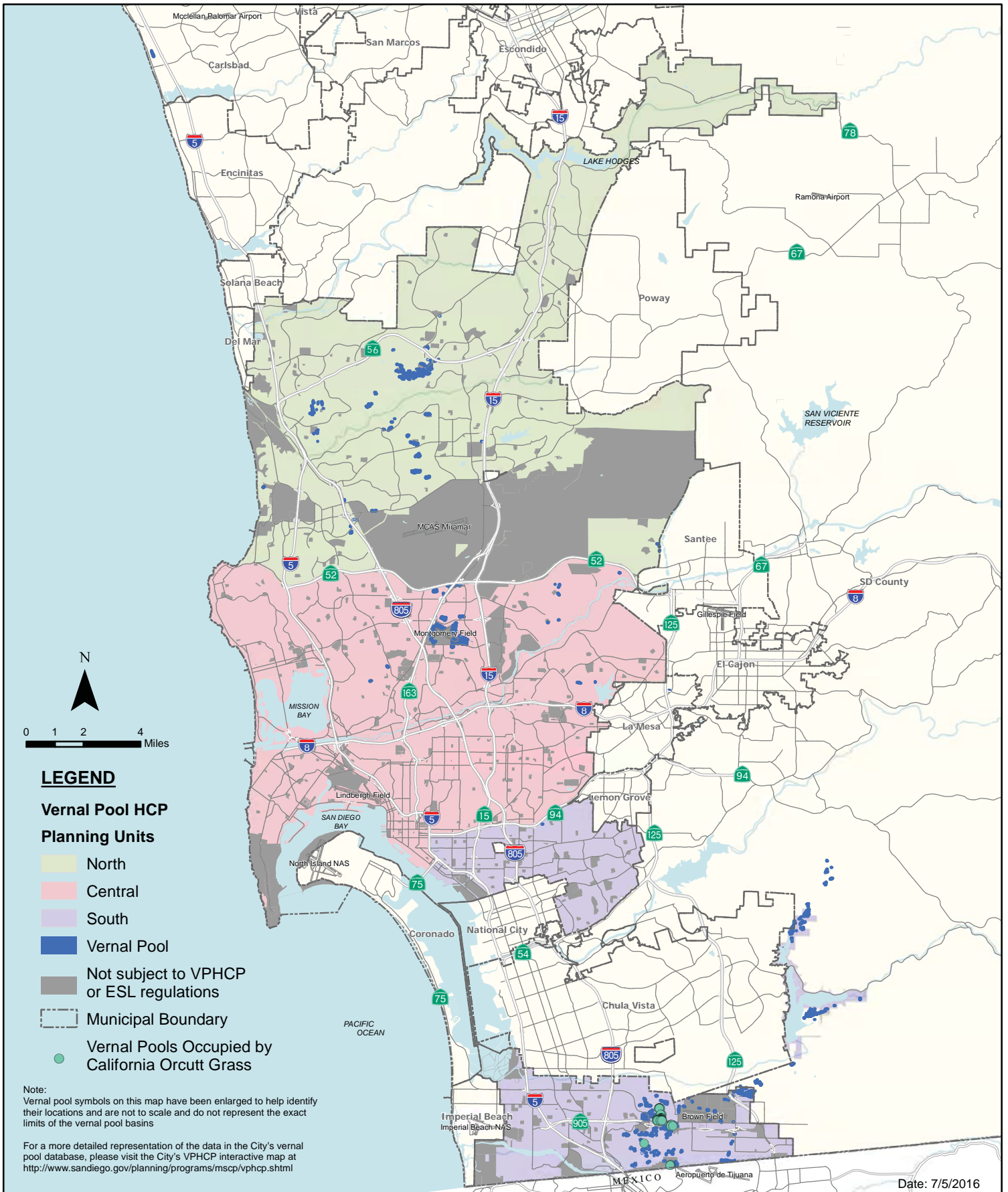
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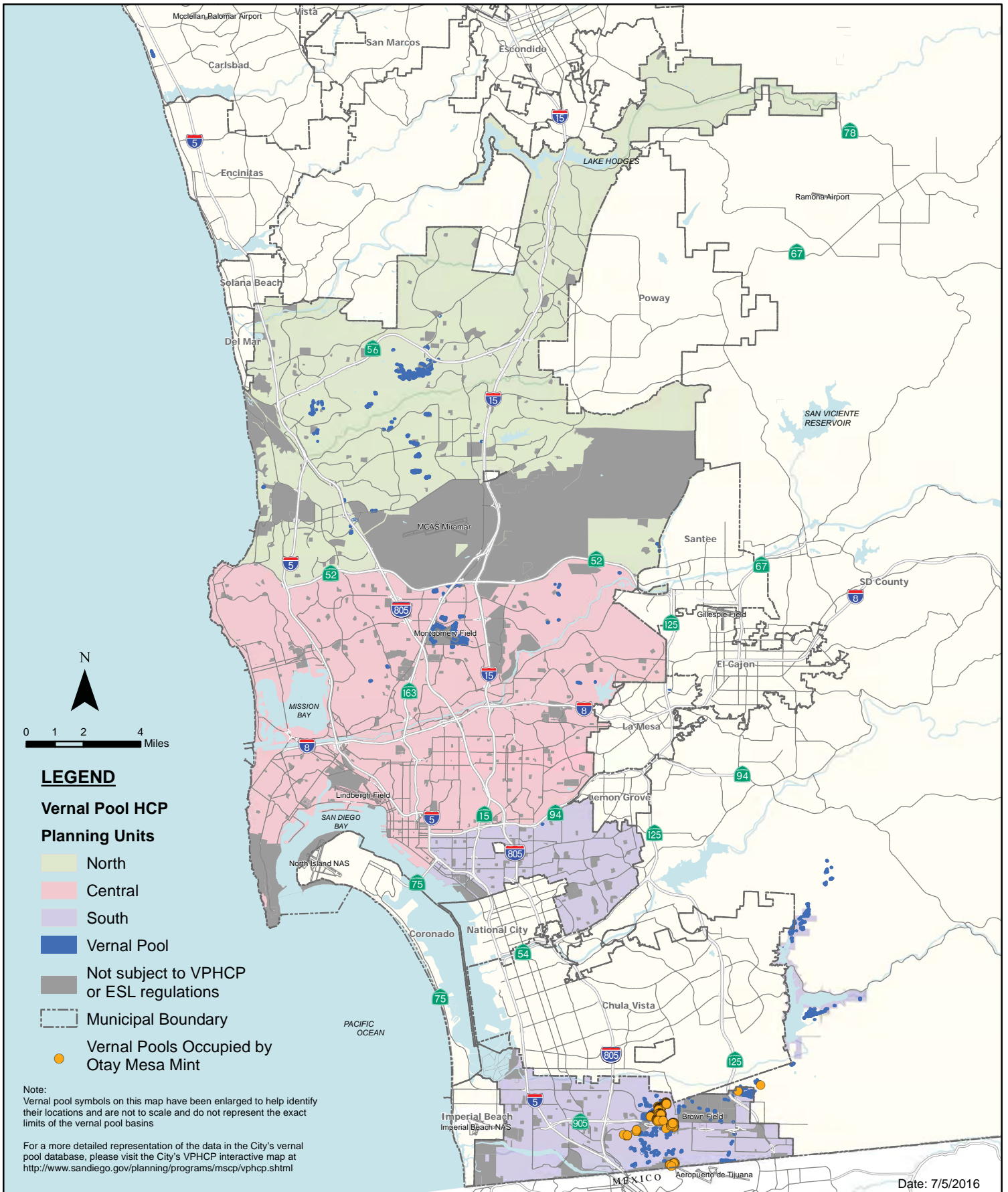
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Source: City of San Diego; SANDAG; SanGIS.

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Source: City of San Diego; SANDAG; SanGIS.

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The life cycle of San Diego fairy shrimp is dependent on the changing hydrologic conditions of the vernal pool. The species cannot persist in perennial water bodies because the rewetting of the dried cysts is one component of a set of environmental stimuli that trigger hatching (Eriksen and Belk 1999). San Diego fairy shrimp are usually observed January through March when seasonal rainfall fills vernal pools and initiates cyst hatching. Individuals hatch and mature within 7 to 14 days of rainfall filling a pool, depending on water temperature (Simovich and Hathaway 1996). This hatching period may be extended in years with early or late rainfall.

The cysts from successful reproduction are either dropped to the pool bottom or remain in the brood sac until the female dies and sinks. The cysts are capable of withstanding temperature extremes and prolonged drying. Only a portion of the cysts may hatch when the pools refill in the same or subsequent rainy seasons. Therefore, cyst “banks” develop in pool soils that are composed of the cysts from several years of breeding. This partial hatching of cysts allows the San Diego fairy shrimp to persist in its extremely variable environment, since pools commonly fill and dry before hatched individuals can reproduce. If all cysts hatched during an insufficient filling, the species could be extirpated from a pool (Philippi et al. 2001; Simovich 2005; Simovich and Hathaway 1996). The ability of San Diego fairy shrimp to develop and maintain cyst banks is vital to the long-term survival of the species (Ripley et al. 2004; Simovich 2005).

For more information on the life history of this species and additional references, refer to the USFWS 5-year review (USFWS 2008a).

3.1.2 Listing Status

San Diego fairy shrimp was federally listed as endangered on February 3, 1997 (62 Federal Register [FR] 4925). San Diego fairy shrimp was listed in 1997 primarily due to the threat of development throughout the range of the species. At the time of listing, it was estimated that 90 to 97% of its historical habitat in San Diego County had been destroyed (Bauder 1986; Oberbauer and Vanderwier 1991; Keeler-Wolf et al. 1995) and that similar declines had occurred elsewhere (Keeler-Wolf et al. 1995; Ferren and Pritchett 1988).

Critical habitat for the San Diego fairy shrimp was designated by USFWS on December 12, 2007 (72 FR 70648). This final rule designated five Critical Habitat units (with 29 subunits) for San Diego fairy shrimp on 3,082 acres of land in Orange and San Diego counties. On September 20, 2011, the District Court of the District of Columbia vacated 143 acres of designated Critical Habitat as mandated by the United States Court of Appeals for the District of Columbia Circuit on September 14, 2011, and its underlying Opinion and Judgment dated July 22, 2011 (*Otay Mesa Property L.P. et al. v. U.S. Department of the Interior, et al.* 1:08-CY-00383). A total of 1,314 acres of San Diego fairy shrimp Critical Habitat is located in the VPHCP Plan Area.

Additionally, the USFWS 5-year review was completed on September 30, 2008 (USFWS 2008a) and recommended no change to the endangered listing status of the San Diego fairy shrimp.

3.1.3 Status and Distribution

San Diego fairy shrimp is currently considered to be extant at 137 known occupied vernal pool complexes in the United States. San Diego fairy shrimp is found in 132 vernal pool complexes in San Diego County, 35 are within the VPHCP Plan Area. These pool complexes are located in Del Mar Mesa, Kearny Mesa, Mira Mesa, Chollas Heights, Mission Trails Regional Park, Marron Valley, and Otay Mesa. Additional occupied vernal pool complexes located in San Diego County, but not in the City of San Diego, are found within MCAS Miramar, Marine Corps Base (MCB) Camp Pendleton, Poway, Carlsbad, San Marcos, Santee, Ramona, Santa Fe Valley, Naval Base Coronado, Otay Mesa, Sweetwater Reservoir, and Tijuana Slough (USFWS 2008a).

Due to the small size and life history traits of San Diego fairy shrimp, surveying occurrences for changes in numbers of individuals and demographic trends over time has not been feasible. Therefore, population trends have been based on changes in the amount of habitat occupied by the species over time. In 2008, a project was funded by a FESA Section 6 grant to develop a protocol to estimate San Diego fairy shrimp population sizes and conduct population viability analyses in real time to detect a decline preceding the likely extinction of a population (Bohonak 2011). Bohonak (2011) investigates several different methods of dry and wet sampling protocols and includes recommendations on how dry sampling might be used for monitoring population trends. This technique has not yet been applied; however, research is ongoing to refine monitoring techniques.

San Diego fairy shrimp occurs across all types of vernal pool soils, including Redding, Olivenhain, Huerhuero, Stockpen, Diablo, Linne, and Chesterton. These complexes occur on both claypan- and hardpan-type soils, and include every soil type that has been identified to support vernal pools.

San Diego fairy shrimp has been identified in 517 vernal pools within 35 complexes inside the VPHCP Plan Area (Table 3-1).

3.2 RIVERSIDE FAIRY SHRIMP

3.2.1 Species Biological Description

Riverside fairy shrimp was first identified in 1985 (Eng et al. 1990). Riverside fairy shrimp is a small aquatic crustacean in the order Anostraca. Riverside fairy shrimp feed on algae, bacteria,

protozoa, rotifers, and bits of detritus. Male Riverside fairy shrimp are distinguished from other fairy shrimp species primarily by the second pair of antennae. The females carry their cysts in an oval or elongated ventral brood sac (Eng et al. 1990; Eriksen and Belk 1999).

The life cycle of Riverside fairy shrimp is dependent on the changing hydrologic conditions of the vernal pool. The species is known to occur in pools that are greater than 12 inches in depth. The species cannot persist in perennial water bodies because the rewetting of the dried cysts is one component of a set of environmental stimuli that trigger hatching (Eriksen and Belk 1999). Riverside fairy shrimp are usually observed January through March, although the hatching period may be extended in years with early or late rainfall. Individuals hatch, mature, and reproduce within 7 to 8 weeks of rainfall filling a pool, depending on water temperature (Simovich and Hathaway 1996).

Similar to the San Diego fairy shrimp described above, the ability of Riverside fairy shrimp to develop and maintain cyst banks is vital to the long-term survival of the species (Ripley et al. 2004; Simovich 2005).

For more information on the life history of this species and additional references, refer to the USFWS 5-year review (USFWS 2008b).

3.2.2 Listing Status

On August 3, 1993, the Riverside fairy shrimp was federally listed as endangered (58 FR 41384).

A final designation of Critical Habitat for this species was made on December 4, 2012 (77 FR 72070) and consists of 1,724 acres of land in five units in Ventura, Los Angeles, Riverside, Orange, and San Diego counties. There is a total of 585 acres of designated Riverside fairy shrimp Critical Habitat acres within the VPHCP Plan Area.

Additionally, the USFWS 5-year review was completed on September 29, 2008 (USFWS 2008b) and recommended no change to the endangered listing status of the Riverside fairy shrimp.

3.2.3 Status and Distribution

Riverside fairy shrimp is currently considered extant at 45 known occupied vernal pool complexes in the United States. Riverside fairy shrimp is found in 26 vernal pool complexes in San Diego County six are within the VPHCP Plan Area. These pool complexes are located in Cal Terraces, Goat Mesa, and Otay Mesa. Additional occupied vernal pool complexes located in San

Diego County, but not in the City of San Diego jurisdiction, are found at MCAS Miramar, MCB Camp Pendleton, and Otay Mesa (USFWS 2008b).

Riverside fairy shrimp is restricted to vernal pools and other nonvegetated ephemeral pools greater than 12 inches in depth in Riverside, Orange, and San Diego counties.

Due to the small size and life history traits of Riverside fairy shrimp, surveying occurrences for changes in numbers of individuals and demographic trends over time is not feasible. Therefore, population trends are determined indirectly by assessing changes in the amount of habitat occupied by the species over time (USFWS 2008b). Similar to San Diego fairy shrimp, research is ongoing to refine monitoring techniques.

The soil types that underlie the vernal pool complexes with Riverside fairy shrimp are Huerhuero, Stockpen, Olivenhain, Diablo, and Linne, which are claypan-type soils.

Riverside fairy shrimp have been identified in 131 vernal pools within six complexes inside the VPHCP Plan Area (Table 3-1).

3.3 SAN DIEGO BUTTON-CELERY

3.3.1 Species Biological Description

San Diego button-celery is a perennial, gray-green herb that has a storage tap-root. It has a spreading shape with stems and lanceolate leaves, which give the plant a prickly appearance. San Diego button-celery has styles in fruit that are about the same length as the calyx (outer whorl of protective structures around the flower) and bractlets (modified leaves) without callused margins (Constance 1993).

San Diego button-celery is a vernal pool obligate and relies on ephemerally wet conditions to reproduce, blooming from April through June. San Diego button-celery seems more tolerant of a wider range of vernal pool habitat than most obligate vernal pool species. It is specifically adapted to surviving in vernal wet conditions due to the presence of air channels in the roots that facilitate necessary gas exchange in submerged plants (Keeley 1998).

San Diego button-celery is presumably insect-pollinated (Zedler 1987), potentially by bee flies (*Bombyliids*) (Schiller et al. 2000) and solitary bees (*Apoidea*), as are many vernal pool species (Thorpe 2007). Currently, the level of relationships between pollinators and San Diego button-celery is unknown.

An important difference between San Diego button-celery and the other sensitive vernal pool plant species in southern California is that San Diego button-celery is a perennial species and has been known to occur in the intermound areas, outside of vernal pool basins. San Diego Mesa mint, Otay Mesa mint, California Orcutt grass, and spreading navarretia are all annual species and are highly dependent on the health and quality of the existing seed bank for current and future ecological stability. While a healthy seed bank is important for San Diego button-celery as well, the fact that the plants are perennial means that the seed bank can be almost nonexistent and the San Diego button-celery will continue to persist for a number of years, with fluctuating wet and dry years.

For more information on the life history of this species and additional references, refer to the USFWS 5-year review (USFWS 2010a).

3.3.2 Listing Status

San Diego button-celery was federally listed as an endangered species on August 3, 1993, 14 years after it was listed as endangered by the State of California (58 FR 41384). It is a California Native Plant Society (CNPS) List 1B species and is a narrow endemic species under the City of San Diego LDM Biology Guidelines.

No Critical Habitat has been designated for San Diego button-celery, but the Recovery Plan (USFWS 1998A) calls for essentially all populations of San Diego button-celery within the City MSCP to be conserved.

Additionally, the USFWS 5-year review was completed on September 1, 2010 (USFWS 2010a) and recommended no change to the endangered listing status of San Diego button-celery.

3.3.3 Status and Distribution

Historically, habitat for the San Diego button-celery included a coastal swath from Mesa de Colonet, north to Los Angeles County, and San Quintin in Baja California, Mexico. The northernmost range of the variety on the Pacific Coast is at MCB Camp Pendleton (Wire Mountain). San Diego button-celery can be locally abundant in remnant vernal pools; however, the distribution of this variety has been dramatically reduced (95 to 97%) due to loss of most vernal pool habitats in San Diego County (USFWS 1998A).

San Diego button-celery is found in vernal pools in San Diego County at Otay Mesa, Kearny Mesa, Del Mar Mesa, MCAS Miramar, and MCB Camp Pendleton, and in northern Baja California, Mexico (USFWS 1993).

Within the VPHCP Plan Area, San Diego button-celery occurs across various types of vernal pool soils, including Redding, Olivenhain, Huerhuero, Stockpen, Diablo, and Linne. Unlike some of the other sensitive plant species known to occur in southern California vernal pools, San Diego button-celery does not appear restricted to any particular type of soil type.

San Diego button-celery has been identified in 732 vernal pools within 20 complexes inside the VPHCP Plan Area (Table 3-1).

3.4 SPREADING NAVARRETIA

3.4.1 Species Biological Description

Spreading navarretia is an annual herb in the phlox family (*Polemoniaceae*). It is a low, mostly spreading or ascending plant, with flat-topped, compact, leafy head flowers with white to lavender petals. The fruit is an ovoid, two-chambered capsule. Each seed is covered by a layer that becomes sticky and viscous when the capsule is moistened. Spreading navarretia also has linear corolla lobes, spreading or ascending habit, and flat-topped inflorescences.

The life cycle of spreading navarretia is dependent on the function of the vernal pool ecosystem. This annual species germinates from seeds left in the seed bank. For many vernal pool plant species, soil moisture affects the timing of plant germination (Myers 1975). Although not proven, it is likely that spreading navarretia uses these same cues for germination. The timing of germination is important so that the plant germinates under favorable conditions in the spring rather than the summer, autumn, or winter.

Spreading navarretia abundance also varies from year to year depending on precipitation and the soil saturation/drying time of the vernal pool. This annual variation makes it impossible to obtain an accurate count of the number of individuals in the population because the proportion of standing plants to remaining seeds in the seed bank that makes up the population cannot be measured.

Pollination and dispersal mechanisms are not well known for spreading navarretia. The plant has the ability to self-pollinate, but is not an obligate self-pollinator. Information on the pollinators of spreading navarretia is not available. Hypothetically, insects would be the main pollinators of the flowers. For example, the Hymenopteran insect *Perdita navarretiae* (a type of mining bee in the *Andrenidae* family) has been documented to make repeated visits to spreading navarretia, possibly for pollination (Krombein 1979).

After germination, the plant usually flowers in May and June when the vernal pool is devoid of water (Glenn Lukos Associates 2005). The plant then produces fruit, dries out, and senesces in the hot, dry summer months. Minimal information exists on the dispersal of spreading navarretia seeds. Individual seeds can often be glued in seed clusters that could stick to an animal or bird passing through the vernal pool, providing a method of dispersal. More research is needed to discover the actual methods of pollination and dispersal for spreading navarretia.

For more information on the life history of this species and additional references, refer to the USFWS 5-year review (USFWS 2009).

3.4.2 Listing Status

Spreading navarretia was federally listed as a threatened species on October 13, 1998 (63 FR 54975). This plant is a CNPS List 1B species and is considered to be a narrow endemic species under the City of San Diego LDM Biology Guidelines.

Approximately 6,720 acres of habitat in Los Angeles, Riverside, and San Diego counties falls within the boundaries of the Critical Habitat designation for spreading navarretia (75 FR 62192). There is a total of 450 acres of spreading navarretia Critical Habitat acres in the VPHCP Plan Area.

Additionally, the USFWS 5-year review was completed on August 10, 2009 (USFWS 2009) and recommended no change to the endangered listing status of spreading navarretia.

3.4.3 Status and Distribution

Spreading navarretia is found in widely disjointed and restricted vernal pool complexes extending from the Santa Clarita region of Los Angeles County, east to the western lowlands of Riverside County, south through coastal and foothill San Diego County, and south to San Quintin, Baja California, Mexico. Nearly 60% of populations in the official listing and in the Recovery Plan (USFWS 1998A) were concentrated at three locations: Otay Mesa in southern San Diego County, alongside the San Jacinto River in western Riverside County, and near Hemet in western Riverside County (Bauder 1986; Bramlet 1993). At the time of listing, spreading navarretia occupied less than 300 acres of habitat in the U.S. (USFWS 2009).

Spreading navarretia occurs on a number of vernal pool soil types, including Huerhuero, Stockpen, Redding, and Chesterton, and is known from hardpan, claypan, alkali playas, and alluvial terrace pool complexes. The soil types that underlie the complexes with spreading

navarretia are Redding, Huerhuero, Stockpen, Olivenhain, and Linne. With the exception of one complex (D5-8, also known as Carroll Canyon), all of these complexes are on claypan-type soils.

Within the VPHCP Plan Area, 95 pools are occupied with spreading navarretia within eight complexes (Table 3-1).

3.5 SAN DIEGO MESA MINT

3.5.1 Species Biological Description

San Diego mesa mint is an annual herb in the mint family (*Lamiaceae*). San Diego mesa mint has two flowers per node on the stem, whereas Otay Mesa mint (described later in this chapter) has at least six flowers per node. San Diego mesa mint typically blooms from May or June through early July and usually gives off a strong, sweet mint odor. The vegetative portions of the plant develop a reddish tinge during maturation. The plant has a hairy calyx, rather than the smooth calyx of the Otay Mesa mint, and bracts and leaves that are narrower than Otay Mesa mint.

The link between the onset of germination, temporal conditions associated with vernal pool inundation, temperature, and moisture are critical to the germination, maturation, flowering, and fruiting of San Diego Mesa mint. These environmental factors make it difficult to obtain an accurate measure of the population. Additionally, a portion of the population is represented by seeds remaining in the seed bank that are not accounted for each year. Dr. Tom Ebert (1999) developed a stage-structured demographic model for San Diego Mesa mint, which includes information on seed storage in the soil.

The life cycle of San Diego mesa mint is dependent on soil saturation in vernal pools. San Diego mesa mint usually blooms in May and June when water is absent from the vernal pool (Munz 1974). The plants produce fruit, dry out, and senesce in the hot, dry summer months.

Pollination of San Diego mesa mint was described by Schiller et al. (2000) by monitoring insect visitors to individual plants on Del Mar Mesa. Schiller et al. found the Eurasian honey bee (*Apis mellifera*), two anthophorid bees (*Exomalopsis nitens* and *E. torticornis*), and bee flies (*Bombylids*) to be the most common and likely pollinators of San Diego mesa mint at the Del Mar Mesa locality. Other potential pollinators include hover flies (Syrphids). Pollinator studies specific to vernal pool species have been conducted in the California Central Valley where the upland habitat may play a crucial role in supporting native bee populations (Thorp and Leong 1998).

Gene dispersal may occur via pollen or seed. Schiller et al. documented that San Diego mesa mint is self-fertile but has significantly greater seed set when cross-pollinated (Schiller et al. 2000). San Diego mesa mint does not have seed morphology associated with animal or wind dispersal, although scattered occurrences of pool plants along well-worn trails that link individual pools over wide areas suggest that small and large animals may contribute to seed dispersal (Cole 1995). Waterfowl use pools (Proctor et al. 1967; Zedler 1987) and rabbit movement (Zedler and Black 1992) may be a potential mechanism for dispersal and genetic mixing. In addition, San Diego mesa mint seeds can sometimes float, which may result in limited dispersal opportunities when pools interconnect or lakes fill their basins in years of greater than average precipitation (Scheidlinger 1981).

For more information on the life history of this species and additional references, refer to the USFWS 5-year review (USFWS 2010b).

3.5.2 Listing Status

San Diego mesa mint was federally listed as an endangered species in September 1978 (43 FR 44810) and was listed the following year by the State of California. This plant is a CNPS List 1B species and is a narrow endemic species under the City of San Diego LDM Biology Guidelines.

No Critical Habitat has been designated for San Diego Mesa mint, but the Recovery Plan calls for essentially all populations of San Diego mesa mint to be conserved and protected. Much of the range and distribution for the species is found on MCAS Miramar with remaining populations outside MCAS Miramar found on City MSCP lands. While MCAS Miramar has an approved management plan for vernal pools and San Diego Mesa mint, it is not required to maintain all existing populations of San Diego mesa mint within the MCAS Miramar boundary (U.S. Marine Corps 2011). Because of this less-than-certain protection for San Diego mesa mint on MCAS Miramar, the Recovery Plan considers all populations within the VPHCP Plan Area critical to the stability and conservation of the species (USFWS 1998A).

Additionally, the USFWS 5-year review was completed on September 1, 2010 (USFWS 2010b) and recommended no change to the endangered listing status of San Diego Mesa mint.

3.5.3 Status and Distribution

San Diego mesa mint is found in vernal pools on mesas of western San Diego County; however, specific occurrence and range information was not included in the official listing (USFWS 1978). The Recovery Plan (USFWS 1998A) identifies the northern distribution for San Diego mesa mint as Del Mar Mesa. It occurs south on Mira Mesa, MCAS Miramar, and Kearny Mesa,

with a few scattered populations in western Tierrasanta. Examination of occurrence data from the time of listing (Bauder 1986; CDFG 2010) suggests that the distribution of San Diego mesa mint has decreased since its listing in 1978. San Diego mesa mint was extirpated from pool complexes in the most southern and northern extremities of its range (Element Occurrences 49, 56). No new extant occurrences have been detected since the time of listing.

Historically, outside of San Diego Mesa mint's current range, the species is thought to have occurred around Linda Vista, the vicinity of Balboa Park, Normal Heights, and the area surrounding San Diego State University (USFWS 1998; Zedler et al. 1979). Some confusion has existed regarding San Diego Mesa mint's historical range due to misidentified herbarium specimens (identified as Otay Mesa mint) and vague references regarding collection sites. Upon review of these historical herbarium collections from the central part of San Diego County, it was determined that these historical occurrences were, in fact, San Diego mesa mint (Bauder and McMillan 1998; Howell 1931). No estimate of numbers of San Diego mesa mint plants at specific sites is currently available. This is likely due to the difficulty of measuring temporal abundance at each occurrence. As with most annual plants, the germination success of San Diego mesa mint differs annually depending, in part, on temperature, timing, and amount of rainfall.

Vernal pools that support San Diego mesa mint are typically found on Redding soils. All San Diego mesa mint populations are known from hardpan-type vernal pools. Olivenhain was also identified from several complexes, and the J30 complex (Lone Star) also had Linne soils underlying the complex.

San Diego mesa mint has been identified in 337 vernal pools within 16 complexes inside the VPHCP Plan Area (Table 3-1).

3.6 CALIFORNIA ORCUTT GRASS

3.6.1 Species Biological Description

California Orcutt grass is an annual grass in the grass family (Poaceae) that is bright gray-green in color and secretes sticky droplets. This species is inconspicuous and prostrate at first, although it develops more erect glandular pubescent stems. The plant inflorescences consist of seven spikelets arranged in two ranks, with the upper spikelets overlapping on a somewhat twisted axis. California Orcutt grass is sparsely hairy with a prostrate stem (USFWS 1998A).

California Orcutt grass typically flowers from April through July and then sets seed. This species is adapted to conditions in the wettest, longest lasting portion of vernal pools. It is less abundant at the shallow periphery of vernal pools that are subject to more rapid changes in moisture

(Reeder 1993; Munz 1974). The first significant fall and winter rains begin the process of vernal pool inundation; with no rain, no significant germination of this species will occur. California Orcutt grass seeds germinate while pools are inundated, and the plant appears prostrate during this period. Orcutt grass typically requires at least 15 to 30 days of inundation before germination will occur, so in low rainfall years, there may not be enough ponding to promote adequate germination and the species may remain dormant in the seed bank until an adequate rainfall season (Griggs 1976, 1981). As the season progresses, temperature increases and rainfall declines result in increased evaporation. This stimulates the plant's stems to become more erect, at which time the plant begins to flower. Flowering generally occurs April through June, and by early to mid-summer the pools become dry.

Orcutt grass relies on fungi to play a role in stimulating germination (Griggs 1976, 1981; Keeley 1988), but it is unclear if this fungal association is present in all populations. As for the entire grass family, California Orcutt grass is believed to be wind pollinated, although no studies of wind pollination or vector-assisted pollination in this species are currently known (USFWS 2011).

For more information on the life history of this species and additional references, refer to the USFWS 5-year review (USFWS 2011).

3.6.2 Listing Status

California Orcutt grass was listed as an endangered species by the State of California in September 1979. The species was federally listed as endangered on August 3, 1993 (58 FR 41384). It is a CNPS List 1B species and is a narrow endemic species under the City of San Diego LDM Biology Guidelines (City of San Diego 2012a).

No Critical Habitat has been designated for California Orcutt grass, but the Recovery Plan calls for all populations of Orcutt grass to be conserved and protected (USFWS 1998A).

Additionally, the USFWS 5-year review was completed on March 11, 2011 (USFWS 2011) and recommended no change to the endangered listing status of California Orcutt grass.

3.6.3 Status and Distribution

California Orcutt grass is currently considered extant at 28 occurrences in four counties of southern California: three occurrences in Ventura County, three occurrences in Los Angeles County, nine occurrences in Riverside County, and 13 occurrences in San Diego County. Of these 13 occurrences, only the three vernal pool complexes located in Otay Mesa fall within City

jurisdiction. Additional occupied vernal pool complexes located in San Diego County, but not in the City, are found within MCAS Miramar, the City of Carlsbad, and Warner Valley. Additionally, two populations of this species known from Otay Mesa are presumed to have been extirpated, and the status of a population at a created pool at the Peñasquitos Substation is unknown (USFWS 2011).

Historically, this species also was found on Mesa de Colinet and in pools at San Quintin in northern Baja California, Mexico. There is no current knowledge confirming the contemporary existence of the species in Baja California, but the vernal pool habitat that supported these occurrences still persists (USFWS 2011). No estimate of numbers of California Orcutt grass specimens at specific sites is currently available. This is likely due to the difficulty of measuring temporal abundance at each occurrence. As with most annual plants, the germination success of California Orcutt grass differs annually depending, in part, on temperature, timing, and amount of rainfall.

The soil types that underlie the three complexes with California Orcutt grass are Huerhuero, Olivenhain, Stockpen, and Linne, which are claypan-type soils.

California Orcutt grass has been identified in 58 vernal pools within three complexes inside the VPHCP Plan Area (Table 3-1).

3.7 OTAY MESA MINT

3.7.1 Species Biological Description

Otay Mesa mint is an annual herb in the mint family (Lamiaceae). Otay Mesa mint has at least six flowers or more per node on the stem, and a glabrous to minutely hairy calyx, while San Diego mesa mint (described above) typically only has two flowers per node. Otay Mesa mint bracts and leaves are also wider than San Diego Mesa mint. The plant is typically minimally branched, and the vegetative and floral portions of the plant emit a strong, turpentine mint odor. In contrast to San Diego Mesa mint, the vegetative portions of the plant do not develop a reddish tinge until the plant is past the flowering period. The flowers are purple with a white throat.

The link between the onset of germination, temporal conditions associated with vernal pool inundation, temperature, and moisture are critical to the germination, maturation, flowering, and fruiting of Otay Mesa mint. The interaction of these factors provides the plants favorable conditions in the spring rather than in the summer, autumn, or winter. Otay Mesa mint commences flowering in May and continues through June or July; by early to mid-summer, the pools become dry. Natural differences in the precipitation and the saturation/drying time of

vernal pools from year to year may influence the distribution and abundance of Otay Mesa mint. These environmental factors make it difficult to obtain an accurate measure of the population. Additionally, a portion of the population is represented by seeds remaining in the seed bank, which is not accounted for each year.

The family is primarily bee pollinated (Proctor and Yeo 1973). Potential pollinators that frequent Otay Mesa mint flowers are hover flies (*Syrphids*), bee flies (*Bombylids*), sweet bees (*Halictids*), and the common honey bee (*Apis mellifera*) (McMillan 2012, pers. com.). Gene dispersal may occur via pollen or seed. Otay Mesa mint does not have seed morphology associated with animal or wind dispersal, although scattered occurrences of pool plants along well-worn trails that link individual pools over wide areas suggest that small and large animals may contribute to seed dispersal (Cole 1995). As with San Diego Mesa mint, waterfowl using pools (Proctor et al. 1967; Zedler 1987) and rabbit movement (Zedler and Black 1992) may be potential mechanisms for dispersal and genetic mixing. In addition, Otay Mesa mint seeds can sometimes float, which may result in limited dispersal opportunities when pools interconnect or lakes fill their basins in years of greater than average precipitation (Scheidlinger 1981).

For more information on the life history of this species and additional references, refer to the USFWS 5-year review (USFWS 2010c).

3.7.2 Listing Status

Otay Mesa mint was listed as an endangered species by the State of California in 1987, and federally listed as endangered on August 3, 1993 (58 FR 41384). It is a CNPS List 1B species and is a narrow endemic species under the City of San Diego LDM Biology Guidelines.

No Critical Habitat has been designated for Otay Mesa mint, but the Recovery Plan calls for all populations of Otay Mesa mint to be conserved and protected (USFWS 1998A).

Additionally, the USFWS 5-year review was completed on September 1, 2010 (USFWS 2010c) and recommended no change to the endangered listing status of Otay Mesa mint.

3.7.3 Status and Distribution

Otay Mesa mint is found only in southern San Diego County. This mint grows in vernal pools near the Otay Mesa region. Historically, Otay Mesa mint was believed to be found beyond Otay Mesa and occurred at 10 locations in southern San Diego County, including sites farther north near University Heights, Balboa Park, and Mission Valley (USFWS 2010c). However, upon review of these historical herbarium collections from the central part of San Diego County, it

was determined that these historical occurrences were actually San Diego mesa mint (McMillan 2012, pers. com.).

Otay Mesa mint also historically grew in vernal pools near the Tijuana International Airport in Baja California, Mexico, but has likely been extirpated there due to urban development. Most recently, the San Diego National Wildlife Refuge introduced it into the vernal pool complex (“S” series) located just south of the Sweetwater Reservoir. Seeds were distributed at the Shinohara vernal pool restoration site prior to the 2011 growing season. The seeds have sprouted, but it is too soon to tell whether this population will be successfully established. No estimate of numbers of individual Otay Mesa mint plants at specific sites is currently available. This is likely due to the difficulty of measuring temporal abundance at each occurrence. As with most annual plants, the germination success of Otay Mesa mint differs annually depending, in part, on temperature, timing, and amount of rainfall.

All Otay Mesa mint populations are known from claypan-type vernal pools. The soil types that underlie the 10 Otay Mesa mint complexes are Stockpen, Olivenhain, Linne, and Huerhuero (Bauder and McMillan 1998; Beauchamp and Cass 1979).

While Otay Mesa mint may have historically occurred in hundreds of pools on Otay Mesa, by the mid-1990’s the species was present in less than 20 pools (Bauder and McMillan 1998). Major vernal pool restoration efforts (e.g., Cal Terraces, Otay Mesa Road parcels) were undertaken on Otay Mesa in the late 1990s, and continue today. Vernal pool restoration over the last two decades has resulted in the creation and enhancement of additional vernal pools on Otay Mesa, many of which now support healthy populations of Otay Mesa mint. Currently, Otay Mesa mint has been identified in 369 vernal pools within four complexes inside the VPHCP Plan Area (Table 3-1).

3.8 SUMMARY OF STATUS INFORMATION FOR COVERED SPECIES

Table 3-2 summarizes key information and status data for each covered species within the VPHCP Plan Area.

Table 3-2
Summary of Covered Species Key Information and Status in VPHCP Plan Area

Covered Species	Federal and State Listing Status	Critical Habitat in VPHCP Plan Area	Key Description Information	Habitat	Life Cycle	Status and Distribution	Status in VPHCP Plan Area
San Diego fairy shrimp	FE	Approximately 1,314 acres (out of 2,931 acres in species designation)	<ul style="list-style-type: none"> • Small aquatic crustacean • Feed on algae, diatoms, and particulate organic matter 	<ul style="list-style-type: none"> • Occurs in vernal pools and other nonvegetated ephemeral pools from 2 to 12 inches in depth in coastal areas of San Diego County, Orange County, and northwestern Baja • Restricted to dilute vernal pools having relatively low sodium concentrations, low alkalinity, and neutral pH 	<ul style="list-style-type: none"> • Usually observed January through March, although the hatching period may be extended in years with early or late rainfall • Individuals hatch, mature, and reproduce within 7 to 14 days of rainfall filling a pool, depending on water temperature 	<ul style="list-style-type: none"> • Coastal areas of San Diego County, Orange County, and northwestern Baja • Historic occurrence in Santa Barbara County 	<ul style="list-style-type: none"> • Occurs in 517 vernal pools within 35 vernal pool complexes • Occurs across all types of vernal pool soils, including Redding, Olivenhain, Huerhuero, Stockpen, Diablo, Linne, and Chesterton • Occurs on both claypan- and hardpan-type soils
Riverside fairy shrimp	FE	Approximately 585 acres (out of 1,724 acres in species designation)	<ul style="list-style-type: none"> • Small aquatic crustacean 	Restricted to vernal pools and other nonvegetated ephemeral pools greater than 12 inches in depth in Riverside, Orange, and San Diego counties	<ul style="list-style-type: none"> • Usually observed January through March, although the hatching period may be extended in years with early or late rainfall • Individuals hatch, mature, and reproduce within 7 to 8 weeks of rainfall filling a pool, depending on water temperature • Cysts are capable of withstanding temperature extremes and prolonged drying 	<ul style="list-style-type: none"> • Riverside, San Diego, and Orange counties • Historical occurrences reported from Ventura County, Los Angeles County, and northwestern Baja 	<ul style="list-style-type: none"> • Identified in 131 vernal pools within six vernal pool complexes • Occurs on Huerhuero, Stockpen, Olivenhain, Diablo, and Linne soils • Claypan-type soils associated with marine sediments with subsurface layers that are basic in pH

3.0 Covered Species

Covered Species	Federal and State Listing Status	Critical Habitat in VPHCP Plan Area	Key Description Information	Habitat	Life Cycle	Status and Distribution	Status in VPHCP Plan Area
San Diego button-celery	FE, CE	No designated Critical Habitat	<ul style="list-style-type: none"> Perennial gray-green herb that has a storage tap-root Stems and lanceolate leaves give the plant a prickly appearance 	<ul style="list-style-type: none"> Found in almost every type of southern California vernal pool, including claypan-, hardpan-, and alluvial-terrace-type pools Does not appear restricted to any particular type of soil type 	<ul style="list-style-type: none"> Vernal pool obligate and relies on ephemeral wet conditions to reproduce, blooming from April through June Seems more tolerant of a wider range of vernal pool habitat than most obligate vernal pool species Can tolerate disturbance factors better than most endemic species Presumably insect-pollinated 	<ul style="list-style-type: none"> San Diego County at Otay Mesa, Kearny Mesa, Del Mar Mesa, MCAS Miramar, and MCB Camp Pendleton, and in northern Baja California, Mexico Historically, habitat included a coastal swath from Mesa de Colonet and San Quintin in Baja north to Los Angeles County 	<ul style="list-style-type: none"> Occurs in 732 vernal pools within 20 vernal pool complexes Occurs across various types of vernal pool soils, including Redding, Olivenhain, Huerhuero, Stockpen, Diablo, and Linne
Spreading navarretia	FT	Approximately 450 acres (out of 6,720 total acres in species designation)	<ul style="list-style-type: none"> Annual herb Flat-topped, compact, leafy head flowers with white to lavender-white petals Seed is covered by a layer that becomes sticky and viscous when the capsule is moistened 	Known from hardpan, claypan, alkali playas, and alluvial terrace pool complexes	<ul style="list-style-type: none"> Pollination and dispersal mechanisms not well known Ability to self-pollinate, but is not an obligate self-pollinator Blooms in May and June through summer months Minimal information on seed dispersal 	<ul style="list-style-type: none"> Found in widely disjointed and restricted vernal pool complexes extending from the Santa Clarita region of Los Angeles County, to the western lowlands of Riverside County, through coastal and foothill San Diego County, and south to San Quintin, Baja 	<ul style="list-style-type: none"> Occurs in 95 vernal pools within eight complexes Occurs on Redding, Huerhuero, Stockpen, Olivenhain, and Linne soils Primarily claypan-type soils associated with marine sediments and typically have basic pH subsurface layers
San Diego mesa mint	FE, CE	No designated Critical Habitat	<ul style="list-style-type: none"> Annual herb Two flowers per node Plant emits a strong, sweet mint odor 	Known from hardpan-type vernal pools in San Diego County	<ul style="list-style-type: none"> Dependent on saturated soils of vernal pools Blooms from May or June through early July Primarily bee pollinated Gene dispersal occurs via pollen or seed 	<ul style="list-style-type: none"> Mesas of western San Diego County including Del Mar Mesa, Mira Mesa, Marine Corps Air Station Miramar, Kearny Mesa, and western Tierrasanta Historically, thought to have occurred around Linda Vista, the vicinity of Balboa Park, Normal Heights, and the area 	<ul style="list-style-type: none"> Occurs in 337 vernal pools within 16 vernal pool complexes Found on Redding soils, with Olivenhain or Linne on several complexes Hard-pan soils acidic in pH

Covered Species	Federal and State Listing Status	Critical Habitat in VPHCP Plan Area	Key Description Information	Habitat	Life Cycle	Status and Distribution	Status in VPHCP Plan Area
						surrounding San Diego State University	
California Orcutt grass	FE, CE	No designated Critical Habitat	<ul style="list-style-type: none"> • Annual grass • Bright gray-green in color and secretes sticky droplets • Inflorescences consist of seven spikelets arranged in two ranks, with the upper spikelets overlapping on a somewhat twisted axis 	Restricted to vernal pools in southern California	<ul style="list-style-type: none"> • Flowers from April through July and then sets seed • Adapted to conditions in the wettest, longest lasting portion of vernal pools • Typically requires at least 30 days of inundation before germination begins • Believed to be wind pollinated 	<ul style="list-style-type: none"> • Ventura, Los Angeles, Riverside, and San Diego counties • Several historical occurrences reported from northern Baja 	<ul style="list-style-type: none"> • Occurs in 58 vernal pools with California Orcutt grass within three vernal pool complexes • Occurs on Huerhuero, Olivenhain, Stockpen, and Linne soils • Claypan-type soils associated with marine sediments with subsurface layers that are basic in pH
Otay Mesa mint	FE, CE	No designated Critical Habitat	<ul style="list-style-type: none"> • Annual herb • Six flowers per node • Plant emits a strong, turpentine mint odor 	Known from claypan-type vernal pools on Otay Mesa	<ul style="list-style-type: none"> • Dependent on saturated soils of vernal pools • Blooms from May or June through early July • Primarily bee pollinated • Gene dispersal occurs via pollen or seed 	<ul style="list-style-type: none"> • Found only in southern San Diego County vernal pools on Otay Mesa • Extirpated from Baja due to development 	<ul style="list-style-type: none"> • Occurs in 369 vernal pools within four vernal pool complexes • All but one of the pools have had some habitat restoration • Found on Stockpen, Olivenhain, Linne, and Huerhuero soils

FE = federally endangered
 FT = federally threatened
 CE = California state endangered

3.9 THREATS AND PRESSURES

Threats (direct impacts on survival and persistence of the species) and pressures (indirect threats that affect the species) occur for all seven covered species. Some of these threats and pressures apply to all seven species, while others are species specific. Conceptual models of the threats and pressures for vernal pool plant and crustacean species are provided in Chapter 7. Threats and pressures to specific covered species are summarized here.

The loss and modification of vernal pool habitat continue to be a significant threat to the covered species, especially in areas where urbanization is expected to expand, and is considered a primary threat to vernal pools in southern California (Bauder 1986, 1987). Acquisition of land and conservation easements have preserved vernal pool habitat, but some loss of vernal pool habitat has continued. Most of these losses and impacts are the result of urban development, international border security, and military-related development and training, followed by industrial/commercial development, grazing, dumping, trampling, plowing, off-road vehicle traffic, and other mechanical disturbances. Other indirect threats degrade or destroy covered species habitat including altered hydrology, exposure to pesticides, invasion by nonnative plant species, habitat fragmentation, water and air pollution, and fire and wildfire suppression activities.

There are specific known losses of vernal pool complexes for three of the seven covered species. As of 2008, 28 of the 137 vernal pool complexes occupied by the San Diego fairy shrimp had been partially lost to urban development and about five additional complexes contained pools that had been damaged but not lost (USFWS 2008a). Of these 28 complexes, 14 are within the VPHCP Plan Area. Since its listing in 1993, at least nine complexes known to be occupied by Riverside fairy shrimp have been lost to urban development, 10 complexes have been partially lost to urban development, and eight complexes have damaged pools. Human access and disturbance effects associated with adjacent development have been documented at the majority of the spreading navarretia occurrences (McMillan 2012, pers. comm.).

San Diego fairy shrimp, Riverside fairy shrimp, San Diego button-celery, spreading navarretia, San Diego Mesa mint, California Orcutt grass, and Otay Mesa mint also may be affected by factors associated with climate change, which has the potential to adversely affect this species through changes in vernal pool inundation patterns and consistency. While it is possible that climate warming will cause shifts in the distribution and abundance of San Diego fairy shrimp, this threat will be considered as a changed circumstance for the VPHCP. The secondary effects of climate change (e.g., drought, increased weed invasion, increased fire threat) will be addressed in further detail in Chapter 7.

Other threats specific to San Diego fairy shrimp include hybridization, direct competition with the versatile fairy shrimp and cytoplasmic incompatibility induced by *Wolbachia* (or similar) bacteria. The versatile fairy shrimp has been documented within the range of the San Diego fairy shrimp at Otay Mesa, MCAS Miramar, Del Mar Mesa, and MCB Camp Pendleton. Hybridization and competition could threaten the San Diego fairy shrimp in the future should the range of the versatile fairy shrimp expand (USFWS 2008a). In addition to incompatibility, the *Wolbachia* bacteria also can lead to biased sex ratios, parthenogenesis (female asexual reproduction), feminization of males, and a high juvenile male mortality. There is substantial evidence that the versatile fairy shrimp harbors feminizing endoparasitic bacteria (Krumm 2006). While there is no evidence of the bacteria in San Diego fairy shrimp, the potential hybridization of the two species suggests that this could be a concern for the genetics and reproduction of the San Diego fairy shrimp. These issues are being addressed with funding provided by FESA Section 6 and Transnet research grants. The results of this research will be used to refine management and monitoring techniques.

At the time of listing in 1978, the major threats to San Diego mesa mint and its habitat were road-widening projects (e.g., Miramar Road, SR 163, and SR 52), housing development, off-highway vehicle use, and illegal dumping. Military activities, altered hydrology, and nonnative plants are new threats identified since its listing, which all continue to pressure San Diego mesa mint habitat. Additionally, the Cedar Fire in 2003 burned large expanses of MCAS Miramar, including many vernal pools that support San Diego mesa mint and other listed vernal pool species. For many of these areas, the fire facilitated a dramatic increase in the weed populations. Since the fire, weed invasion has had a substantial impact on the populations of San Diego mesa mint (McMillan 2012, pers. comm.).

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CHAPTER 4

COVERED PROJECTS AND ACTIVITIES

This chapter describes the projects (Section 4.1) and activities (Section 4.2) within the VPHCP Plan Area that will be covered by the final permits and for which the VPHCP shall provide avoidance, minimization, and compensation (i.e., conservation) for impacts to covered species and vernal pool habitat. “Projects” are well-defined actions that occur once in a discrete location. “Activities” are actions that occur repeatedly in one location or throughout the permit area. Together, these activities and projects are the covered activities for which incidental take authorization from the Wildlife Agencies will be obtained.

This chapter also includes a discussion of “planned projects,” i.e., projects that have a previously approved development footprint or hardline for which conservation and loss of lands has been determined (Section 4.3). Conserved lands established as hardline Preserve for planned projects are included in the MHPA. Impacts to vernal pools and incidental take of covered species associated with planned projects have been, or will be, exempted separately and are not considered in the impact analysis for the VPHCP (Chapter 5).

4.1 COVERED PROJECTS

4.1.1 Definition

Covered projects are projects involving land use development within the City for which hardline Preserve boundaries have been established and any incidental take of covered species would be approved through the VPHCP. Conservation measures consistent with the VPHCP have been or will be specified as binding conditions of approval in such projects’ plans and discretionary approvals.

Lands with covered projects have areas delineated for both development and preservation and/or mitigation. The MHPA hardline Preserve boundaries for covered projects have been established on a project-by-project basis after evaluation of habitat and species data collected and/or surveys conducted as part of project entitlement processing, evaluation by the Wildlife Agencies, and consideration of how the proposed vernal pool conservation could best contribute to the overall VPHCP planning effort.

Projects involving land use development within the City for which MHPA hardline Preserve boundaries were not yet established prior to the adoption of the VPHCP will be analyzed for coverage pursuant to the requirements of the VPHCP and the MSCP SAP.

4.1.2 List of Covered Projects

The covered projects described below have planned development footprints that have been negotiated as take-authorized areas along with associated hardline conserved lands within the Preserve. The covered projects are identified in the MHPA with a hardline depicting the take-authorized development area and the associated 100% conservation area. The following covered projects are included in the VPHCP:

- Tierra Alta (Figure 4-1)
- St. Jerome's Church (Figure 4-2)
- Pasatiempo Parks (Figure 4-3)
- Pure Water Program (Figure 4-4)

A description of these six covered projects is provided below.

Tierra Alta

The Tierra Alta project (Figure 4-1) has been redesigned and would develop eight single-family residential dwelling units on a 4.44-acre site at the northerly terminus of Caminito Rodar within the Mira Mesa Community Plan Area. Open space of 2.56 acres will be protected in perpetuity by placement of a covenant of easement over the area. Of this area, 0.33 acre will be designated as a vernal pool Preserve. The project (LDR No. 98-0792) was approved in 2001 by the City Council and is in the process of obtaining a Coastal Development Permit from the California Coastal Commission.

The project will preserve the single on-site vernal pool, occupied by San Diego fairy shrimp, and its watershed. In addition, the project approved by the City included 11 lots and has subsequently been redesigned to eliminate three lots to allow for a connection between the vernal pool and the open space to the west and to increase the buffer on the north to range from 50 to 60 feet. However, constraints from an existing road alignment to the east and existing development to the south limit the buffer from the watershed. The buffer in these locations will range from 12 to 60



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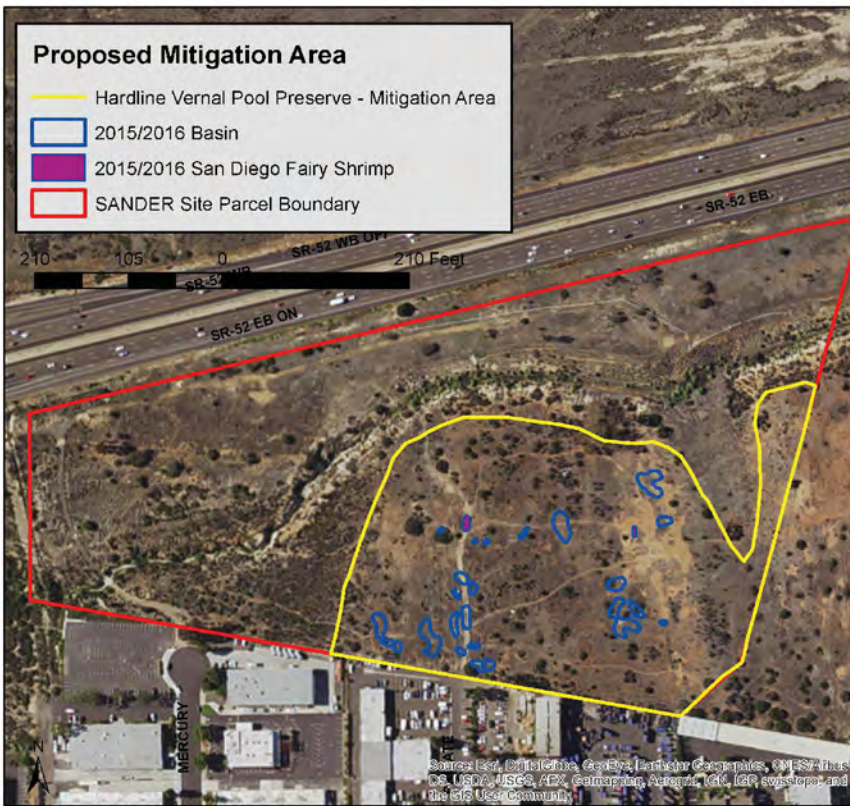
Figure 4-3
Covered Project

**Proposed North City Advanced Water Purification Site
Impact/Development Site**

- 2008 San Diego Fairy Shrimp
- 2015/2016 Basins
- Development Boundary
- Diegan Coastal Sage Scrub
- Disturbed Habitat
- Non-native Grassland

Proposed Mitigation Area

- Hardline Vernal Pool Preserve - Mitigation Area
- 2015/2016 Basin
- 2015/2016 San Diego Fairy Shrimp
- SANDER Site Parcel Boundary



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VPHCP- Pure Water San Diego Program

THE CITY OF SAN DIEGO

**Figure 4-4
Covered Project**

feet. To mitigate potential indirect impacts from the adjacent development and reduced buffer consistent with the VPHCP and Environmentally Sensitive Lands (ESL) Regulations, the project will implement a long-term management and monitoring plan, record a covenant of easement over the conserved area, and provide funding in perpetuity for management and monitoring.

St. Jerome's Catholic Church

The proposed St. Jerome's Catholic Church site (Figure 4-2) occupies approximately 17.7 acres located on undeveloped land at the northwest corner of Otay Mesa Road and Ocean View Hills Parkway in the Otay Mesa Community Plan area. The proposed project originally included a church, a parish hall/gymnasium, a preschool and elementary school, playfields, and parking on 10.42 acres. The project site is currently being reassessed and may or may not include a Catholic parish. The remaining 7.24 acres of the property will be preserved as natural open space. An EIR (PTS No. 4480) was in process in 2006 but was never completed. The project will have direct impacts to six vernal pools occupied by San Diego and/or Riverside fairy shrimp. To mitigate for these impacts, the project will preserve 18 vernal pools and restore additional pools within the 7.24-acre on-site vernal pool Preserve, and record a covenant of easement over the Preserve and implement a long-term management and monitoring plan that will be funded in perpetuity. The agreed upon mitigation at a 4:1 ratio and conservation measures described above will constitute the conditions required to consider this a covered project under the VPHCP.

Pasatiempo Parks

The Pasatiempo Parks project (Figure 4-3) consists of two future parks with passive uses located within the Navajo Community Planning area. The parks are located on Pasatiempo Avenue north of Rancho Park Drive. A 10-acre neighborhood park site is located on the east side of the street and a 5.2-acre open space park is located on the west side of the street.

As shown in Figure 4-3, this site will include a parking area and children's play area, and multipurpose courts located in the northwest corner of the site. The native upland vegetation on-site will remain largely intact. Other proposed amenities may include picnic tables, benches, trail with fitness stations, and interruptive signage. Final design of the park will be determined with input from the community through public workshops. The neighborhood park consists of a fenced 5-acre vernal pool Preserve area, where all the on-site pools will be managed and preserved in perpetuity.

Due to its steep topography and open space nature, the adjacent open space park will not include parking or hardscape areas but will include amenities, such as picnic tables, benches, trail with fitness stations, and interpretive signage interspersed within 2 acres of the native habitat. An

SDG&E easement that may contain vernal pool resources runs through the center of the site. The City does not have jurisdiction over this easement and uses within this easement are permitted through SDG&E's HCP (Permit No. PRT-809637). However, to provide a connective trail system within the park, a trail within the existing SDG&E easement or pathways may be needed and may have potential for indirect impacts to vernal pool resources. Site-specific surveys will be conducted to determine if any of the vernal pool resources exist within the City's jurisdiction as part of any future project permitting process.

The City will conserve, manage, and protect these resources if present. Any proposed project within either park will require discretionary approval and will be consistent with ESL Regulations and the VPHCP. Any impacts to vernal pool resources in the open space park will be mitigated within the Neighborhood Park vernal pool Preserve area.

Pure Water Program

The North City Area component of the program (Figure 4-4) includes expansion of the existing North City Water Reclamation Plant, construction of a new Advanced Purification Facility, pipelines, and support facilities such as pump stations. Plans for the existing North City Water Reclamation Plant are to maximize the current plant capacity, which could yield 30 million gallons per day of purified water and additional nonpotable recycled water. A new advanced treatment facility would be located on the vacant City-owned lot across the street to the north of the existing plant. Based on the 2002-2003 vernal pool inventory, five road pools were identified on this site. Updated mapping efforts have been conducted and are addressed in a project-level Environmental Impact Report (EIR) prepared for the Pure Water San Diego Program, North City Project No. 499621/SCH No. 2016081016. The site is not located within the MHPA or San Diego fairy shrimp Critical Habitat, or identified in the USFWS Recovery Plan for Vernal Pool of Southern California as necessary to stabilize or reclassify any of the covered species. Mitigation at a 2:1 ratio is proposed to occur at the City's SANDER site and would require implementation of a 5-year restoration plan along with long-term management and monitoring of the site.

4.1.3 Future Development Projects

The following types of projects are permitted under the VPHCP, subject to consistency with ESL Regulations and VPHCP:

- Public and private development, including construction of buildings, structures, infrastructure, and all alterations of the land, that are permitted through the City;

- Third Parties⁵ receiving take authorization under the City’s permit through a Certificate of Inclusion; and

Current and future development projects not included on the above covered projects list would be required to analyze their impacts and conservation compared to the requirements and conditions of the VPHCP (see Chapter 5). Subsequent environmental review including consistency with the City’s Biology Guidelines, CEQA, and NEPA (where applicable) would also be required. If projects are consistent with the VPHCP they would be granted the authority to impact vernal pools with endangered species through the City’s Incidental Take Permit (ITP) issued upon the adoption of the VPHCP. Incidental take would be extended upon the discretionary approval by the City of the proposed land development activity.

4.1.4 Maintenance, Development, and Expansion of Roads

Maintenance of existing access roads may be required throughout the VPHCP Plan area. Expansion of existing roads and the development of new roads may be required to cross the MHPA to accommodate existing and planned land use. The City identifies the need to expand existing roads and the development of new roads in the circulation/mobility element of the City’s General Plan and the corresponding Community Plans. Transportation modeling is used to determine the necessary road widths and required network to accommodate the “average daily trips” that result from existing and planned land uses. For the VPHCP, maintenance of existing access roads, expansion of existing roads, and development of new roads are covered projects because they are considered conditionally compatible with the MHPA as listed in Table 4-1. Mitigation, consistent with the VPHCP, would be required for any impacts to vernal pools or the seven vernal pool species as a result of covered maintenance projects. Impacts would be evaluated by the City during project-level environmental review.

⁵ Third parties proposing projects that are not subject to the City’s discretionary land use authority (e.g., school district activities) may elect to utilize the City’s land use permitting process to gain incidental take authorization under the VPHCP, provided the City exercises legal control (i.e., Certificate of Inclusion) over the third party and project for purposes of implementing the VPHCP.

**Table 4-1
Covered Road Projects**

Covered Activity	Description	Conditions
Use, maintenance, and repair of existing access roads	Existing access roads for City staff, public safety, or as required as provisions of a utility access easement are allowed within the MHPA.	Use, maintenance, and repair of existing access roads would be allowed. Any improvements to existing access roads may not extend beyond the limits of the existing access road. Vernal pools and/or road ruts with San Diego or Riverside fairy shrimp (based on project-level surveys) would be avoided if possible. Any unavoidable impacts would be minimized through specific techniques (e.g., metal plates over pools, operation in dry season). Mitigation would be consistent with the provisions of the VPHCP. Mitigation shall only be required for the initial impact; subsequent maintenance of the same road segment would not require additional mitigation.
Expansion of existing roads	Expansion of existing roads in and adjacent to the MHPA may be necessary to implement the transportation element of the adopted Community Plan.	Expansion of existing roads may not impact vernal pools within the MHPA unless no other feasible alternative exists. If avoidance is not feasible, the project must demonstrate that impacts have been minimized to the maximum extent practicable. The project must evaluate the need for the road expansion pursuant to the Community Plan and evaluate alternate development proposals (e.g., reduced medians, reduction in road width/classification). The City would document all of these steps as part of its determination of consistency with the VPHCP. Mitigation consistent with the VPHCP and project approval through the City’s discretionary process would be required for all unavoidable impacts.
Development of new roads	New roads (e.g., Community Plan, local, and unclassified) may be required to implement the transportation element of the adopted Community Plan and the City’s Street Design Manual. These roads may impact vernal pool resources.	New roads may not impact vernal pools within the MHPA unless no other feasible alternative exists. If avoidance is not feasible, the project must demonstrate that impacts have been minimized to the maximum extent practicable. The project must evaluate the need for the road expansion pursuant to the Community Plan and evaluate alternate development proposals (e.g., reduced

Covered Activity	Description	Conditions
		medians, reduction in road width/classification). The City would document all of these steps as part of its determination of consistency with the VPHCP. Mitigation consistent with the VPHCP and project approval through the City's discretionary process would be required for all unavoidable impacts. Specific roads are further discussed and conditioned below.
Private roads	Private access roads are those that are used to service a single private lot or development.	Private roads would only be allowed in the MHPA if necessary to allow for access to an existing legal lot(s) and to maintain the existing legal rights of the underlying zone of the lot(s). Private roads would not be allowed in the MHPA if a viable access alternative exists. Private roads that are allowed would have to show that they have avoided and minimized impacts to the maximum extent practicable and mitigated pursuant to the VPHCP. Road development would count toward the allowable development area of the proposed project. Mitigation consistent with the VPHCP and project approval through the City's discretionary process would be required for all unavoidable impacts.

The following roads within existing Community Plans have been preliminarily reviewed by the City and Wildlife Agencies and, as conditioned, meet the VPHCP compatibility criteria:

- Rancho Peñasquitos and Torrey Highlands Community Plans
 - Camino Del Sur (portion related to SR-56 merge project PTS 227694)
 - Carmel Mountain Road (portion related to SR-56 merge project PTS 227694)

- Otay Mesa Community Plan
 - Airway Road between Caliente and Heritage
 - La Media south of Aviator Road
 - Siempre Vive between Las Californias and La Media
 - Border Road between Las Californias and La Media (Truck Route)

The segment of La Media north of Aviator Road is not covered by the VPHCP. It has been specifically excluded. If this road is proposed for development in the future, separate authorization would be required for any vernal pool impacts.

4.1.5 Essential Public Projects

There is a potential for impacts to occur to vernal pool resources during the construction of the City's essential public projects (EPPs). Pursuant to the City's Biology Guidelines and ESL Regulations, Section 143.0510 (d), a wetland deviation, including impacts to vernal pools, may be considered when a proposed project meets all the criteria as outlined under the EPP Option. A wetland deviation would only be required for impacts to vernal pools that occur inside the MHPA. If impacts occur outside the MHPA and the project is consistent with the VPHCP, a wetland deviation would not be required.

Any EPP that would propose impacts to vernal pool resources would be analyzed in accordance with ESL Regulations, City's Biology Guidelines, and the VPHCP and would provide mitigation consistent with those requirements.

4.2 COVERED ACTIVITIES

4.2.1 Definition and Discussion

Covered activities are land use and public infrastructure activities, as well as conservation activities identified in the VPHCP, which are subject to the City's jurisdiction that may result in incidental take of covered species by impacting potential vernal pool species and/or occupied habitat. The VPHCP will extend necessary incidental take coverage for these species in accordance with and subject to the requirements of the plan and ITP. The potential impacts to vernal pool species and habitat from the covered activities must either be avoided or minimized and mitigated as required under the VPHCP.

4.2.2 Operations for Public Safety and Fire Protection

The interface between current and future urban development and the MHPA requires increased coordination between Preserve managers and the agencies responsible for public safety and protection.

Fire is a natural phenomenon in the Mediterranean climate of southern California. Frequent and intense fires can modify the natural landscape and poses a threat to public safety. The City has adopted Fire Safety and Brush Management Guidelines to reduce the risk of fire and create

defensible space between structures and potential fuel sources (e.g., native vegetation). This defensible space slows down the fire, giving fire safety personnel time to stage and protect structures. In addition, during major wildfires, fuel breaks and backfires are often used to proactively fight fires.

Fuel reduction activities (i.e., brush management) for fire protection proposals that are in conformance with the City Brush Management Regulations (Land Development Code (LDC) Section 142.0412) are allowed in the MHPA, as listed in Table 4-2. All fire protection agencies would be allowed access to the MHPA as necessary to enforce local fire safety laws, and to protect public health, safety, and welfare as necessary to combat wildfires.

**Table 4-2
Covered Police and Fire Activities**

Covered Activity	Description	Condition for Consistency
Homeless or itinerant worker camps abatement	Remove homeless or itinerant work camps located in the MHPA. This includes dismantlement and removal of structures.	City staff (i.e., Park and Recreation Department, Environmental Services Department) would provide maps of known vernal pool locations (based on project-level surveys) to the abatement crews and would provide oversight (i.e., identify areas to be avoided) to ensure impacts to vernal pool resources would be avoided and/or minimized to the maximum extent feasible. If impacts to vernal pools occur, directly related to the action(s) of City abatement crews, the City would revegetate/remediate disturbed and/or destroyed habitat and any impacts would be mitigated according to the provisions of the VPHCP.
Brush management and weed abatement	On private property, to the extent required by Land Development Code, Section 142.0412 and/or the Fire Department, brush management (vegetation thinning) may occur on private property.	Since vernal pool vegetation poses no significant fuel load (i.e., combustible vegetation capable of supporting a fire), no clearing within vernal pool basins or impacts to vegetation and/or covered species are allowed within the vernal pool preserve area. Thinning for any required brush management in the watershed would be limited to the standards set forth in the Land Development Code, Section 142.0412.

Law enforcement and fire control agencies, the National Guard, the Immigration and Naturalization Service, the Border Patrol operating within the MHPA area are subject to all applicable requirements of federal and state law. This VPHCP will create no additional permit requirements beyond those of existing federal and state law for the activities of these agencies.

The MHPA accommodates access for emergency response, fire control and management, homeless abatement, and other police and safety services. All law enforcement agencies are allowed access to the MHPA as necessary to enforce all local, state, and federal laws. All medical, rescue, and other emergency agencies are allowed access to carry out operations necessary to address an imminent threat to the health, safety, and welfare of the public. Emergency response is not considered a covered activity; rather, impacts associated with emergency response are evaluated in Chapter 9.

4.2.3 Operations for Safety on Solid Waste Sites

The City maintains 22 solid waste sites throughout the City. No known vernal pools occur on any old/closed, inactive, or active landfill sites, except for the Miramar Landfill, which is not included in this VPHCP due to its occurrence on land outside the land use control of the City (i.e., federal lands). While there are no known vernal pool resources on any solid waste sites at this time, over the course of years, there is a potential that vernal pools could form and may be encountered during management activities.

To protect public health, safety, and the environment, from methane, leachate, and/or surface water pollution contamination, laws and regulations apply to solid waste sites to periodically maintain the surface to avoid ponding water. Thus, maintenance activities may prevent the formation of vernal pools; however, exceptions may occur. Landfills, burn sites, and other solid and hazardous waste facilities are often capped with clay materials that resemble vernal pool soils and can subside causing depressions that capture water. Propagules may be dispersed by birds or other vectors resulting in one or more covered species occurring and resulting in the take of an endangered species due to the necessary management to protect public health, safety, and welfare.

Under the VPHCP, the maintenance activities specified below in Table 4-3 required for old/closed, inactive, and active sites for the protection of public health and safety and the environment are considered covered activities, subject to the conditions of the VPHCP.

**Table 4-3
Covered Solid Waste Activities**

Covered Activity	Description	Condition for consistency
Cover installation, maintenance, and repair	Solid waste sites such as burn sites and landfills often require placement of cover material. This is a necessary part of protecting air and water resources. Cover may include soils, geotextiles, vegetation, or other material.	If possible, cover material would not be placed during the rainy season. If ponding is noticed within the activity area, a fairy shrimp survey would be required to document the presence or absence of any fairy shrimp and any impacts to San Diego or Riverside fairy shrimp would be mitigated according to the provisions of the VPHCP.
Gas collection and management system installation, maintenance, and repair	With concerns about greenhouse gases, measures to contain, collect, and manage greenhouse gases are increasingly important. Gas infrastructure includes collection pipes, monitoring probes, flares, and other structures.	Use, maintenance, inspection, and repair of existing gas collection and management systems are allowed. Vernal pools and/or road ruts with San Diego or Riverside fairy shrimp (based on project-level surveys) would be avoided if possible. Any unavoidable impacts would be minimized through specific techniques (e.g., metal plates over pools, operation in the dry season). Mitigation would be consistent with the provisions of the VPHCP.
Use and maintenance of water collection, protection, and drainage structures	It is important to prevent various means of water contamination that may be caused by run on, runoff, and infiltration. Drainage systems, including berms, ditches, sedimentation basins, and other structures are required by regulatory agencies (e.g., San Diego Water Quality Control Board).	Use, maintenance, inspection, and repair of existing water collection, protection, and drainage structures are allowed. Vernal pools and/or road ruts with San Diego or Riverside fairy shrimp (based on project-level surveys) would be avoided if possible. Any unavoidable impacts would be minimized through specific techniques (e.g., metal plates over pools, operation in the dry season). Mitigation would be consistent with the provisions of the VPHCP.
Installation of vegetation, removal of vegetation, maintenance of vegetation, brush management, and other vegetation control	Although vegetation is needed in some areas to prevent sedimentation, deep-rooted species that may violate the landfill cap are not allowed. Adjustments are needed from time to time to the vegetation to ensure that water protection, air protection, safety, and other regulatory goals are met.	Only appropriate vernal pool species would be allowed within the vernal pool basins; appropriate upland species would be allowed in the associated watersheds. No deep-rooting species would be allowed.
Installation, removal, modification, and maintenance of fencing and other barriers and signs	To prevent public exposure to hazardous materials and for other purposes, fencing and signage are necessary at some sites.	New signs, fences, and other barriers would not be allowed in the vernal pool basins, but would be acceptable within the vernal pool watershed where necessary due to property boundaries, topography, proximity to critical access points, or for other management reasons.

Covered Activity	Description	Condition for consistency
Animal abatement measures	Coyotes may pose problems by digging into waste; seagulls may collect waste and drop it on residences, or may pose a bird strike hazard near airports. To prevent public health or safety issues, wildlife sometimes must be excluded from solid waste sites.	City staff will avoid vernal pool resources when performing these activities.
Waste site abatement and/or remediation	Some sites need to be capped. At other sites, the wastes must be removed entirely. Various treatments may be needed to prevent public health and safety or environmental problems.	Waste removal should not occur during the rainy season. If ponding occurs within the area of proposed activity, a fairy shrimp survey would be required to document the presence or absence of any fairy shrimp and any impacts to San Diego or Riverside fairy shrimp would be mitigated according to the provisions of the VPHCP.

4.2.4 Operations for Public Utilities

The City Public Utilities Department provides safe, healthful drinking water to the 1.3 million residents of San Diego and regional wastewater treatment and disposal services for more than 2 million residents of San Diego County. The City’s Water Branch has one of the largest and most complex water storage, treatment, and delivery systems in the nation. Nine reservoirs hold the raw water before it is moved to one of three plants for treatment. Water is then pumped through hundreds of miles of pipeline to customers.

The City’s Wastewater Branch is responsible for the collection, treatment, and safe disposal of wastewater for the City. The Wastewater Branch operates the Point Loma Sewage Treatment Plant. It also provides regional wastewater treatment and disposal services for 15 other cities and special districts within a 450-square-mile area stretching from Del Mar to the north, Alpine and Lakeside to the east, and San Ysidro to the south.

Within the vast operational service area of the City Public Utilities Department are contained miles of water and sewer lines, pump stations, access roads, reservoirs, dams, and other critical infrastructure. Routine and proactive maintenance is required to avoid environmental contamination from spills, and public health, safety, and welfare from disruption of services. Maintenance activities have the potential to impact vernal pool resources that may contain one or more of the VPHCP covered species.

Under the VPHCP, the maintenance activities⁶ specified in Table 4-4 are required for the operation of the City water and sewer service and are considered covered activities, subject to the conditions of the VPHCP.

**Table 4-4
Public Utilities Covered Activities**

Covered Activity	Description	Conditions
Maintenance, inspection, and repair activities for all existing sewer and water infrastructure	This includes meter inspections, assessments of the condition of pipelines, sonar and television pipelines, cleaning of sewer lines, pipeline repairs, bypass pumping, manhole replacement, pump station maintenance, vaults, meters, maintenance of stormwater protection devices, access gates, access protections (bollards, rocks, etc.), fencing, and signage.	Maintenance, inspection, and repair of existing sewer and water infrastructure are allowed. Vernal pools and/or road ruts with San Diego or Riverside fairy shrimp (based on project-level surveys) would be avoided to the extent feasible. Any unavoidable impacts would be minimized through specific techniques (e.g., metal plates over pools, operation in the dry season). Mitigation would be consistent with the provisions of the VPHCP.
Maintenance and improvements of existing access paths to sewer and water infrastructure	This includes all activities necessary to keep existing access and improvements needed to maintain existing access to sewer and water infrastructure.	Maintenance of existing access paths would be allowed. Any improvements to existing access paths may not extend beyond the limits of the existing access path. Vernal pool locations (based on project-level surveys) would be avoided if possible. Any unavoidable impacts would be minimized through specific techniques (e.g., metal plates over pools, operation in dry season). Mitigation would be consistent with the provisions of the VPHCP. Mitigation shall only be required for the initial impact; subsequent maintenance of the same road segment would not require additional mitigation.

4.2.5 Preserve Management

The City is required to manage species and habitats under the adopted MSCP (City of San Diego 1997) and this VPHCP. Management may include a range of stewardship activities, such as

⁶ Covered activities for the operation of water and sewer service do not include the expansion of existing infrastructure or replacement of existing infrastructure. New infrastructure would be considered an Essential Public Project and would be analyzed consistent with the VPHCP (Section 4.1.5) to determine consistency with the Incidental Take provisions of the VPHCP.

fencing, signage, and litter removal, and activities related to biological management such as restoration, enhancement, and weed removal. MHPA management in the City is done by the departments that own the land; for example, the City’s Open Space is managed by the Park and Recreation Department, lands around the City reservoirs are managed by the Public Utilities Department, and the municipal airport land is managed by the Airport Division of the Real Estate Assets Department.

All of these City land managers, as well as other nonprofit or private land managers, may propose activities for the betterment of the vernal pool species. These activities have the possibility of inadvertently impacting vernal pool resources and/or the seven covered species. MHPA management activities are considered a covered activity under this VPHCP, subject to the conditions of the VPHCP, and are listed in Table 4-5.

**Table 4-5
Management Covered Activities**

Covered Activity	Description	Conditions
Existing and new fences, signs (denoting conserved area and/or educational), and interpretive panels	New signs, fences, and interpretive panels may be installed (and existing locations maintained or moved upon replacement) within the MHPA.	New signs, fences, and interpretive features are not allowed in the vernal pool basins, but are acceptable within the vernal pool watershed and buffer where necessary due to property boundaries, topography, proximity to critical access points, or for other management reasons.
Restoration and enhancement	This includes activities within the MHPA to restore and enhance native habitat and species. Associated activities such as herbicide application, hand and mechanical weeding, excavation using hand and mechanized equipment, planting of container stock, earth manipulation designed to improve habitat for native pollinators, and other restoration/enhancement activities.	This activity is allowed on City-owned land under the VPHCP if a restoration plan is developed by a qualified biologist and has been reviewed and accepted by the Wildlife Agencies and City staff (i.e., Environmental Analysis Section [EAS], MSCP, and the department(s) responsible for land management).
Litter and trash removal	The removal of litter and trash in the Preserve is recognized as a necessary function of MHPA management.	Litter and trash removal would be consistent with requirements of the VPHCP. Access for the removal of litter and trash shall be on existing access roads to avoid impacts to vernal pool resources. Removal of litter within vernal pools shall be done by hand or other methods that would not damage the vernal pools and/or covered species.

Covered Activity	Description	Conditions
Education features	Educational features such as kiosks, signage, educational trail segments, boardwalks, and viewpoints are acceptable within the vernal pool watershed, and/or buffer. Educational projects are currently planned for areas such as Del Mar Mesa, Carmel Mountain, and Otay Mesa, and may be expanded to other areas of the MHPA based upon the success of the current projects.	Educational features on City-owned land would be consistent with the VPHCP and would avoid vernal pool basins and covered species. Educational projects within vernal pool watersheds, and/or buffers would use construction techniques and designs that would avoid and minimize impacts to vernal pool resources and would use construction material that prolongs the life of the feature to avoid the need for continued replacement.
Monitoring and research	Monitoring and/or research activities are allowed within the MHPA and may take place within a vernal pool, watershed, or buffer. Monitoring and research may be focused on vernal pools, or other biological processes (e.g., wildlife corridors).	Monitoring and/or research activities on City-owned land are consistent with the VPHCP goals and objectives. Access to City-owned sites would be at the discretion of the land-owning department.

4.2.6 Parks and Recreation

The City of San Diego Park and Recreation Department operates and maintains a diverse and valued park system that serves millions of residents and visitors each year. The City operates and manages 24,655 total acres managed as open space within the City. Open Space Parks are used for purposes such as preservation of natural resources, passive outdoor recreation, and scenic and visual enjoyment.

Incidental impacts from recreational uses may occur to vernal pool resources that may contain one or more of the VPHCP covered species. Use of designated trails in open space areas are considered a covered activity under this VPHCP, subject to the conditions of the VPHCP and approved area-specific Natural Resource Management Plans or VPMMP that has been approved by the Wildlife Agencies (see Table 4-6).

**Table 4-6
Parks and Recreation Covered Activities**

Covered Activity	Description	Conditions
Maintenance and use of existing trails	Existing trails, authorized and designated for public use, would be allowed to remain in place and be maintained within the Preserve. Use of these trails would be limited to nonmotorized forms of transportation and would be consistent with any applicable area-specific Natural Resource Management Plan (NRMP) that has been approved by the Wildlife Agencies.	The City would monitor and enforce the use of the trails consistent with the City of San Diego Municipal Code and any applicable NRMP. Park and Recreation staff would evaluate the need to prohibit and/or reroute trail use located adjacent to vernal pool resources or to protect the vernal pools through signage and fencing.
Development of new trails	Recreation demand, public safety, and/or a biologically superior trail alignment may instigate the need for development of new recreational trails within and outside the Preserve. Use of these trails would be limited to nonmotorized forms of transportation and would be consistent with any applicable area-specific NRMP that has been approved by the Wildlife Agencies.	New trails proposed within and outside the vernal pool Preserve area would avoid vernal pool and upland watershed (based on project-level surveys). Exceptions may be allowed on a case-by-case basis where all alternatives would have a greater biological impact. Bridges are acceptable as a trail design feature to avoid direct impacts to vernal pool basins or watersheds.
Brush management and weed abatement	The Park and Recreation Department conducts brush management (vegetation thinning) on 1,000 acres of City-owned open space adjacent to existing privately developed lots.	City staff (i.e., Park and Recreation Department) would provide maps of known vernal pool locations (based on project-level surveys) to the brush management crews and would provide oversight (i.e., flagging) to ensure impacts to vernal pool resources would be avoided. Since vernal pool vegetation poses no significant fuel load (i.e., combustible vegetation), no clearing within vernal pool basins or impacts to vegetation and/or covered species are allowed within the vernal pool preserve area. Thinning for any required brush management in the watershed would be limited to the standards set forth in the Land Development Code, Section 142.0412.

4.2.7 City of San Diego Airports

The City owns and operates Brown Field Municipal Airport in Otay Mesa and Montgomery-Gibbs Executive Airport in Kearny Mesa. General aviation includes all aviation activities except scheduled airline and military flights. The two airports support a significant portion of the San Diego region's total annual flight operations and can accommodate a variety of general aviation aircraft. In addition to general aviation activities, both airports support critical services, such as law enforcement, air ambulance, and fire-rescue operations. City staff has the responsibility of maintaining the airports in conformance with Federal Aviation Administration regulations and guidelines, and administering the various revenue-producing leases.

Federal aviation regulations require that the airport be maintained and operated in a manner that promotes the health, safety, and welfare of airport users, and the surrounding communities. As a result of this mandate, both airports have large areas of undeveloped land surrounding the airports. Many of these undeveloped lands are required for the protection of people as consistent with adopted Airport Land Use Compatibility Plans. Some of these lands contain vernal pool resources with one or more covered species. Both airports have required operations and standard activities that have the potential to impact the covered species and/or vernal pool habitat. Management and monitoring of on-site vernal pool resources are currently required pursuant to the City's MSCP/State NCCP permit; for Montgomery-Gibbs Executive Airport, management of vernal pool resources is also required pursuant to the 1994 BO for the Runway Extension (1-6-94-f-32).

Under the VPHCP, the maintenance activities specified below required on the City's municipal airports for the protection of public health and safety are considered covered activities, subject to the Conditions of the VPHCP and are listed in Table 4-7.

**Table 4-7
Covered Airport Activities**

Covered Activity	Description	Conditions
Maintenance and inspection of all existing safety areas, object-free areas, runway protection zones, critical areas, infields, runway and taxiway shoulders, and storm water conveyances.	All activities necessary to keep all existing safety areas, object-free areas, runway protection zones, critical areas, infields, runway and taxiway shoulders, and storm water conveyances free from aviation obstructions and could include mowing of grass, spraying, and erosion control.	Airport Division would develop an Operation Plan that specifically addresses maintenance and inspection activities within and adjacent to on-site vernal pool resources in accordance with the VPHCP. The Operation Plan would focus on ways to accomplish the required activities while avoiding and/or minimizing impacts to vernal pool resources to the maximum extent practicable given FAA safety requirements, and shall be submitted to the Wildlife Agencies and FAA for review and approval. If impacts to vernal pools cannot be avoided, a comprehensive mitigation plan consistent with the VPHCP and approved through the City’s discretionary permitting process would be developed, which would allow for all identified activities to continue in perpetuity. In addition, a wildlife assessment study will be conducted and approved by the City and FAA to determine where, if any, mitigation could occur within airport boundaries.
Maintenance, access, inspections, and operation of all existing equipment and infrastructure for public safety and normal airport operations.	This includes activities related to: navigational aids; localizer and glide slope critical areas; visual approach slope indicators; precision approach path indicators; approach lights; runway end identifier lights; wind socks; rotating beacons; segmented circles; airfield signs; lights; markings; fencing and gates, all above-ground and underground utilities, including electrical, sewer, water, communications, and their associated easements; automated weather stations, air traffic control towers; communication stations; survey markers and monuments and their associated access roads.	
Capital Improvement Program rehabilitation and/or maintenance of existing airport infrastructure.	This includes runways, taxiways, helicopter landing and parking areas, blast pads, run-up areas, overruns, aircraft parking aprons, and vehicle parking areas (sweeping, painting, pavement repairs, etc.) and their associated access roads.	
Maintenance and inspection of existing public right-of-way access.	This includes all activities necessary for normal airport operations, including use of access roads.	

4.3 PLANNED PROJECTS

4.3.1 Definition

Planned projects are projects involving land use development within the City for which hardline Preserve boundaries have been established and take has been authorized or exempted through a process other than VPHCP (such as an approved USFWS BO). Although the projects may not have been built yet, they are included in the baseline. If no changes are proposed to the planned projects, they will not require any further approvals related to incidental take of covered species, and no further mitigation related to the covered species would be required.

4.3.2 List of Planned Projects

The planned projects described below have planned development footprints that have been negotiated as take-authorized areas along with associated hardline conserved lands within the Preserve. Their conservation areas are identified as 100% conserved and would be added to the MHPA (Baseline). Consistent with the project approvals and/or BOs, the permittee shall be responsible for the implementation of the mitigation measures (i.e., restoration plans) and funding of the long-term management and monitoring plan. Planned projects included in the VPHCP, as shown in Figures 4-5 through 4-7 are:

- Castlerock (BO No. 15B0240-15F0536) (Figure 4-5)
- Rhodes Crossing⁷ (BO No. 08B0401-12FC0578) (Figure 4-6)
- Candlelight (BO No. 08B0715-08F0817) (Figure 4-7)

⁷ The isolated vernal pools (vernal pool areas 1-5, 8-10, 14, and 15) that were avoided by the Rhodes Crossing project (PTS No. 3230) were addressed in BO No.08B0401-12F0578 are included as take authorized areas in the VPHCP because they have minimal long-term viability. If the project is redesigned to impact these areas, they would be mitigated consistent with the City's ESL Regulations, Biology Guidelines, and VPHCP.

Image source: SanGIS (from May 2012)

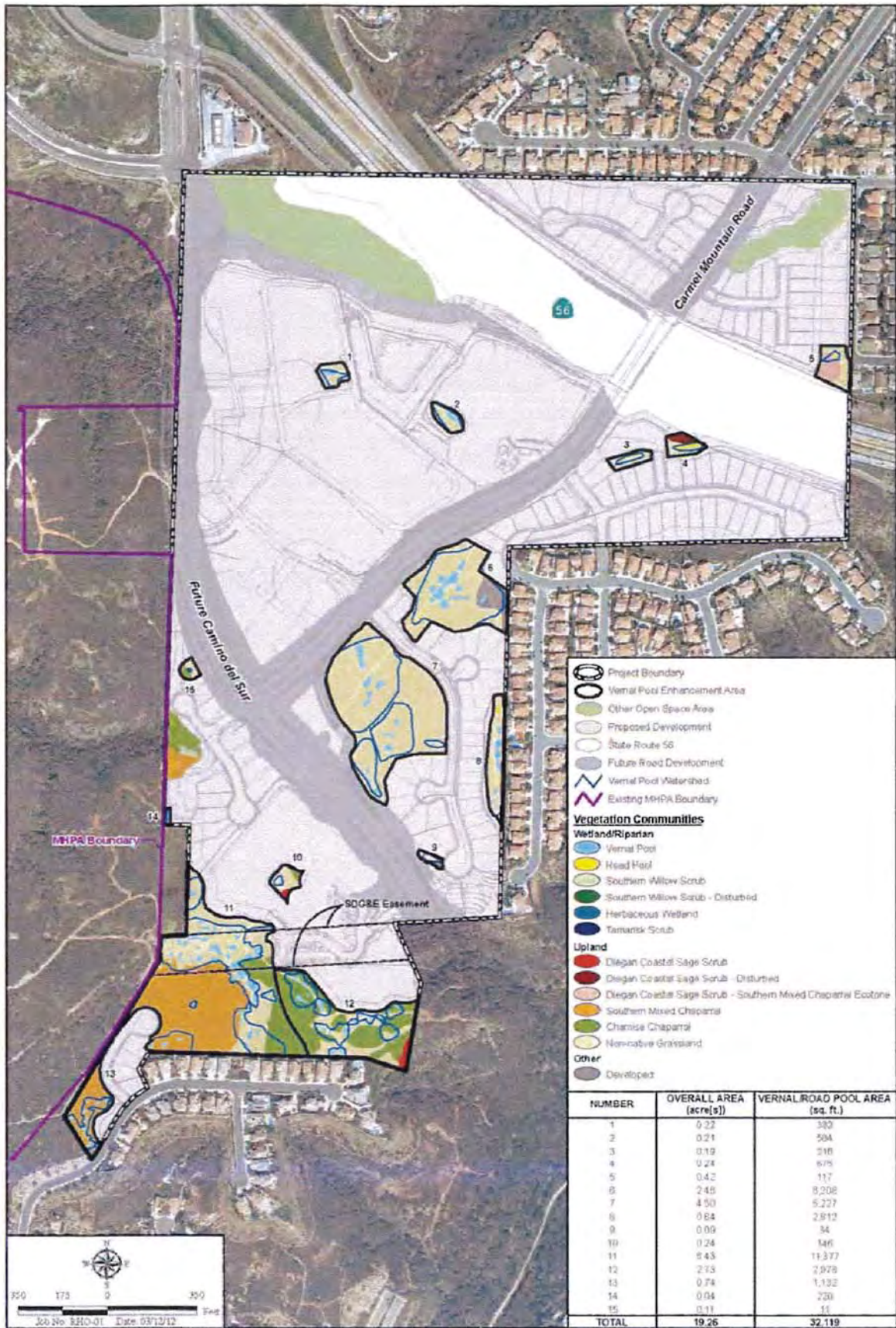


- Project Boundary
- Existing MHPA Boundary
- Proposed MHPA Boundary
- Features
- Features Containing San Diego Fairy Shrimp
- Proposed Restoration Vernal Pools
- Preserved Vernal Pools
- Vernal Pool Preserve
- Existing Vernal Pool
- Vernal Pool Restoration Area (San Diego Fairy Shrimp Mitigation Area)
- Extended Weed Control



Date: 9/13/2016

Path: S:\ERAMSCP\VP HCP\Vernal Pool HCP\Draft VPHCP 2016\MapFigures\MXD\VP_HCP_PlanArea_Castlerock_A_2016.mxd



Date: 7/5/2016

Path: S:\ERAM\SCVP\HCP\Vernal Pool HCP\DRAFT\VP\HCP 2016\MapFigures\MXD\VP\HCP_PlanArea_RoadsCrossing_2016.mxd



VPHCP- Rhodes Crossing

THE CITY OF SAN DIEGO

**Figure 4-6
Planned Project**

Legend

Habitat	Sensitive Resources
Vernal Pool	Coastal California Gnatcatcher (<i>Poilocola californica californica</i>)
Vernal Pool with Shrimp	Burrowing Owl (<i>Athene cunicularia</i>)
Road Pool	San Diego Fairy Shrimp (<i>Branchinecta sandiegoensis</i>)
Disturbed Wetland	Riverside Fairy Shrimp (<i>Streptocephalus woodsoni</i>)
Maritime Succulent Scrub	Corps Waters of the U.S./CDFG Streambed (width shown in feet)
Maritime Succulent Scrub - Disturbed	Watershed
Non-native Grassland	MHPA Boundary
Eucalyptus Woodland	Parcel Boundary
Disturbed Habitat	Project Impacts
	Brush Management



Date: 6/3/2016

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CHAPTER 5

CONSERVATION STRATEGY

Chapter 5 describes the conservation strategy to meet the regulatory requirements of FESA and the City's existing state NCCP authorizations, and to streamline compliance with CEQA, NEPA, and other applicable environmental regulations (see discussion in Chapter 1). The VPHCP's overall conservation strategy for the covered species is to allow impacts to degraded vernal pools with low long-term conservation value in exchange for restoration, enhancement, preservation, and long-term management and monitoring of vernal pools with long-term conservation value in the MHPA. The conservation strategy builds on the existing conservation (i.e., baseline conservation) of the seven vernal pool species and habitat that has occurred under the City's MSCP SAP that includes most (84%) of the extant vernal pools in the City. The City's existing MSCP SAP provides a Framework Management Plan (FMP) that includes management considerations and specific directives regarding vernal pool habitat and the seven covered vernal pool species. The VPHCP updates the FMP and provides habitat-based and species-specific objectives for conservation, management, and/or restoration of the vernal pools and associated species covered under this VPHCP and was informed by the recovery criteria identified in the vernal pool recovery plan. This chapter also describes the additional areas to be added to the MHPA via implementation of the VPHCP to provide increased protection of vernal pools and covered species in a configuration that provides long-term conservation viability. Avoidance, minimization, and mitigation requirements for impacts to vernal pools and covered species resulting from covered projects and covered activities (as described in Chapter 6) are also provided.

5.1 VPHCP GOAL AND OBJECTIVES

The biological goal of the VPHCP is to contribute to the recovery of the VPHCP covered species and ensure continued persistence of the covered vernal pool species populations identified in the VPHCP and the City's existing NCCP. This goal will be achieved by implementing the VPHCP conservation strategy, which includes both habitat-based (vernal pool) and species-specific objectives (Table 5-1) and has been design to meet or exceed existing MSCP requirements. The habitat-based objectives identify the number of specific vernal pools and complexes that will be conserved, managed, and/or restored through implementation of the VPHCP. The species-specific objectives include conservation, management, and/or restoration and enhancement actions for covered species. Restoration would be targeted for areas that historically supported vernal pools. The VPHCP objectives were developed using the "SMART" method: **S**pecific, **M**easurable, **A**chievable, **R**esults-oriented, and **T**ime-fixed (Adamcik et al. 2004) and will be

implemented through the mitigation, management, and monitoring strategies identified in the VPHCP and through the complex-specific VPMMP (Chapter 7 and Appendix D). The objectives outlined in Table 5-1 are required to be implemented and funded under the VPHCP. Funding necessary to achieve the VPHCP objectives is identified in Chapter 10 and Appendix E.

Appendix A of the VPMMP (see Appendix D of this document) includes the required management levels for each managed vernal pool complex under the VPMMP. Note that not all vernal pool sites conserved under the VPHCP require management in the VPMMP. As noted in Table 5-1, once fully implemented, 68 vernal pool sites will be conserved under the VPHCP. Of those, 59 will be actively managed via the VPMMP. In addition, 19 of the 59 sites that will be managed also require restoration to bring the sites from a Management Level 2 or Management Level 3 status to a Management Level 1 (stewardship) status. The 9 vernal pool sites that will not be conserved and will not be actively managed under the VPMMP are either privately held (but may seek development entitlement in the future, at which point the City will ensure the property owner implements the recommended management in the VPMMP) or have been developed pursuant to prior approval by City and no management was required at that time, nor is any management being required as part of this VPHCP. As shown in Table 5-1, restoration of some of the 19 sites will also reestablish viable populations of specific covered species. Population viability is defined as the ability of a population to persist and avoid extinction from external forces (e.g., natural disasters or introduced species) or internal forces (e.g., competition or fluctuation in genetic composition) (Lehmkuhl 1984; Shaffer 1981; Thomas 1990; Trail et al. 2007). The viability of a population naturally will increase or decrease in response to changes in rates of birth/germination, death, and/or growth of individuals.

**Table 5-1
VPHCP Conservation Objectives**

Objectives	Conserve	Manage¹	Restore²
Vernal Pools Objectives (Habitat Based)	Conserve in perpetuity at least 2,409 vernal pools (totaling approximately 37.5 acres of basin surface area) at 68 vernal pool sites (within 53 vernal pool complexes) in the MHPA in a configuration that maintains long-term viability of the VPHCP covered species.	Manage in perpetuity 59 vernal pool sites within the MHPA through implementation of the VPHCP Vernal Pool Management and Monitoring Plan or Site-Specific Management Plans (that are consistent with the VPHCP goals and objectives).	Restore 19 vernal pool sites (within 12 complexes) to a “Level 1” (stewardship) management condition within the MHPA through implementation of the VPHCP Management and Monitoring Plan or Site-Specific Management Plans (that are consistent with the VPHCP goals and objectives).
Species-Specific Objectives	Conserve occupied complexes identified in Appendix A of the VPMMP to stabilize covered species’ populations.	Manage specific sites identified in Appendix A of the VPMMP to maintain the covered species populations consistent with the VPMMP (Appendix D).	Restore specific complexes identified in Appendix A of the VPMMP to enhance covered species populations to ensure long-term viability.

Objectives	Conserve	Manage ¹	Restore ²
Otay Mesa Mint	Conserve 369 vernal pools occupied by Otay Mesa mint within four sites.	Manage all conserved complexes/sites consistent with the VPMMP.	Establish viable populations of Otay Mesa mint within the J13E, J13N, J16–18, J20–21, J27, and J28 complex series.
San Diego Mesa mint	Conserve 335 vernal pools occupied by San Diego mesa mint within 19 sites.	Manage 12 sites as identified in Appendix A of the VPMMP and consistent with the VPMMP.	Restoration is not necessary for this covered species, as the populations of this species are adequately conserved under the VPHCP.
Spreading navarretia	Conserve 94 vernal pools occupied by spreading navarretia within seven sites.	Manage all conserved complexes/sites consistent with the VPMMP.	Establish viable populations of spreading navarretia within J11E, J11W, J12, J13E, J13 N, J16–18, J20–21, J27, J28, and R1.
San Diego button-celery	Conserve 722 vernal pools occupied by San Diego button-celery within 24 sites.	Manage 22 sites as identified in Appendix A of the VPMMP and consistent with the VPMMP.	Establish a viable population of San Diego button-celery within J13E and J13N.
California Orcutt grass	Conserve 58 vernal pools occupied by California Orcutt grass within three sites.	Manage all conserved complexes/sites consistent with the VPMMP.	Establish viable populations of California Orcutt grass within J11E, J11W, J12, J13E, J14, J16-18, J20–21, J21, J27, and J28E.
Riverside fairy shrimp	Conserve 131 vernal pools occupied by Riverside fairy shrimp within 7 sites.	Manage all conserved sites consistent with the VPMMP.	Establish viable populations of Riverside fairy shrimp within J11E, J11W, J12, J13E, J13N, J14, J16-18, J20–21, J21, J27, and J28E.
San Diego fairy shrimp	Conserve 465 vernal pools occupied by San Diego fairy shrimp within 38 sites.	Manage 33 sites as identified in Appendix A of the VPMMP and consistent with the VPMMP.	Restoration is not necessary for this covered species, as the populations of this species are adequately conserved under the VPHCP.

¹ In addition to conservation, includes active management of sites at Management Level 1, as well as sites at Levels 2 and 3. The 9 vernal pool sites that will not be conserved but not actively managed under the VPMMP are either privately held (but may seek development entitlement in the future, at which point the City shall ensure the property owner implements the recommended management in the VPMMP) or have been developed pursuant to prior approval by City and no management was required at that time, nor is any management being required as part of this VPHCP.

² Restoration shall occur at specific vernal pool complexes to establish populations of covered species, consistent with the Recovery Plan (USFWS 1998). Restored populations shall also be conserved and managed consistent with the VPHCP objectives listed in this table.

5.2 CONSERVATION MEASURES

5.2.1 Avoidance and Minimization Measures

As required by FESA, the VPHCP includes measures to avoid or minimize the impact of the taking of covered species.

Indirect impacts to conserved vernal pools shall be minimized by requiring development projects adjacent to the Preserve or MHPA, to comply with existing Land Use Adjacency Guidelines (see Section 1.4.3 of the MSCP SAP and Section 10.4 of the MSCP Implementing Agreement) and as described below. Areas designated for conservation and described in this chapter include substantial amounts of high-quality habitat for covered species and vernal pool habitat. Covered activities that result in permanent impacts are anticipated to occur primarily in areas with low-quality habitat. Most vernal pool preservation and enhancement (Table 5-1 and Sections 5.2.2 and 5.2.3) will be concentrated within the MHPA away from covered activities.

General avoidance and minimization measures for covered projects and covered activities are as follows:

1. Any development adjacent to the MHPA shall be constructed to slope away from the extant pools to be avoided, to ensure that runoff from the project does not flow into the pools.
2. Covered projects shall require temporary fencing (with silt barriers) of the limits of project impacts (including construction staging areas and access routes) to prevent additional vernal pool impacts and prevent the spread of silt from the construction zone into adjacent vernal pools. Fencing shall be installed in a manner that does not impact habitats to be avoided. Final construction plans shall include photographs that show the fenced limits of impact and all areas of vernal pools to be impacted or avoided. If work inadvertently occurs beyond the fenced or demarcated limits of impact, all work shall cease until the problem has been remedied to the satisfaction of the City. Temporary construction fencing shall be removed upon project completion.
3. Impacts from fugitive dust that may occur during construction grading shall be avoided and minimized through watering and other appropriate measures.
4. A qualified monitoring biologist that has been approved by the City shall be on-site during project construction activities to ensure compliance with all mitigation measures identified in the CEQA environmental document. The biologist shall be knowledgeable of vernal pool species biology and ecology. The biologist shall perform the following duties:
 - a. Oversee installation of and inspect the fencing and erosion control measures within or upslope of vernal pool restoration and/or preservation areas a minimum of once per week and daily during all rain events to ensure that any breaks in the fence or erosion control measures are repaired immediately.
 - b. Periodically monitor the work area to ensure that work activities do not generate excessive amounts of dust.

- c. Train all contractors and construction personnel on the biological resources associated with this project and ensure that training is implemented by construction personnel. At a minimum, training shall include (1) the purpose for resource protection; (2) a description of the vernal pool species and their habitat(s); (3) the conservation measures that must be implemented during project construction to conserve the vernal pool species, including strictly limiting activities, and vehicles, equipment, and construction materials to the fenced project footprint to avoid sensitive resource areas in the field (i.e., avoided areas delineated on maps or on the project site by fencing); (4) environmentally responsible construction practices as outlined in measures 5, 6 and 7; (5) the protocol to resolve conflicts that may arise at any time during the construction process; and (6) the general provisions of the project's mitigation monitoring and reporting program (MMRP), the need to adhere to the provisions of FESA, and the penalties associated with violating FESA.
 - d. Halt work, if necessary, and confer with the City to ensure the proper implementation of species and habitat protection measures. The biologist shall report any violation to the City within 24 hours of its occurrence.
 - e. Submit regular (e.g., weekly) letter reports to the City during project construction and a final report following completion of construction. The final report shall include as-built construction drawings with an overlay of habitat that was impacted and avoided, photographs of habitat areas that were avoided, and other relevant summary information documenting that authorized impacts were not exceeded and that general compliance with all conservation measures was achieved.
5. The following conditions shall be implemented during project construction:
- a. Employees shall strictly limit their activities, vehicles, equipment, and construction materials to the fenced project footprint.
 - b. The project site shall be kept as clean of debris as possible. All food-related trash items shall be enclosed in sealed containers and regularly removed from the site.
 - c. Disposal or temporary placement of excess fill, brush, or other debris shall be limited to areas within the fenced project footprint.
6. All equipment maintenance, staging, and dispensing of fuel, oil, coolant, or any other such activities shall occur in designated areas within the fenced project impact limits. These designated areas shall be located in previously compacted and disturbed areas to the maximum extent practicable in such a manner as to prevent any runoff from entering the vernal pools or their watersheds, and shall be shown on the construction plans. Fueling of equipment shall take place within existing paved areas greater than 100 feet from the vernal

pools or their watersheds. Contractor equipment shall be checked for leaks prior to operation and repaired as necessary. A spill kit for each piece of construction equipment shall be on-site and must be used in the event of a spill. “No-fueling zones” shall be designated on construction plans.

7. Grading activities immediately adjacent to vernal pools shall be timed to avoid wet weather to minimize potential impacts (e.g., siltation) to the vernal pools unless the area to be graded is at an elevation below the pools. To achieve this goal, grading adjacent to avoided pools shall comply with the following:
 - a. Grading shall occur only when the soil is dry to the touch both at the surface and 1 inch below. A visual check for color differences (i.e., darker soil indicating moisture) in the soil between the surface and 1 inch below indicates whether the soil is dry.
 - b. After a rain of greater than 0.2 inch, grading shall occur only after the soil surface has dried sufficiently as described above, and no sooner than 2 days (48 hours) after the rain event ends.
 - c. To prevent erosion and siltation from storm water runoff due to unexpected rains, best management practices (i.e., silt fences) shall be implemented as needed during grading.
 - d. If rain occurs during grading, work shall stop and resume only after soils are dry, as described above.
 - e. Grading shall be done in a manner to prevent runoff from entering preserved vernal pools.
 - f. If necessary, water spraying shall be conducted at a level sufficient to control fugitive dust but not to cause runoff into vernal pools.
 - g. If mechanized grading is necessary, grading shall be performed in a manner to minimize soil compaction (i.e., use the smallest type of equipment needed to feasibly accomplish the work).
8. Prior to project construction, topsoil shall be salvaged from the impacted vernal pools or road ruts with fairy shrimp on-site consistent with the requirements of the approved restoration plan (e.g., free of versatile fairy shrimp [*Branchinecta lindahli*]). Vernal pool soil (inoculum) shall be collected when dry to avoid damaging or destroying fairy shrimp cysts and plant seeds. Hand tools (i.e., shovels and trowels) shall be used to remove the first 2 inches of soil from the pools. Whenever possible, the trowel shall be used to pry up intact chunks of soil, rather than loosening the soil by raking and shoveling, which can damage the cysts. The soil from each pool shall be stored individually in labeled boxes that are adequately ventilated and kept out of direct sunlight in order to prevent the occurrence of fungus or excessive heating of the soil, and stored off-site at an appropriate facility for

vernal pool inoculum. Inoculum from different source pools shall not be mixed for seeding any restored pools, unless otherwise approved by the City and Wildlife Agencies. The collected soils shall be spread out and raked into the bottoms of the restored pools. Topsoil and plant materials salvaged from the upland habitat areas to be impacted shall be transplanted to, and/or used as a seed/cutting source for, the upland habitat restoration/creation areas to the maximum extent practicable as approved by the City.

9. Permanent protective fencing along any interface with developed areas and/or use other measures approved by the City to deter human and pet entrance into on- or off-site habitat shall be installed. Fencing shall be shown on the development plans and should have no gates (except to allow access for maintenance and monitoring of the biological conservation easement areas) and be designed to prevent intrusion by pets. Signage for the biological conservation easement area shall be posted and maintained at conspicuous locations. The requirement for fencing and/or other preventative measures shall be included in the project's mitigation program.

5.2.2 Habitat Protection

The VPHCP adds lands to the existing MHPA that include vernal pools, as well as associated watershed, habitat buffers, and adjacent uplands to meet the tenets of appropriate and functional reserve design, as guided by USFWS (USFWS 2000). The protection of vernal pools as a function of the VPHCP reserve design through addition of lands to the MHPA is described below. The following analysis is based on whether a vernal pool or modeled habitat is located within the preserve or not and does not account for potential impacts from covered activities. There could be minor impacts to individual vernal pools (known or unknown) and/or species from covered activities (e.g., management, trail use) that are not accounted for here because the locations of potential future covered activities are not known at this time. The following estimates of conserved vernal pools and complexes do not include lands owned by Caltrans. These areas on Del Mar and Otay Mesas are currently being restored by Caltrans. When the restoration is complete, these lands will be transferred to the City, State, or Service and will be managed consistent with the VPHCP.

Baseline Conservation – Existing Conserved Lands

As shown in Table 5-2, a total of 2,183 vernal pools (totaling 34.7 acres of basin surface area) within 45 complexes and 3,797 acres of modeled vernal pool habitat are currently conserved within the MHPA under the Baseline conditions. This includes vernal pools on both private and public lands conserved within the MHPA, or within a hardline conservation area associated with an existing permit (i.e., USFWS BO) or planned project (see Chapter 4). Under the Baseline conditions, 84% of the vernal pools and 61% of modeled habitat within the VPHCP Plan Area

are conserved; however, management is not guaranteed on baseline lands that are privately owned. As separate funding becomes available (e.g., grant funds) the City may work with private land owners to implement additional recommended management as identified on the site-specific VPMMP management.

Expansion of the MHPA

Land preservation is an important component of this conservation strategy, in particular lands with vernal pool resources that are not currently conserved. A gap analysis for vernal pools was conducted to identify the areas within the VPHCP Plan Area where vernal pools were not adequately protected. When determining the additional areas to add to the MHPA through implementation of the VPHCP, the following approach for conserving vernal pool complexes and covered species populations was considered:

- Conserve complexes occupied with the covered species (75% or 100% conservation level⁸).
- Conserve complexes (75% or 100% conservation level) identified in the Recovery Plan (USFWS 1998a) as necessary to maintain the viability of covered species populations.
- Conserve areas designated as Critical Habitat for the covered species.

The VPHCP proposes to add additional public and private lands to the City's existing MHPA to meet the goals and objectives for the covered species. Specifically, additional lands shall be added in the following locations: Otay Mesa, Kearny Mesa, Mira Mesa, and Navajo. Once these additional lands are added, the MHPA will conserve a total of 2,409 vernal pools within 53 vernal pool complexes and 4,316 acres of modeled vernal pool habitat (Table 5-2). Approximately 93% of the vernal pools and 65% of modeled habitat within the VPHCP Plan Area will be conserved under implementation of the VPHCP.

As shown in Table 5-2, implementation of the VPHCP will increase conservation from the Baseline conditions by adding 226 vernal pools (2.8 additional acres of basin area) within eight additional complexes and 519 acres of modeled vernal pool habitat to the MHPA (9% more vernal pools and 4% more modeled habitat conserved than under Baseline conditions).

⁸ The City has designated conservation levels (75 or 100%) for each parcel within the MHPA. The conservation level denotes the portion of a parcel that will be conserved. For example, for a parcel designated with a 75% conservation level, 25% of the parcel is available for development. Development would occur on the least environmentally sensitive area of the parcel, as determined by the City environmental review process.

**Table 5-2
Additional Conservation from Implementation of the VPHCP**

	Number of Complex Series in the VPHCP Plan Area	Number of Complex Series Conserved	Total Number of Pools in VPHCP Plan Area	Number of Pools Inside MHPA	Number of Pools Conserved Based on Conservation Level ²	Acreage of Pools Conserved	Acreage of Modeled Habitat Conserved
Baseline¹	54	45	2,591	2,199	2,183	34.7	3,797
MHPA after VPHCP Implementation	54	53	2,591	2,472	2,409	37.5	4,316
Additional Conservation Resulting from VPHCP Implementation	N/A	8	n/a	273	226	2.8	519

¹ The Baseline includes conserved lands within the City's existing MHPA, permitted projects, and planned projects. See Chapter 4 for more detail.

² Pools and species population conserved is an estimate based on 75% or 100% conservation level by vernal pool complex. See Appendix C for more detail on the conservation analysis for each vernal pool complex in the VPHCP Plan Area.

5.2.3 Species Protection

Conservation of covered species within the city is discussed below, including conservation under Baseline conditions as well as additional conservation through the addition of lands into the MHPA under the VPHCP.

Baseline Conservation – Existing Conservation of Covered Species

Table 5-3 shows the total number of vernal pools occupied by the seven covered species within the VPHCP Plan Area under the Baseline conditions. The total number of known occupied pools conserved within the VPHCP Plan Area and the percentage of occupied pools conserved are also shown for each species. Under the Baseline conditions, 100% of the known occupied pools would be conserved within the Preserve for two of the seven covered species (Otay Mesa mint and California Orcutt grass).

Additional Conservation of Covered Species in the MHPA

Table 5-3 summarizes the conservation of covered species under the VPHCP once additional lands are added to the MHPA, including the total conservation of occupied pools, as well as the percentage of occupied pools conserved. The increase in conservation of occupied vernal pools from the Baseline conditions is also shown. Addition of lands to the MHPA through implementation of the VPHCP will result in conservation of 100% of the known occupied pools for four of the seven covered species, including Otay Mesa mint, San Diego Mesa mint, California Orcutt grass, and Riverside fairy shrimp. Therefore, 100% conservation is afforded to two additional species from the Baseline conditions (San Diego mesa mint and Riverside fairy shrimp).

In addition, conservation of occupied vernal pools will increase for two covered species: three additional pools occupied by San Diego button-celery will be conserved (an increase of 1% from the Baseline conservation) and 31 additional pools occupied by San Diego fairy shrimp will be conserved (an increase of 6% from the Baseline conservation).

A summary of conservation for each covered species is provided below. The conservation objectives for each species, including conservation, management, and/or restoration required under the VPHCP, are included in Table 5-1. Where complexes occupied by covered species are not conserved, or where the existing population within a complex is not conserved (see Chapter 6 for details), mitigation is required.

Otay Mesa Mint

All of the 369 vernal pools known to be occupied with Otay Mesa mint (100%) within the VPHCP Plan Area are conserved in the Preserve under the Baseline conservation (Table 5-3). In addition, potential habitat that will be restored (as identified in Table 5-1) on Otay Mesa shall be added to the preserve. The VPHCP shall also provide additional management and monitoring for this species, beyond Baseline conditions, as described in Chapter 7.

**Table 5-3
Conservation of Vernal Pools Occupied with Covered Species (Total and % Pools Conserved)**

	PONU Total Pools in VPHCP Plan Area	PONU Total Pools Conserved	PONU % Pools Conserved	POAB Total Pools in VPHCP Plan Area	POAB Total Pools Conserved	POAB % Pools Conserved	NAFO Total Pools in VPHCP Plan Area	NAFO Total Pools Conserved	NAFO % Pools Conserved	ERAR Total Pools in VPHCP Plan Area	ERAR Total Pools Conserved	ERAR % Pools Conserved	ORCA Total Pools in VPHCP Plan Area	ORCA Total Pools Conserved	ORCA % Pools Conserved	RFS Total Pools in VPHCP Plan Area	RFS Total Pools Conserved	RFS % Pools Conserved	SDFS Total Pools in VPHCP Plan Area	SDFS Total Pools Conserved	SDFS % Pools Conserved
Baseline¹	369	369	100%	337	332	99%	95	94	99%	732	719	98%	58	58	100%	131	128	98%	517	431	83%
MHPA after VPHCP Implementation²	369	369	100%	337	335	99%	95	94	99%	732	722	99%	58	58	100%	131	131	100%	517	462	89%
Additional Conservation Resulting from VPHCP Implementation	n/a	0	0	n/a	3	1%	n/a	0	0	n/a	3	1%	n/a	0	0	n/a	3	2%	n/a	31	6%

n/a= Not applicable

¹ The Baseline includes conserved lands within the City's existing MHPA, permitted projects, and planned projects. See Chapter 4 for more detail.

² Pools and species population conserved is an estimate based on 75% and/or 100% conservation level by vernal pool complex. This estimate does not include potential impacts from covered activities. See Appendix C for more detail on the conservation analysis for each vernal pool complex in the VPHCP Plan Area.

PONU = Otay Mesa mint
 POAB = San Diego Mesa mint
 NAFO = Spreading navarretia
 ERAR = San Diego button-celery

ORCA = California Orcutt grass
 RFS = Riverside fairy shrimp
 SDFS = San Diego fairy shrimp

San Diego Mesa Mint

Three additional vernal pools occupied by San Diego mesa mint will be conserved in the MHPA as a result of implementation of the VPHCP compared to the Baseline conservation, thereby conserving 335 vernal pools (99%) that are known to support San Diego mesa mint in the VPHCP Plan Area (Table 5-3). A restoration plan consistent with the requirements outlined in Section 5.3 provides a Mitigation Framework that includes restoring vernal pools with the salvaged San Diego mesa mint (i.e., in-kind restoration) would be required to mitigate for the two impacted pools that supports San Diego mesa mint. In addition, potential habitat that could be restored with mitigation or grant funding on Kearny Mesa shall be added to the preserve. The VPHCP shall also provide additional management and monitoring for this species, beyond Baseline conditions, as described in Chapter 7.

Spreading Navarretia

All but one of the 95 pools known to be occupied with spreading navarretia are conserved under the Baseline conditions (Table 5-3). In addition, potential habitat that will be restored (as identified in Table 5-1) on Otay Mesa and Kearny Mesa shall be added to the Preserve through implementation of the VPHCP. Although one vernal pool that supports spreading navarretia will be impacted at the NDU 1&2 site within the J13 complex series on Otay Mesa (see Chapter 6 for more discussion of impacts), there are two pools known to support spreading navarretia within this historically recognized J13 population. The other occupied pool shall be conserved under the VPHCP. Therefore, the potentially unique genetics of spreading navarretia at the J13 complex will be preserved.

To prevent net loss of unique genetics, mitigation is required under this VPHCP for direct impact to the one pool at the NDU 1&2 complex that supports spreading navarretia, including salvage of potentially impacted spreading individuals preserve the population genetics. A restoration plan consistent with the requirements outlined in Section 5.3 provides a Mitigation Framework that includes restoring vernal pools with the salvaged spreading navarretia individuals (i.e., in-kind restoration) would be required to mitigate for the one impacted pool that supports spreading navarretia. The VPHCP shall also provide additional management and monitoring for this species, beyond Baseline conditions, as described in Chapter 7.

San Diego Button-celery

Three additional vernal pools that are known to support San Diego button-celery will be conserved in the MHPA as a result of implementation of the VPHCP compared to the Baseline conservation, thereby conserving 722 vernal pools (99%) that support San Diego button-celery in

the VPHCP Plan Area (Table 5-3). However, of the 11 pools known to support San Diego button-celery within the J13 complex series, only three will be conserved. To prevent the net loss of the unique genetics of the J13 San Diego button-celery population, mitigation for impacted pools shall occur consistent with the mitigation requirements outlined in Section 5.3, including salvage of impacted San Diego button-celery individuals and in-kind restoration. The VPHCP is designed to accommodate restoration, establishment, and conservation of new populations of San Diego button-celery in a more biologically defensible configuration (e.g., substantial connection to biological open space) than avoiding them and surrounding them with development. As noted in Table 5-1, a VPHCP conservation objective is to establish a viable population of San Diego button-celery within J13. In addition, potential habitat that will be restored on Otay Mesa and Kearny Mesa shall be added to the Preserve. The VPHCP shall also provide additional management and monitoring for this species, beyond Baseline conditions, as described in Chapter 7.

California Orcutt Grass

All 58 vernal pools occupied with California Orcutt grass within the VPHCP Plan Area are conserved within the Baseline conservation (Table 5-3). No additional occupied basins are added through the VPHCP; however additional potential habitat will be restored on Otay Mesa (as identified in Table 5-1) shall be added to the Preserve. The VPHCP shall also provide additional management and monitoring for this species, beyond Baseline conditions, as described in Chapter 7.

Riverside Fairy Shrimp

Three additional vernal pools occupied by Riverside fairy shrimp will be conserved in the MHPA as a result of implementation of the VPHCP compared to the Baseline conservation, thereby conserving all 131 vernal pools (100%) that support Riverside fairy shrimp in the VPHCP Plan Area (Table 5-3). In addition, potential habitat that will be restored on Otay Mesa (as identified in Table 5-1) shall be added to the Preserve. The VPHCP shall also provide additional management and monitoring for this species, beyond Baseline conditions, as described in Chapter 7.

San Diego Fairy Shrimp

Thirty-one additional vernal pools that are known to support San Diego fairy shrimp will be conserved in the MHPA as a result of implementation of the VPHCP compared to the Baseline conservation, thereby conserving 462 vernal pools (89%) that are known to support San Diego fairy shrimp in the VPHCP Plan Area (Table 5-3). At the sites where vernal pools occupied by

San Diego fairy shrimp would be lost (Rhodes, Pueblo Lands North, Brown Field, NDU 1&2, Bachman, Southview East (Airway Road), Montgomery-Gibbs Executive Airport, and Magnatron) salvage of unique genetic material (where appropriate) and in-kind restoration is required to conserve the population at these locations. Mitigation for impacted pools that supports San Diego fairy shrimp shall occur consistent with the mitigation requirements outlined in Section 5.3, Mitigation Framework. In addition, potential habitat that could be restored with mitigation or grant funding on Kearny Mesa and Otay Mesa shall be added to the Preserve. The VPHCP shall also provide additional management and monitoring for this species, beyond Baseline conditions, as described in Chapter 7.

5.2.4 Protection of Designated Critical Habitat

Baseline Conservation – Existing Conservation of Designated Critical Habitat

Table 5-4 shows the total acres of Critical Habitat conserved under the Baseline conditions (for three covered species with designated Critical Habitat: spreading navarretia, Riverside fairy shrimp, and San Diego fairy shrimp), as well as the percentage of Critical Habitat acres within the overall VPHCP planning area that is conserved under the Baseline.

**Table 5-4
Summary of Critical Habitat Conservation**

	Spreading Navarretia Critical Habitat (Acres)	Riverside Fairy Shrimp Critical Habitat (Acres)	San Diego Fairy Shrimp Critical Habitat (Acres)
Total Critical Habitat Designation (for Species Range, occurs within and outside VPHCP Plan Area)	6,720	1,724	2,931
Total Acres in VPHCP Plan Area (% of Total Species Designation)	628 9%	804 47%	1,801 61%
Existing Critical Habitat Conservation in VPHCP Plan Area (% of Critical Habitat Conserved)	561 89%	724 90%	1,330 74%
Critical Habitat Conserved in MHPA through VPHCP (% of Critical Habitat Conserved)	565 90%	740 92%	1,409 78%
Additional Habitat Conserved with Implementation of the VPHCP (% of Additional Critical Habitat Conserved)	4 1%	16 2%	79 4%

Additional Conservation of Designated Critical Habitat in the MHPA

As shown in Table 5-4, additional lands with Critical Habitat would be added to the MHPA through implementation of the VPHCP. The high-quality habitat that will be added to the MHPA is suitable for vernal pool restoration, either as restoration associated with the VPHCP objectives (Table 5-1), mitigation on a project-specific basis (see Section 5.3.2), or as a potential mitigation bank (see Section 5.3.3). Although some overall loss of Critical Habitat will occur for each of the three covered species (see Chapter 6), the additional lands to be added to the MHPA are of higher biological value and are arranged in a configuration that maintains long-term viability of the VPHCP covered species. Management, maintenance, enhancement, and/or restoration of conserved vernal pool complexes containing Critical Habitat, as described in the VPMMP (see Chapter 7 and Appendix D), would result in a net biological benefit for all three species and their Critical Habitats.

A discussion of additional Critical Habitat conservation for the three covered species with designated Critical Habitat is provided below.

Spreading Navarretia

As shown in Table 5-4, the VPHCP, when fully implemented, will conserve approximately 4 additional acres of spreading navarretia Critical Habitat from the Baseline conservation, to total 565 acres (90% of the designated spreading navarretia Critical Habitat in the VPHCP Plan Area). The additional 4 acres are located in West Otay Mesa Critical Habitat Subunit 5H within the Unit 5 Southern Coastal Mesa Management Area (see Figure 6-1). In addition, approximately 37 acres of habitat that supports primary constituent elements (PCEs) and will be restored on west Otay Mesa are in proximity to Subunit 5H.

Riverside Fairy Shrimp

Once fully implemented, the VPHCP will conserve approximately 16 additional acres of Riverside fairy shrimp Critical Habitat from the Baseline conservation, to total 740 acres (92% of the designated Riverside fairy shrimp Critical Habitat within the VPHCP Plan Area), as shown in Table 5-4. The additional 16 acres are located within the San Diego South Coastal Mesa Critical Habitat Unit 5, within Subunits F (1 acre), G (9 acres), and H (6 acres) (see Figure 6-2). The additional lands with designated Riverside fairy shrimp Critical Habitat that will be added through implementation of the VPHCP have high biological value and potential for restoration.

San Diego Fairy Shrimp

As shown in Table 5-4, the VPHCP, once fully implemented, will conserve approximately 79 additional acres of San Diego fairy shrimp Critical Habitat from the Baseline conservation, to total 1,409 acres (78 % of the San Diego fairy shrimp Critical Habitat designation within the VPHCP Plan Area). The additional 79 acres are located within the following six Critical Habitat Units (see Figure 6-3): Otay Mesa Southwest (53 acres), Cubic (5 acres), SANDER and Magnatron (11 acres), Otay Mesa Northwest (7 acres), and Montgomery-Gibbs Executive Airport (2 acres). The additional lands with designated San Diego fairy shrimp Critical Habitat that will be added through implementation of the VPHCP have high biological value and potential for restoration.

5.3 MITIGATION FRAMEWORK

5.3.1 Compensatory Mitigation

Impacts outside and within the MHPA shall be limited to covered projects, future projects, and covered activities (Chapter 4). Mitigation shall be consistent with requirements established in this VPHCP, the City's LDM Biology Guidelines of the Land Development Manual, and the ESL Regulations for wetland impacts (see Section 8.2.1). Mitigation will prevent any net loss of vernal pool functions and values of impacted vernal pools.

Consistent with the ESL Regulations, the Mitigation Framework includes compensatory measures that would result in a biologically superior net gain in overall function and values of (a) the type of wetland resource being impacted and/or (b) the biological resources to be conserved. As required by the Mitigation Framework, the biologically superior mitigation shall include either:

- (1) Standard mitigation including wetland vernal pool restoration and enhancement (of the same type of wetland resource that is being impacted) that results in high-quality wetlands; AND a biologically superior project design whose avoided area(s) (i) is in a configuration or alignment that optimizes the potential long-term biological viability of the on-site sensitive biological resources, and/or (ii) conserves the rarest and highest quality on-site biological resources; or
- (2) For a project not consistent with (1) above, extraordinary mitigation is required.

Examples of increased function and value include, but are not limited to, an increase in the availability of habitat for native fauna, an increase in native flora diversity, a decrease in invasive

species, an increase in ground water recharge, water quality improvements and sedimentation deposition rates. Success criteria using the best currently available information for the particular mitigation habitat shall be required as part of the restoration or enhancement plan.

Mitigation for projects impacting vernal pools shall include salvage of sensitive species, when appropriate (i.e., high quality and no presence of versatile fairy shrimp), from vernal pools to be impacted, introduction of salvaged material into restored vernal pool habitat where appropriate (e.g., same vernal pool series), and maintenance of salvaged material pending successful restoration of the vernal pools. Use of salvaged materials shall be determined on a project-specific basis during the project-level review phase. Salvaged material shall not be introduced to existing vernal pools containing the same species outside the vernal pool series unless approved by USFWS. The mitigation sites shall include preservation of the appropriate area of watershed and a buffer based on functions and values and a hydraulic analysis that evaluates surface and/or subsurface flow; however, if such an analysis is not conducted, there shall be a default of a minimum 100-foot buffer from the watershed. In addition, specific requirements for the J13 San Diego button-celery population in Otay Mesa and spreading navarretia at the NDU 1&2 complex to ensure no net loss of habitat, maintain population size and prevent loss of genetics have been included as a requirement of the VPHCP (See Section 5.2.3, Species Protection).

Impacts to vernal pool habitat within the MHPA require a deviation from the City's ESL Regulations. Any impacts to vernal pools, inside and outside the MHPA, must be mitigated "in-kind" and achieve a "no-net loss" of wetland function and values (except as provided for in the City's ESL Wetland Deviation Section 143.0510 (d)(2) Economic Viability Option). Standard mitigation ratios for vernal pools can range from 2:1 when no listed species are present, and up to 4:1 for when listed species with very limited distributions are present (e.g., *Pogogyne abramsii*). Consistent with the City's LDM Biology Guidelines for the biologically superior alternative, extraordinary mitigation ratios for vernal pools can range from 4:1 when no listed species are present, and up to 8:1 when listed species with very limited distributions (e.g., *Pogogyne abramsii*) are present

5.3.2 General Conditions for Compensatory Mitigation

Project-specific vernal pool restoration, enhancement, and preservation plans that are required as part of compensatory mitigation under the VPHCP Mitigation Framework shall be consistent with the general requirements outlined in the City's LDM Biology Guidelines. The restoration/enhancement/preservation plan and perpetual management and monitoring plan shall be mailed to the Wildlife Agencies for technical review, as generally defined below, and approval. Upon receipt of the plans, the Wildlife Agencies shall have 30 working days in which to review and provide written comments to the City. Subsequent reviews and comments shall be

completed within 15 working days. Failure to respond within the specified timelines shall result in approval of the draft plans unless an extension is agreed to by all parties. General conditions specific to vernal pool restoration/enhancement/preservation and perpetual management and monitoring plans are as follows:

1. The project proponent shall submit a vernal pool restoration/enhancement/preservation plan to the City (Development Services Environmental Analysis Section and Planning Department MSCP Staff) and Wildlife Agencies for approval as part of the development review process and the plan shall be included as an attachment to the project's CEQA document. The restoration plan shall be consistent (as applicable) with the restoration plan outline included in Attachment B of the City's LDM Biology Guidelines. The plan must be approved and implemented prior to or concurrent with project impacts. In addition, the restoration plan shall include the following information and conditions:
 - a. Implementation of the enhancement/restoration shall be conducted under the direction of a qualified biologist (vernal pool restoration specialist) with at least 3 years of vernal pool restoration experience, to be approved by the City and Wildlife Agencies.
 - b. To avoid impacts to any extant vernal pools, all conservation measures required at the project construction site to avoid and minimize impacts to adjacent vernal pools and their watersheds shall also be implemented at the restoration site and thus specified in the restoration plan.
 - c. All vernal pools to be avoided and their watersheds shall be enhanced, as deemed appropriate by the Wildlife Agencies, to achieve the same success criteria or better as the restored pools and surrounding uplands. Enhancement activities will include addition of vernal pool plant species and addition of appropriate upland habitat (e.g., coastal sage scrub, native grassland and/or chaparral) compared to the surrounding uplands. All plant material used for enhancement will be collected from local sources (i.e., as close to the site as reasonably feasible). This establishment can be accomplished by redistributing topsoil containing seeds, spores, bulbs, eggs, and other propagules from affected pools and adjacent vernal pool and upland habitats; by the translocation of propagules of individual species from off-site habitats; and by the use of commercially available native plant species and/or any vernal pool inoculum or plant material from an off-site source approved by the Wildlife Agencies. Topsoil and plant materials from the native habitats to be affected on-site will be applied to the watersheds of the enhanced and restored pools to the maximum extent practicable. Nonnative invasive weed control shall be implemented within the restoration areas to protect and enhance habitat remaining on-site.

- d. All restoration/enhancement/preservation activities shall commence the first summer-fall season prior to, or concurrently with, the initiation of project impacts.
- e. Discussion and a table on the exact activities that shall occur at each restored or enhanced vernal pools. The discussion and table shall also include the initial and planned conditions of the pools (i.e., basin size, average depth, ponding duration), existing native and nonnative cover and presence of listed species.
- f. All final specifications and topographic-based grading, planting, and watering plans shall have 0.5-foot contours for the vernal pools, watersheds, and surrounding uplands (including adjacent mima mounds) at the restoration sites. The basis for this fine-scale resolution is the micro-depth (i.e., several inches) of the vernal pools that shall be restored. The grading plans shall also show the watersheds of extant vernal pools, and overflow pathways that hydrologically connect the restored pools in a way that mimics natural vernal pool complex topography/hydrology.
- g. A hydraulic analysis (i.e., surface and/or subsurface flow, where applicable) that shows each vernal pool proposed for restoration and its watershed, and hydrologic connection between the pools is required. The restored pools and their watersheds shall not impact the watersheds of any extant pools except where needed to establish hydrologic connections.
- h. As a last resort and after approval by the Wildlife Agencies, additional inoculum from donor vernal pools as close to the project site as possible may be used to supplement the inoculum collected at the project impact site. If inoculum is used for restoration and enhancement, the plan shall identify any proposed donor pools and include documentation that they are free of versatile fairy shrimp (*Branchinecta lindahli*). No more than 10% of the basin area of any donor pool shall be used for collection of inoculum. Collection of inoculum from donor pools shall be coordinated with the Wildlife Agencies.
- i. Inoculum and planting shall not be installed until the City and Wildlife Agencies have approved habitat restoration site grading. All planting shall be installed in a way that mimics natural plant distribution, and not in rows. Inoculum shall not be introduced into the restored or enhanced pools until after they have been demonstrated to retain water for the appropriate amount of time to support the targeted vernal pool species (i.e., at least 21 to 28 days for San Diego fairy shrimp or 30 to 60 days for Riverside fairy shrimp) and have been surveyed for versatile fairy shrimp to the satisfaction of the City and Wildlife Agencies. If versatile fairy shrimp are detected in the restored or enhanced pools, inoculum shall not be introduced until appropriate measures to address versatile fairy shrimp are approved by the City and Wildlife Agencies.

- Inoculum shall be spread evenly over the surface, no more than 0.25 inch deep. If any ponding water is present at the time of soil inoculation, the soil shall only be placed on the wet soil adjacent to the ponded areas. Inoculum shall be placed into the bottoms of the restored/enhanced pools in a manner that preserves, to the maximum extent possible, the orientation of the fairy shrimp cysts and plant seeds within the surface layer of soil (e.g., collected inoculum shall be shallowly distributed within the pond so that cysts have the potential to be brought into solution upon inundation).
- j. Plant palettes (species, size, and number/acre) and seed mix (species and pounds/acre) shall be included in the restoration/enhancement plan. The plant palette shall include native species specifically associated with the on-site habitat type(s) and should be from a local source. The source and proof of local origin of all plant material and seed shall be provided.
 - k. Native plants and animals shall be established within the restored/enhanced pools, their watersheds, and surrounding uplands. This can be accomplished by redistributing topsoil containing seeds, spores, bulbs, eggs, and other propagules from affected pools and adjacent vernal pool and upland habitats; by the translocation of propagules of individual species; and by the use of commercially available native plant species. Any vernal pool inoculum or plant material from an off-site source must be approved by the City and Wildlife Agencies. Topsoil and plant materials from the native habitats to be affected on-site shall be applied to the watersheds of the enhanced and restored pools to the maximum extent practicable. Exotic weed control shall be implemented within the restoration/enhancement areas to protect and enhance habitat remaining on-site.
 - l. In the event that natural rain is inadequate to support plant establishment, artificial watering of the restored/enhanced pools and their watersheds may be done upon approval by the City and Wildlife Agencies in order to establish plants but not hydrate shrimp. Any artificial watering shall be done in a manner that prevents ponding in the pools. Any water to be used shall be identified and documented to be free of contaminants that could harm the pools.
 - m. All weeding within and immediately adjacent to the enhanced/restored pools shall be performed by hand. All workers conducting weed removal activities shall be educated to distinguish between native and nonnative species so that local native plants are not inadvertently killed by weed removal activities.
 - n. All herbicide and pesticide use shall be under the direction of a licensed pest control advisor and shall be applied by a licensed applicator, under the supervision of a vernal pool restoration specialist. Glyphosate-based herbicides, such as RoundUp or

- Aquamaster, shall be applied on all areas that have been dethatched. Herbicide shall only be applied when wind speed is less than 5 miles per hour, and spray nozzles shall be of a design to maximize the size of droplets, to reduce the potential for drift of herbicide to non-target plants. A 10-foot buffer shall be maintained between concentrations of any sensitive plant species. Application of herbicide shall not occur if rain is projected within 24 hours of the scheduled application. When vernal pools are ponding or close to saturation, only hand herbicide application (i.e., saturated glove technique) shall be used in and around the edges of pools by specially trained herbicide applicators under the direct supervision of the vernal pool restoration specialist. When vernal pools are not ponding or close to saturation, herbicide may be sprayed but applicators must stay at least 3 feet from the edge of the pools.
- o. A final implementation schedule shall be included that indicates when all vernal pool impacts, as well as vernal pool restoration/enhancement grading and planting, shall begin and end. A temporal loss of vernal pools shall be avoided by initiating the restoration work prior to or concurrent with impacts. This will minimize the length of time inoculum is kept in storage and ensure that there is appropriate habitat to translocate it to.
 - p. A minimum of 5 years of monitoring shall be conducted to ensure that success criteria are achieved. Success criteria for vernal pool and upland habitat restoration/enhancement areas shall include quantitative hydrological, vegetation transects, fairy shrimp protocol surveys, or other measurements as approved by the City and Wildlife Agencies (e.g., viable cyst, hatched fairy shrimp, and gravid female measurements), floral and faunal inventories, and photographic documentation. To minimize impacts to the vernal pool's soil surface during restoration, enhancement, and monitoring, cobbles shall be oriented within the vernal pools to serve as stepping stones. Reference data shall be established from a vernal pool reference or control site located within each of the three VPHCP subareas (North, Central, South). The vernal pool control sites shall be approved by the City and Wildlife Agencies.
 - q. Restoration success for fairy shrimp shall be determined by measuring the ponding of water, and density of viable cysts, hatched fairy shrimp, and gravid females, within the restored pools. Water measurements shall be taken in the restored pools to determine the depth, duration, and quality (e.g., pH, temperature, total dissolved solids, and salinity) of ponding. Dry samples shall be taken in the restored and reference pools to determine the density of viable cysts in the soils. Dry sampling shall occur in the first year of the restoration monitoring program to establish a baseline, and the last year to identify changes to viable cyst density. Wet samples shall also be taken in the restored and reference pools to determine the density of

hatched fairy shrimp and gravid females. The pools shall pond for a period of time similarly to reference vernal pools during an average rainfall year and at an appropriate depth and quality to support fairy shrimp. The hatched fairy shrimp and gravid female density of the restored pools shall not differ significantly ($p < 0.05$) from reference pools for, at least, three wet seasons before a determination of success can be made. The average viable cyst density of the restored pools shall not differ significantly ($p < 0.05$) from reference pools at the end of the monitoring period before a determination of success can be made. Vernal pools selected as reference or control pools for evaluating restoration success shall be identified and described in the restoration plan. Alternate methods of determining success may be used upon approval by the City and Wildlife Agencies.

- r. To ensure that the construction and operation of the project do not adversely affect the vernal pools on-site, post-construction monitoring shall be conducted throughout the rainy season of an adequate rainfall year (i.e., 55% of average rainfall) to verify that avoidance measures were successful and determine whether the project is changing the hydrology of, or causing erosion and sediment delivery to, these vernal pools (based on pre-construction conditions). Monitoring shall occur for 3 years following project construction. In the event that sufficient rainfall to demonstrate adequate ponding does not occur during the 3 years following project construction, monitoring shall continue in 1-year increments, to a maximum of 5 years. A monitoring report shall be submitted to the City and Wildlife Agencies by September 1 following each monitoring season. The monitoring program shall be described in the final vernal pool restoration/enhancement plan. If monitoring detects impacts to the adjacent vernal pools from construction and/or operation of the proposed project (e.g., from changes in hydrology) within the monitoring period, remediation shall be required.
- s. Monitoring and success criteria for vernal pool and upland restoration/enhancement areas shall include coastal sage scrub, native grassland, and chaparral species richness and cover criteria for all 5 years of monitoring. Success criteria for weed cover shall be as follows: 0% cover for weed species categorized as High or Moderate in the Cal-IPC Invasive Plant Inventory, and relative cover of all other weed species is no more than 5% and 10% coverage in the pools basins and watersheds, respectively, for other exotic/weed species for all 5 years of the monitoring period. Container plant survival success criteria shall be 80% of the initial plantings for the first 5 years. At the first and second anniversaries of plant installation, all dead plants shall be replaced unless their function has been replaced by natural recruitment. The method used for monitoring shall be described and a map of proposed sampling locations shall be included. Photo points shall be used for qualitative monitoring and stratified-random sampling shall be used for all quantitative monitoring.

- t. Verification that restoration/enhancement of vernal pools is complete shall require written sign-off by the City and Wildlife Agencies. If a performance criterion is not met for any of the restored/enhanced vernal pools or upland habitat in any year, or if the final success criteria are not met, the project proponent shall prepare an analysis of the cause(s) of failure and, if deemed necessary by the City or Wildlife Agencies, propose remedial actions for approval. If any of the restored/enhanced vernal pools or upland habitat has not met a performance criterion during the initial 5-year period, the project proponent's maintenance and monitoring obligations shall continue until the City and Wildlife Agencies deem the restoration/enhancement successful. Contingency measures may be required by the City or Wildlife Agencies. Restoration/enhancement shall not be deemed successful until success criteria are achieved. If contingency measures are required, restoration/enhancement shall not be deemed successful until at least 2 years after any required contingency measures are implemented, as determined by the City and Wildlife Agencies.
 - u. Annual reports shall be submitted to the City and Wildlife Agencies by December 1 of each year that assess both the attainment of yearly success criteria and progress toward the final success criteria. The reports shall also summarize the project's compliance with all applicable mitigation measures and permit conditions.
2. The project proponent shall ensure the long-term management of the on-site areas shall occur in perpetuity (see Chapter 7). Each project proponent shall implement a perpetual management, maintenance, and monitoring plan (e.g., Habitat Management Plan) for their respective biological conservation easement areas. The plan, which shall be approved by the City and Wildlife Agencies and funding source must be established prior to, or concurrent with, impacts. The plan should include, but not be limited to, the following: method of protecting the resources in perpetuity (i.e., covenant of easement dedication to the City, or a deed restriction or other conservation mechanism consistent with California Civil Code Section 815, et seq. and/or Government Code Section 65870 and acceptable to the Wildlife Agencies; monitoring schedule; measures to prevent human and exotic species encroachment; funding mechanism; and contingency measures should problems occur. In addition, the plan shall include the proposed land manager's name, qualifications, business address, and contact information. The project proponent shall also establish a nonwasting endowment or similar secure funding method in an amount approved by the City and the Wildlife Agencies based on a Property Analysis Record (PAR; Center for Natural Lands Management ©1998), or similar cost estimation method, to secure the ongoing funding for the perpetual long-term management, maintenance, and monitoring of the biological conservation easement area by an agency, nonprofit organization, or other entity approved by the City and the Wildlife Agencies.

3. In the event that a new occurrence of a covered species is identified (i.e., previously undocumented) within an area to be impacted by a covered project or covered activity, mitigation shall be required in the form of salvage and restoration for the impact to the new occurrence. Mitigation shall occur consistent with Conditions 1 and 2 above, as well as the City's LDM Biology Guidelines.

Prior to issuance of any permit for a future development project implemented in accordance with the VPHCP Plan area that could directly affect an archaeological resource, the City shall require (1) an inventory of the site to determine the presence of archaeological resources and (2) the appropriate mitigation for any significant resources that may be impacted by a development activity. Sites may include residential and commercial properties, privies, trash pits, building foundations, and industrial features representing the contributions of people from diverse socioeconomic and ethnic backgrounds. Sites may also include resources associated with prehistoric Native American activities.

5.3.3 Mitigation Banking

Lands contributed to the Preserve system by public or private owners in excess of the VPHCP mitigation requirements may either be used by such owner as vernal pool mitigation for that owner's subsequent development project(s), or it may be "banked" by those owners. Such banked lands can later be used to provide mitigation for future development projects of other owners with lands included in the VPHCP. A vernal pool "Conservation Bank" must comply with the "Conservation and Mitigation Banking Guidelines" issued by the California Natural Resources Agency (August 2014). To set up a vernal pool Conservation Bank, a land owner must prepare a restoration plan consistent with the requirements outlined in Section 5.3.2 above, and submit to the City and Wildlife Agencies for approval.

CHAPTER 6

IMPACT ANALYSIS

This chapter analyzes the potential impact to vernal pools and covered species resulting from covered projects, planned projects, and/or covered activities consistent with the VPHCP (refer to Chapter 4) and the anticipated impacts of the taking. It also discusses loss of Critical Habitat for the three species for which USFWS has designated Critical Habitat: spreading navarretia, San Diego fairy shrimp, and Riverside fairy shrimp. Direct impacts are assessed quantitatively (i.e., mapped vernal pools, modeled habitat, and species occurrences), while indirect impacts are assessed qualitatively; permanent and temporary impacts are also evaluated based on the definitions below. The Existing Conservation/No Action Alternative would include the City operating under existing state NCCP/MSCP authorizations which includes coverage for take/impacts to and conservation of vernal pool habitat and the seven vernal pool species addressed in this VPHCP.

Impacts are those actions affecting vernal pools, modeled habitat, and covered species in the VPHCP Plan Area. Impacts can be direct or indirect.

Direct impacts are defined as the removal or alteration of vernal pools, modeled habitat, and/or covered species populations or occurrences (or portions thereof) as a result of covered and Future Projects or covered activities. Direct impacts are a result of land development and occur at the time and place of project implementation (e.g., grading, ground disturbance, trampling of plants). Direct impacts can be either permanent or temporary (see below).

Indirect impacts are defined by USFWS as “those that are caused by the proposed action and are later in time, but are still reasonably certain to occur” (50 CFR 402.02). Indirect impacts in the context of this VPHCP also include those impacts that occur at the time of the proposed action but beyond the footprint of a project or activity (i.e., beyond the area of direct disturbance). Examples of indirect impacts include lighting, fragmentation, and invasive plants. While more difficult to detect and track, indirect impacts can undermine species viability or habitat quality, especially if multiple indirect or direct impacts work cumulatively to impair the species or to degrade the habitat. Indirect impacts can be either temporary or permanent.

Permanent impacts are direct impacts that permanently remove or alter vernal pools as a result of covered projects or covered activities (e.g., land development). Permanent impacts also include indirect impacts to vernal pools that result in a permanent change to vernal pool functions (e.g.,

development around a vernal pool complex that reduces watershed). Impacts that result in reduction of long-term viability of a covered species occurrence are also considered permanent.

Temporary impacts are impacts resulting from covered projects or covered activities that cause temporary habitat disruption but do not permanently alter landforms, and do not result in permanent habitat loss or negative impacts to vernal pool watersheds (e.g., recontoured vernal pool basins that will be restored).

Public and private parcels would be added to the MHPA under the VPHCP, and would retain their development rights. Consistent with the MSCP, the City's ESL Regulations and the Biology Guidelines, parcels wholly within the MHPA would be allowed 25% development in the least sensitive area and the remainder of the parcel would be conserved. A perpetual covenant of easement, dedication to the City, or a deed restriction or other conservation mechanism consistent with California Civil Code Section 815, et seq. and/or Government Code Section 65870 et seq. and acceptable to the Wildlife Agencies shall be recorded on the area to be added to the MHPA. Given the restriction that development must occur within the least sensitive portion of the site (per the ESL Regulations), there is high likelihood that impacts would be significantly less than the "worst-case scenario," which has been provided in this analysis.

Implementation of the VPHCP does not override the necessity for further environmental review for individual actions at the project level (i.e., covered projects, covered activities, and planned projects, as described in Chapter 4). Take authorization for vernal pools would not automatically be granted to individual projects; rather, each discretionary action would be subject to further environmental review and discretionary approval by the City based on a consistency determination with the VPHCP and other state and federal policies, plans, and regulations.

The impact analysis for the VPHCP was conducted based on the best available data at the time of preparation. Data were compiled from a variety of sources that include the City's 2004 vernal pool inventory, site-specific vernal pool reports, restoration and enhancement plans, biological reports submitted to the City, and digital geographic information from USFWS. The analysis included an assessment of the impacts and conservation to known vernal pools and species occurrences as well as to modeled vernal pool habitat.

Local site conditions, such as rainfall, likely influence numbers of standing plants and their local distribution (Schiller et al. 2000, Bauder 2000). Annual variability in rainfall can also alter the proportion of ponding in each pool, which can result in variability in species distribution within and among pools given the species' narrow habitat preferences (Bauder 2005). Despite seasonal fluctuations, the potential for finding additional pools with covered plant species within the City is considered low. Therefore, although a few new pools may be found over the life of the permit,

the current modeled habitat, distributional information for the covered plant species within the City is considered sufficient for purposes of this impact analysis.

Seasonal variability in ponding as a result of varying rainfall amounts and patterns can also affect shrimp occupancy in vernal pools from year to year (Bauder 2005; Simovich and Riley 2008). This variability can result in substantial differences in fairy shrimp occupancy data at a site between years. For example, protocol surveys conducted by RECON in 1997 and 1998 on Marine Corps Base Camp Pendleton identified 216 vernal pools on the base as occupied by fairy shrimp (RECON 1998). Base-wide protocol surveys in 2005 identified 279 occupied vernal pools (USFWS 2008a), which is a 29% increase in observed occupancy.

The distributional information for San Diego fairy shrimp may be less complete than covered plant species for many of the complexes in the City. It is possible that additional vernal pools with San Diego fairy shrimp may be impacted or conserved within the MHPA than are currently estimated. Additionally, it is likely that more comprehensive surveys have been conducted for vernal pools proposed to be impacted by development compared to pools that are already conserved or planned for conservation. Detailed surveys are required (see the LDM Biology Guidelines) for development projects to determine impacts and, therefore, more data is available for pools that potentially will be impacted as a result of proposed development projects. An example are the J13 and J34 complexes in the Otay Mesa area where development has been proposed and extensive surveys have been conducted providing existing data for shrimp species which are relatively accurate. For this reason, it is assumed that data related to the impact analysis for San Diego fairy shrimp is generally sufficient.

On other sites, especially within areas already conserved or planned for conservation, surveys for fairy shrimp (protocol or otherwise) have not occurred or data are incomplete. For example, protocol surveys have not been conducted in over 75 pools conserved at Otay Lakes (K5). However, San Diego fairy shrimp are fairly common within nearby vernal pools in the County; therefore, it is likely that San Diego fairy shrimp could occur in some of these pools. Based on the location of the qualitative assessments and general observations, the conservation of pools occupied by San Diego fairy shrimp within the VPHCP Plan Area is assumed to be underestimated. If and when conserved pools are surveyed, it is likely that it would be determined that a higher number of vernal pools occupied with San Diego fairy shrimp are conserved under the VPHCP.

Riverside fairy shrimp are much rarer; therefore, the same conclusion cannot be assumed for this species. The vernal pools where RFS are known from are much more limited in location (e.g., Otay Mesa) and have generally been surveyed. For this reason, VPHCP data related to RFS

presence/absence is considered sufficient. Conservation of covered species is covered in Chapter 5.

The following sections evaluate the impacts to vernal pools, covered species, and Critical Habitat as a result of covered projects, and/or covered activities in the VPHCP (Chapter 4). The detailed quantitative impact and conservation analysis for each complex in the VPHCP is included in Appendix C, and results of the impact analysis are summarized and discussed below. Appendix C also includes an analysis of how the VPHCP conservation strategy is consistent with the Vernal Pool Recovery Plan's Recovery Criteria (i.e., Appendices F and G). It should be noted that additional complexes from those identified in the USFWS Recovery Plan are now known to be occupied by covered species, and the complexes identified in the USFWS Recovery Plan may not be currently occupied by the covered species, based on the information in the City's vernal pool database (SANDAG 2012). Recently completed 5-year reviews for the vernal pool species recommend that the Recovery Plan be updated to reflect current conditions; however, this task has not been completed.

6.1 DIRECT IMPACTS TO VERNAL POOLS AND MODELED HABITAT

This section evaluates the potential impacts to known vernal pools and modeled habitat as a result of covered projects and covered activities identified in this VPHCP. Specifically, it analyzes the potential loss of vernal pools and modeled habitat resulting from development of lands outside the MHPA, as well as potential loss of vernal pools and modeled habitat inside the MHPA resulting from covered projects (described in Chapter 4). Direct impacts to vernal pools are possible, as discussed below. Indirect impacts to vernal pools from covered projects, and/or covered activities are discussed in Section 6.3.

Under the VPHCP, each vernal pool site within a complex is assigned a conservation level (75% or 100%) depending on ownership and preservation status. Impacts to vernal pools are based on conservation levels. For purposes of this impact analysis, the worst-case scenario has been assumed, (i.e., for sites with a 75% conservation level, 25% of the pools were assumed to be impacted). However, during the development entitlement process, all proposed development inside the MHPA would be limited to impacts to the least sensitive portion of the parcel and would be required to avoid vernal pools to the maximum extent practicable (see Chapter 5). Therefore, impacts would most likely be less with actual implementation of the VPHCP. The 100% conservation level has been applied to existing conserved vernal pool sites.

As shown in Table 6-1, a total of 182 (7%) of known vernal pools would potentially be directly impacted by development, including 120 pools impacted outside the MHPA (due to complexes that are 0% conserved) and 62 pools impacted inside the MHPA as a result of covered projects,

covered activities, and/or future development necessary to allow reasonable use of private property in the MHPA (i.e., within a 75% conservation level area). In addition, approximately 2,303 acres of modeled vernal pool habitat (i.e., lands that potentially contain vernal pools soils or potential areas for vernal pool restoration) that does not contain vernal pools or vernal pool species would not be conserved within the VPHCP Plan Area under the Project.

**Table 6-1
Summary of Potential Vernal Pools Impacts in VPHCP Plan Area from Development**

Total Number of Complexes in VPHCP Plan Area	Number of Complexes Outside MHPA	Total Number of Pools in VPHCP Plan Area	Total Pools Impacted by Development Based on Conservation Level ¹	Pools Impacted by Development Outside MHPA (0% Conservation)	Pools Impacted by Development Inside MHPA Based on Conservation Level ¹	Total Surface Area of Pools Lost Based on Conservation Level ¹ (Acres)	Total Acres of Modeled Vernal Pool Habitat Not Conserved
54	1	2,591	182	120	62	7.6	2,303

¹Pools and species population conserved is based on 75% or 100% conservation level by vernal pool complex. The conservation level denotes the portion of a parcel that will be conserved. For example, for a parcel designated with a 75% conservation level, 25% of the parcel is available for development. Development would occur on the least environmentally sensitive area of the parcel, as determined by the City environmental review process. This table does not include impacts from covered activities.

One complex, KK1 Lake Murray, would not be included in the MHPA. This complex has only one isolated vernal pool, which is not occupied by any covered species. The pool is surrounded by active park uses (i.e., ball field and tennis courts), roads, and single-family homes. No impacts are proposed at this location. However, due to the low quality and isolated nature of the pool, along with the high potential for edge effects, no active management and monitoring activities are proposed for the site. The number of vernal pools that would not be conserved under the VPHCP is approximately 7% of the total number of vernal pools within the VPHCP Plan Area, totaling 7.6 acres of basin surface area.

Impact to vernal pools and/or modeled habitat from covered activities is expected be minimal (e.g. small in size) and predominately occur within disturbed areas. Maintenance and use of roads, easements, and trails that cross the preserve as well as inspection and repair of utility corridors could have small impacts to modeled vernal pool habitat. The VPHCP includes avoidance and minimization measures that should further limit potential impacts to individual basins from these activities.

Maintenance and monitoring prescribed in the VPMMP (Chapter 7 and Appendix D) could also result in potential direct impacts (e.g., incidental take of covered species) and indirect impacts

(e.g., habitat disturbance and trampling from sign and fence installation and repair, use of access trails and roads, monitoring activities, and weed control). Potential direct impacts from maintenance and monitoring are expected to be avoided to the extent feasible through implementation of the avoidance measures identified in Chapter 5. Direct and indirect impacts to habitat from maintenance and monitoring are expected to be minimal. Temporary habitat disturbance during management, monitoring, restoration and enhancement activities will be minimal and these activities will ultimately improve ecological function of the site from conditions prior to ground disturbance. Therefore, no permanent impacts from restoration, long-term management, or monitoring are anticipated.

While the total loss of vernal pools is a relatively low percentage, with only 7% of vernal pools potentially impacted within the VPHCP Plan Area (182 total pools; 120 outside the MHPA and 62 inside the MHPA) and only approximately one-third of those occupied with covered species, the loss is substantial with respect to the remaining vernal pool habitat in the southern California region. It is estimated that over 90% of the pools that once occurred in southern California have already been lost, so any loss of vernal pool habitat must be evaluated in that context.

The City's ESL Regulations and Biology Guidelines requires no net loss of vernal pool habitat (i.e., all impacts shall be offset with restoration and enhancement of an equal or greater acreage of habitat). If impacts to vernal pools occur outside the MHPA and the project is consistent with the VPHCP, a wetland deviation would not be required. All impacts would be mitigated in accordance with the City's Biology Guidelines and ESL Regulations. Any direct impacts to vernal pools inside the MHPA shall be analyzed and mitigated consistent with the ESL Wetland Deviation process.

6.2 DIRECT IMPACTS TO COVERED SPECIES

This section addresses the potential direct impacts to the seven covered species resulting from implementation of the VPHCP. This includes potential impacts to occupied pools resulting from development of lands outside the MHPA, as well as impacts to occupied pools inside the MHPA resulting from Planned, Covered, and Future Projects and covered activities (described in Chapter 4). Direct impacts to covered species are possible, as discussed below. Indirect impacts to covered species from covered projects and covered activities are discussed in Section 6.3.

Most of the vernal pools that would be impacted by development both inside and outside the MHPA are low-quality pools, the majority of which occur in disturbed areas, such as roads and ditches. However, some are moderate quality with relatively high diversity; 67 known occurrences of one or more of the covered species would be potentially impacted by development. The direct loss of moderate quality vernal pools that support covered species

would, to a limited degree, negatively affect the persistence of the affected covered species. Direct impacts to low-quality pools would not affect the continued persistence of covered species, because the low-quality habitat in disturbed pools is unlikely to support covered species.

Some restoration and enhancement activities (e.g., rut removal and recontouring of vernal pools, soil replacement, removal of nonnative invasive plant species, and planting container plants) in occupied habitat have potential to damage or destroy a small number of covered species. Under these types of activities, there is not only potential for changes in the basic micro-habitat provided in each pool, but it is also possible that cysts and/or seeds could be damaged or destroyed by personnel conducting restoration and enhancement activities. For example, cysts and/or seeds could be covered too deeply by soil when vernal pools are recontoured. To minimize this potential impact, disturbance shall be limited to the area that is being enhanced, and soil within areas that are being recontoured shall be salvaged and reintroduced to the pool where they were collected following contouring. Additional measures to ensure that temporary impacts associated with restoration and enhancement activities are minimized are included in Chapter 5.

A summary of potential direct impacts to covered species is provided in Table 6-2. Covered activities may result in impacts to a small, but undeterminable, number of covered species are not accounted for in this table. A discussion of impacts for each species is then provided. Mitigation requirements for impacts to covered species are included in Chapter 5.

Table 6-2
Summary of Covered Species Impacts Inside and Outside MHPA from Development¹

Covered Species	Total Occupied Pools in VPHCP Plan Area	Total and % Occupied Pools Impacted by Development	Number and % Occupied Pools Impacted by Development Outside MHPA	Number and % Occupied Pools Impacted by Development Inside MHPA
Otay Mesa mint	369	0 (0%)	0 (0%)	0 (0%)
San Diego mesa mint	337	2 (1%)	2 (1%)	0 (0%)
Spreading navarretia	95	1 (1%)	1 (1%)	0 (0%)
San Diego button-celery	732	10 (1%)	10 (1%)	0 (0%)
California Orcutt grass	58	0 (0%)	0 (0%)	0 (0%)
Riverside fairy shrimp	131	0 (0%)	0 (0%)	0 (0%)
San Diego fairy shrimp	517	55 (11%)	52 (10%)	3 (<1%)

¹ Pools and species population impacts is based on 75% or 100% conservation level by vernal pool complex. This table does not include impacts from covered activities.

6.2.1 Direct Impacts to Otay Mesa Mint

There will be no direct impacts to any of the known 369 vernal pools occupied by Otay Mesa mint that occur within the VPHCP Plan Area (refer to Appendix C for specific locations) as a result of covered and future projects (Table 6-2). All of the vernal pools occupied with Otay Mesa mint within the VPHCP Plan Area are conserved through implementation of the VPHCP (see Chapter 5 for further details).

6.2.2 Direct Impacts to San Diego Mesa Mint

Two vernal pools occupied by San Diego mesa mint at Montgomery-Gibbs Executive Airport would not be conserved in the MHPA and could be lost due to FAA regulations for Runaway Safety Areas. Mitigation is required for any direct impact to San Diego mesa mint, and must also include the salvage of seed or plants to preserve the population genetics (see Chapter 5).

6.2.3 Direct Impacts to Spreading Navarretia

One of the 95 vernal pools that are known to support spreading navarretia could be directly impacted at the NDU 1&2 site on Otay Mesa (Table 6-2). The NDU 1&2 site is part of the J13 complex that was historically recognized as a single spreading navarretia population (Bauder 1986). Within this historically recognized J13 population, there are two pools known to support spreading navarretia; one of these pools (located at NDU 1&2) will be impacted under the VPHCP.

To ensure no net loss of habitat, maintain population size and prevent loss of genetics, mitigation for any direct impacts to spreading navarretia is required under the VPHCP, and must also include the salvage of seed or plants and in-kind restoration (see Section 5.2.3, Species Protection).

6.2.4 Direct Impacts to San Diego Button-celery

A maximum of 10 of the 732 vernal pools known to support San Diego button-celery will potentially be directly impacted within the J13 complex series, located at the NDU 1&2 site (two pools impacted), South Otay J13 South complex (seven pools impacted), and Brown Field (one pool impacted). The population of San Diego button-celery in the J13 complex series was historically recognized as a single population (Bauder 1986). Of the 11 pools known to support San Diego button-celery within the J13 complex, nine will be impacted.

To ensure no net loss of habitat, maintain population size and prevent loss of genetics, mitigation for any direct impacts to San Diego button-celery have been included as a requirement of the VPHCP and must also include the salvage of seed or plants and in-kind restoration (see Section 5.2.3, Species Protection).

6.2.5 Direct Impacts to California Orcutt Grass

There will be no direct impacts to any of the 58 vernal pools known to be occupied with California Orcutt grass that occur within the VPHCP Plan Area (refer to Appendix C for specific locations) as a result of covered projects or covered activities (Table 6-2). All of the vernal pools occupied with California Orcutt grass within the VPHCP Plan Area are conserved through implementation of the VPHCP (see Chapter 5 for further details).

6.2.6 Take of Riverside Fairy Shrimp

There will be no direct impacts to any of the known 131 vernal pools occupied with Riverside fairy shrimp that occur within the VPHCP Plan Area as a result of covered projects or covered activities (Table 6-2). All of the vernal pools occupied with Riverside fairy shrimp within the VPHCP Plan Area are conserved through implementation of the VPHCP (see Chapter 5 for further details). An unquantified number of Riverside fairy shrimp may be harmed during restoration, management, and monitoring activities.

6.2.7 Take of San Diego Fairy Shrimp

Within the VPHCP Plan Area, a total of 517 pools are known to be occupied by San Diego fairy shrimp within 35 complexes (refer to Appendix C for specific locations). As a result of implementation of the VPHCP, a maximum of 55 vernal pools that support San Diego fairy shrimp will potentially be directly impacted at the following vernal pool complexes: Rhodes (i.e., two out of four occupied pools impacted), Pueblo Lands North (four out of four occupied pools impacted), NDU 1&2 (15 out of 15 occupied pools impacted), La Media ITS (one out of six occupied pools impacted), Bachman (one out of one occupied pool impacted), Brown Field (three out of three occupied pools), Southview East (four out of 12 occupied pools impacted associated with Airway Road), Montgomery-Gibbs Executive Airport (21 out of 24 occupied pools), Teledyne Ryan (three out of 11 occupied pools impacted), and Magnatron (one out of one occupied pools impacted). All of the San Diego fairy shrimp located within these pools could be killed during development of Planned, Covered, and Future Projects and covered activities (described in Chapter 4). In addition, an unquantified number of San Diego fairy shrimp may be harmed during restoration, management, and monitoring activities.

Mitigation is required for any direct impacts to San Diego fairy shrimp. Where appropriate, the salvage of shrimp cysts may also be required to minimize impacts and to conserve the potentially unique genetics of impacted populations (see Chapter 5).

6.2.8 Direct Impacts to Critical Habitat

Critical Habitat is a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection, as determined by USFWS. Critical habitat may include areas that are currently occupied by a species and unoccupied areas that are essential for the species' conservation. Designated Critical Habitat for three of the seven covered species (spreading navarretia, Riverside fairy shrimp, and San Diego fairy shrimp) has been designated. Table 6-3 summarizes the acreage of Critical Habitat that is conserved within the MHPA, and the potential loss of Critical Habitat for each of the three species. Critical habitat designation within and outside the MHPA are shown for the three species in Figures 6-1 through 6-3.

Table 6-3
Summary of Designated Critical Habitat Conservation

	Spreading Navarretia Critical Habitat (Acres)	Riverside Fairy Shrimp Critical Habitat (Acres)	San Diego Fairy Shrimp Critical Habitat (Acres)
Total Acres Designated	6,720	1,724	2,931
Total Acres in VPHCP Plan Area	628	804	1,801
Acres Conserved in MHPA¹	565	740	1,409
Total Acres Not Conserved (Inside and Outside MHPA)	63	64	392
Acres Inside MHPA ¹	1	53	77
Acres Outside MHPA	62	11	315
% Total Designation Not Conserved	0.9%	4%	13%

¹ Based on conservation level of each vernal pool complex with designated Critical Habitat (75% or 100%).

Note: Acreages are rounded so individual acreages may not equal sum of total acreages.

A discussion of designated Critical Habitat for each species that would not be conserved in the MHPA through implementation of the VPHCP is provided below. Note that the Critical Habitat Unit names are not directly correlated with the vernal pool complex ID names.

Spreading Navarretia Critical Habitat

Six critical habitat units have been designated for spreading navarretia on 6,720 acres in Los Angeles, San Diego, and Riverside counties, California (75 FR 62192). Unit 3 includes 102 acres owned by State and local governments and Unit 5 includes 748 acres including 358 acres that are

publically owned and 390 acres of private land. The total designation of spreading navarretia Critical Habitat in Subunit 3C is 37 acres, in 3B is 18 acres and in 3D is 55 acres (see Table 6-4). The VPHCP, when fully implemented, will result in the permanent loss of approximately 63 acres of designated spreading navarretia Critical Habitat within Subunits 3C, 3B, 3D, and 5H (Figure 6-1, Table 6-4).

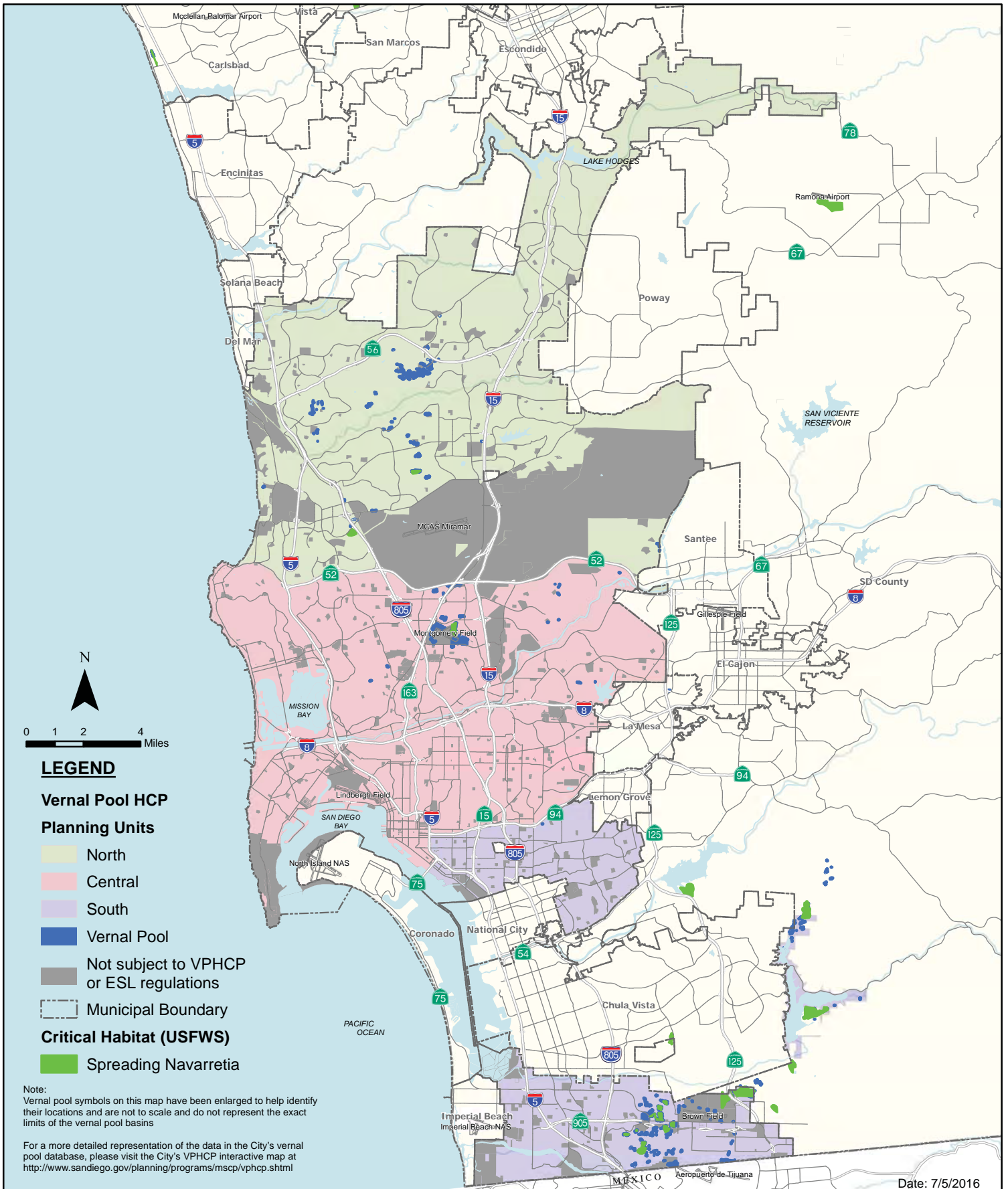
Of the total loss, 44 acres support PCEs for the spreading navarretia. The 7 acres not conserved in Subunit 3C have already been impacted by the California Department of Transportation (under a separate BO) and therefore do not support PCEs. The loss of 1 acre in Subunit 3B is a result of the 75% conservation level designation and would not affect PCEs. There are 14 acres within Subunit 3D that are not conserved on Montgomery-Gibbs Executive Airport which is 26% of this subunit.

The total designation of spreading navarretia Critical Habitat in Subunit 5H is 137 acres and is one of seven subunits that compose Unit 5 (San Diego Southern Coastal Mesa Management Area). The loss of approximately 41 acres in Unit 5 represents a 30% reduction in the extent of Subunit 5H and an approximate 6% reduction in Unit 5. The impact from the VPHCP to the overall spreading navarretia designation is less than a 1% reduction in the total acreage of 6,720 acres.

**Table 6-4
Spreading Navarretia Critical Habitat Not Conserved**

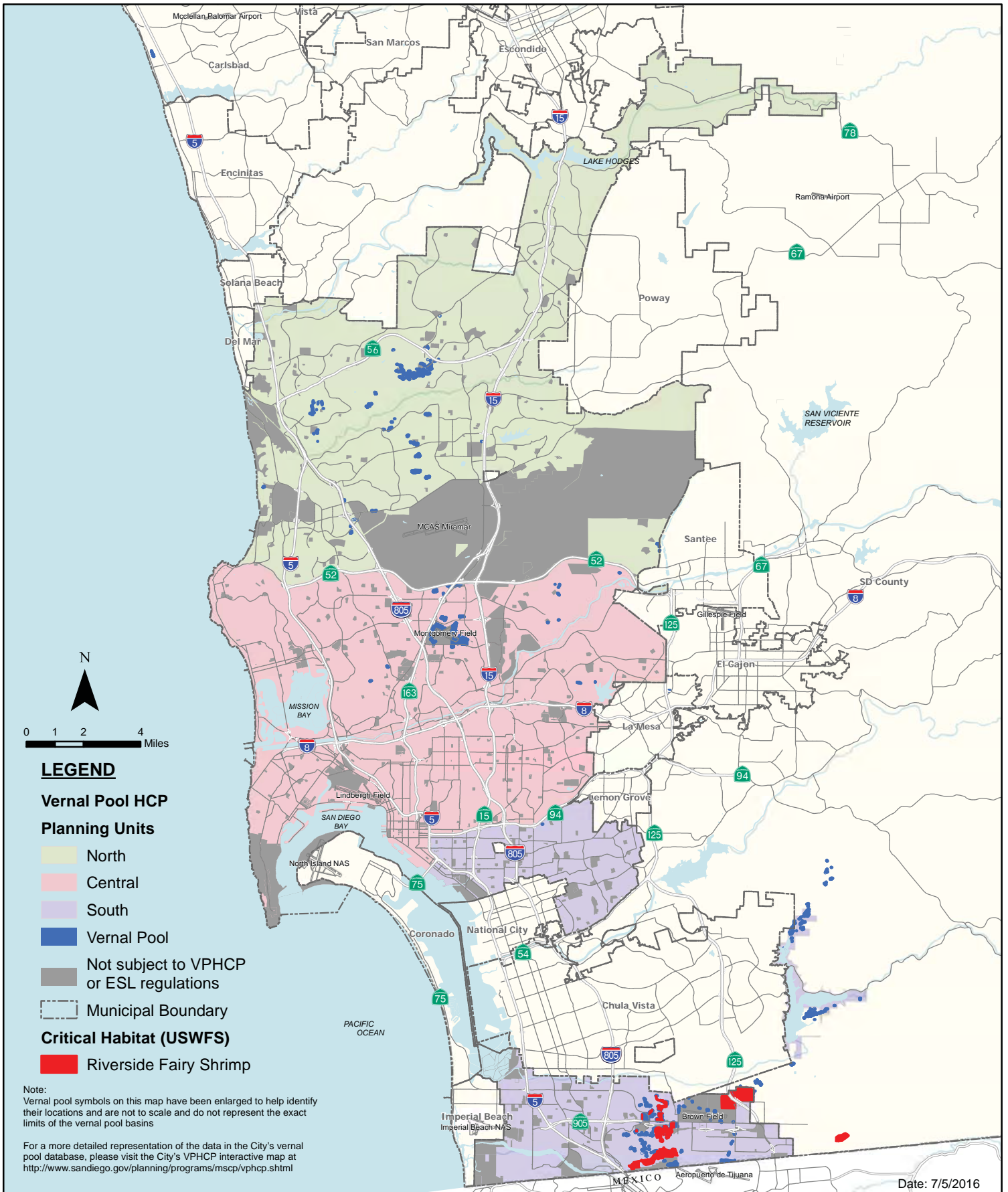
	Units where Critical Habitat Not Conserved						
	TOTAL (Acres)	Unit 3 Central Coastal Mesa Management Area (Acres)	Nobel Drive Subunit 3C (Acres)	Carroll Canyon Subunit 3B (Acres)	Montgomery Field Subunit 3D (Acres)	Unit 5 Southern Coastal Mesa Management Area (Acres)	West Otay Mesa Subunit 5H (Acres)
Total Designation	6,720	111	37	18	55	749	137
Total in VPHCP Plan Area	628	111	37	18	55	518	137
Total in MHPA	565	89	31	17	41	476	96
Acres Not Conserved¹	63	22	7	1	14	41	41
% Total Designation Not Conserved	1%	20%	17%	6%	26%	6%	30%

¹ Based on conservation level of each vernal pool complex with designated Critical Habitat (75% or 100%).
Note: Acreages are rounded so individual acreages may not equal sum of total acreages.



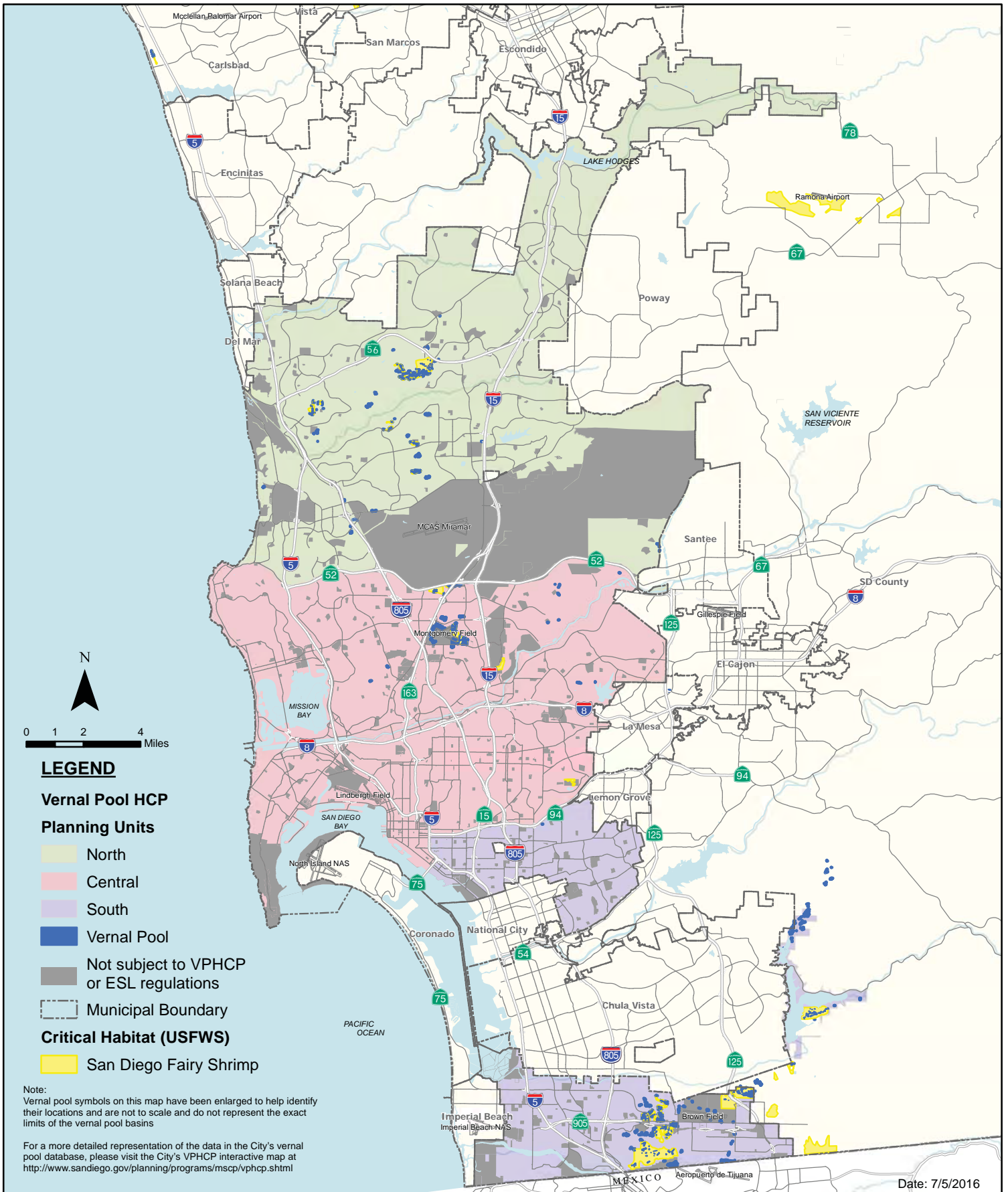
Source: City of San Diego; SANDAG; SanGIS; USFWS.

Path: P:\2013\60309570_CitySD_VPHCP\900-CAD-GIS\920 GIS\922_Maps\ReportFigs\ReportFigs_HCP\Fig_1_SpreadingNav_crithab.mxd



Source: City of San Diego; SANDAG; SanGIS; USFWS.

Path: P:\201360309570_CitySD_VPHCP\900-CAD-GIS\920 GIS\922_Maps\ReportFigs\ReportFigs_HCP\Fig_2_RV\Fairyshrimp_crithab.mxd



Source: City of San Diego; SANDAG; SanGIS; USFWS.

Path: P:\2013\60309570_CitySD_VPHCP\900-CAD-GIS\920 GIS\922_Maps\ReportFigs\ReportFigs_HCP\Fig6_3_SDfairyshrimp_crithab.mxd

Riverside Fairy Shrimp Critical Habitat

Implementation of the VPHCP will result in the permanent loss of approximately 64 acres of designated Critical Habitat for Riverside fairy shrimp within Unit 5 (San Diego Southern Coastal Mesa Management Area), as shown in Table 6-5. While small areas of designated Critical Habitat may be impacted by development within the MHPA (due to 75% conservation levels) in Subunits 5D, 5E, 5F, and 5G, the majority of the acreage that would be potentially impacted by development (inside and outside the MHPA) occurs in Subunit 5H (Table 6-5 and Figure 6-2). The estimated loss is a worst-case scenario and assumes that 25% of the MHPA not currently conserved may be impacted. In reality, most of Subunit 5H will be conserved. The total designation of Riverside fairy shrimp Critical Habitat in Subunit 5H acres is 244 acres, and is one of seven subunits that compose Unit 5. Approximately 16% of Critical Habitat would be potentially impacted in in Subunit 5H.

Designated Critical Habitat for Riverside fairy shrimp totals 1,724 acres in Unit 5 (San Diego Southern Coastal Mesas). The loss of approximately 64 acres of Riverside fairy shrimp Critical Habitat represents an approximate 4% reduction overall in Unit 5.

Table 6-5
Riverside Fairy Shrimp Critical Habitat Not Conserved

	Units where Critical Habitat is Not Conserved					
	Unit 5 TOTAL San Diego Southern Coastal Mesas (Acres)	J29–31 Subunit 5D	J2 N, J4, J5 Subunit 5E Subunit	J2 S and J2 W Subunit 5F Subunit	J14 Subunit 5G Subunit	J11, J12, J16–18 Subunit 5H Subunit
Total Designation	1,724	346	44	33	136	244
Total in VPHCP Plan Area	804	347	44	33	136	244
Total in MHPA	740	342	38	33	122	204
Acres Not Conserved¹	64	4	6	1	14	40
% Total Designation Not Conserved	4%	1%	14%	2%	11%	16%

¹ Based on conservation level of each vernal pool complex with designated Critical Habitat (75% or 100%).
Note: Acreages are rounded so individual acreages may not equal sum of total acreages.

6.2.8.3 San Diego Fairy Shrimp Critical Habitat

The VPHCP, when fully implemented, will result in the permanent loss of approximately 392 acres of designated Critical Habitat for San Diego fairy shrimp (Table 6-6 and Figure 6-3). Approximately 150 acres would be potentially impacted in Unit 4 (Central Coastal Mesa), from Subunits A/B, 4H, and 4K, and approximately 242 acres would be potentially impacted within Unit 5 (San Diego Southern Coastal Mesas), from Subunits 5G and 5F (Table 6-6).

**Table 6-6
San Diego Fairy Shrimp Critical Habitat Not Conserved**

	TOTAL	Units where Critical Habitat is Not Conserved						
		Unit 4 Central Coastal Mesa (Acres)	Del Mar Mesa Subunit A/B (Acres)	Lopez Ridge Subunit 4H (Acres)	SANDER and Magnatron Subunit 4K (Acres)	Unit 5 San Diego Southern Coastal Mesas (Acres)	Otay Mesa Northwest Subunit 5G (Acres)	Otay Mesa Southwest Subunit 5F (Acres)
Total Designation	2,931	554	253	11	81	1,785	132	622
Total in VPHCP Plan Area	1,801	531	253	11	81	1270	132	611
Total in MHPA	1,409	381	168	9	11	1,028	101	400
Acres Not Conserved¹	392	150	85	2	70	242	30	211
% Total Designation Not Conserved	13%	27%	33%	18%	86%	14%	23%	34%

¹ Based on conservation level of each vernal pool complex with designated Critical Habitat (75% or 100%).
Note: Acreages are rounded so individual acreages may not equal sum of total acreages.

Designated Critical Habitat for San Diego fairy shrimp totals 2,931 acres. The loss of approximately 392 acres of San Diego fairy shrimp Critical Habitat within Units 4 and 5 represents an approximate 13% reduction in the overall designation area.

6.3 INDIRECT IMPACTS TO VERNAL POOLS AND COVERED SPECIES

As discussed above, indirect impacts (and potential incidental take) are those that will occur later in time with reasonable certainty. Indirect impacts can be detrimental to vernal pool habitat and covered species indirect impacts are much more difficult to track and quantify. Indirect impacts from covered projects and covered activities will be avoided and minimized to the extent feasible through implementation of measures identified in Chapter 5. The VPHCP monitoring program (Chapter 7) has been designed to identify indirect impacts so decisions can be made on the appropriate mitigation measures to implement over time.

Indirect Impacts to Watersheds

Indirect impacts to vernal pools may occur as a result of development of upland watersheds surrounding vernal pool habitat. Modification of upland watersheds, such as altering topography by removing or filling soil, can disrupt natural hydrologic flow necessary for vernal pools to fill and pond. Altering watershed hydrology can impact covered species that occupy vernal pools (e.g., by reducing the ponding capacity of the basins). The VPHCP requires that impacts to

upland watersheds associated with vernal pools be avoided to maintain natural hydrological flows (Chapter 5). The vernal pool hard-lines preserve areas that have been identified as part of the VPHCP process include sufficient watershed and upland buffer area to protect the natural hydrological flows into the associated vernal pools. Project-specific environmental review would require evaluation of impacts to watersheds and associated vernal pool resources and demonstration of consistency with the avoidance and minimization measures identified in Chapter 5 of the VPHCP.

Fragmentation and Isolation of Vernal Pool Habitat

The continued existence of the covered species is dependent upon the long-term survival of a functioning vernal pool ecosystem. Although ecological processes in vernal pools may be viewed at relatively small temporal (e.g., weeks to months during wetting and drying cycle) and spatial (e.g., tens of square feet) scales, they are greatly influenced by large landscape scale processes (e.g., hydrology, plant and animal dispersal) (Leidy and White 1998).

Fragmentation and isolation of vernal pools can threaten the important ecological and mutualistic processes that link vernal pools to each other and the surrounding uplands (USFWS 1998A). Such ecological and mutualistic processes involve insects that pollinate the vernal pool plants; mammals and birds that disperse flora and fauna between vernal pools; and amphibians that reproduce in vernal pools. Specialized plant-pollinator relationships can be threatened by fragmentation of vernal pools from the surrounding uplands. For example, some solitary bees from the Andrenidae family focus on vernal pool annuals (e.g., *Blennosperma*, *Downingia*, *Lasthenia*, *Limnanthes*) for collecting pollen (Thorp 1990). Except during the blooming period of their host plants, these bees spend most of their lives nesting underground in the adjacent uplands. These bees have a limited range of foraging, which is not surprising since they are small, have limited flight ability, and tend to remain near their natal site (Thorp 1990, Thorp and Leong 1995).

General fragmentation of plant-pollinator systems can have detrimental effects on the visitation rates by pollinators and, ultimately, the seed set produced by the plants (Jennersten 1988). Although few empirical studies exist for southern California, similar plant-insect specialization is likely and may be essential to successful reproduction of certain species (USFWS 1998A). Therefore, plants in vernal pools that are isolated from other natural ecosystems may experience reduced pollination and thus produce less seed. Habitat fragmentation further threatens pollination systems by reducing population sizes and thus potentially increasing occurrences of genetic drift, inbreeding depression, and extinction due to demographic stochasticity.

Watershed contiguity augments gene flow in populations already naturally low in variability (Davies 1996) by allowing flooding between pools. Vernal pool organisms are typically defined by the complex in which they occur, in part because gene flow between complexes appears to be extremely low (Fugate 1993; Davies 1996). Isolation of pools, or modification of the natural watershed, potentially compromises gene flow, resulting in a loss of genetic variability and an increased susceptibility to extinction and reduced fitness (Bohonak 2005; Soule 1986).

Similarly, the proximity of vernal pools to upland habitats influences the dispersal of seeds between vernal pools by herbivores, such as rabbits that can be important vectors of seed dispersal (Zedler and Black 1992). As they become fragmented and isolated, vernal pools can become unsuitable for avian species that consume and disperse vernal pool fairy shrimp species, which could in turn negatively affect the genetic stability of vernal pool fairy shrimp (Proctor 1964, Krapu 1974, Swanson et al. 1974). Vernal pool preserves should provide adequate upland habitat and/or habitat linkages adjacent to vernal pools to support pollinators, herbivores and their predators (to prevent overgrazing of vernal pool flora), and avian species.

Preserving small, isolated, fragmented preserves may not sustain the multiscale ecological processes associated with vernal pools (Leidy and White 1998). As such, the scientific community repeatedly recommends that conservation of vernal pools include the surrounding upland habitats (Bauder 1987; Thorp and Leong 1995, and 1998; Hanes and Stromberg 1998; Leidy and White 1998; USFWS 1998b). These surrounding upland habitats influence vernal pool hydrology, species composition, and essential interactions between the species that inhabit them. Fragmenting vernal pools from each other can disrupt dispersal and gene flow between populations of vernal pool flora and fauna, increase their vulnerability to stochastic events, and hinder their ability to reestablish after local extinctions. Elimination of predators, which could lead to population increases of herbivores such as burrowing rodents, rabbits, and quail, is an indirect effect resulting from the fragmentation and isolation of vernal pools (USFWS 1998b).

The VPHCP, in conjunction with the biologically superior wetland deviation, will allow limited impacts to disturbed, unmanaged vernal pools in exchange for preservation, restoration, and management of vernal pools in a biologically defensible configuration (e.g., substantial connection to biological open space) that helps ensure their long-term viability and supports recovery of the species. Therefore, new vernal pool preserve areas will be designed to have a substantial connection to the MHPA that is expected minimize the negative effects of fragmentation/isolation by allowing important ecological and mutualistic processes that link vernal pools to each other and the surrounding uplands (USFWS 1998b) to continue.

Edge Effects

Another primary potential indirect impact likely to affect covered species is degradation of habitat quality resulting from “edge effects.” Edge effects occur at the interface of conserved and developed lands and may include (but are not limited to) trampling or disturbance from human traffic (foot, bike, vehicle, or equestrian), damage or harassment from pets, spread of invasive exotic plants and/or wildlife, increased risk of wildfires, increased runoff, pollution, loss of pollinators, or other hydrological changes. Edge effects can reduce vernal pool functions and degrade the quality of habitat that supports covered species.

New development projects will require a fuel modification zone (including Brush Management Zone 1 and Zone 2) consistent with the City’s Municipal Code Brush Management requirements (Section (142.0412)). For new development, Brush Management Zone 2 will not be allowed within the MHPA containing vernal pool basins, but may be considered on a case-by-case basis within the associated watershed and buffer with approval from the Wildlife Agencies. The potential for other edge effects will be identified during the development review process and addressed through implementation of the avoidance and mitigation framework identified in Chapter 5 (See Section 5.2.1). If mitigation occurs within the hardline preserve areas, no additional buffer beyond the hardline would be required.

6.4 ANTICIPATED IMPACTS OF THE TAKING

Consistent with the Vernal Pool Recovery Plan and the VPHCP’s overall conservation strategy, impacts to the covered species described above are expected to be degraded vernal pools with low long-term conservation value and these impacts shall be mitigated through restoration, enhancement, preservation, and long-term management and monitoring of vernal pools with long-term conservation value in the MHPA. This conservation strategy will implement specific recovery criteria for covered species identified in Vernal Pool Recovery Plan. Vernal pool restoration and enhancement is expected to reestablish the physical and biotic characteristics of vernal pool habitat such that critical functions are restored. Based on positive data from ongoing monitoring programs, it appears that restoration and enhancement can provide self-sustaining vernal pool ecosystems with clear and significant benefits to vernal pool species, including the seven covered species, especially when seed and cysts translocation occurs from existing (conserved) occupied pools (RECON 2005, EDAW 2010). These benefits, when supplemented by long-term monitoring and management, will reduce threats to the seven covered species and maintain and improve their habitat quality and regional distribution. Overall, implementation of the VPHCP is expected to support the recovery of the seven covered species.

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CHAPTER 7

MANAGEMENT, MONITORING, AND REPORTING

This chapter describes the VPHCP management and monitoring strategy, which will be implemented by the City through its VPMMP (Appendix D). The VPMMP is a framework plan that outlines site-specific management and monitoring actions for the vernal pool complexes that will be managed to achieve the VPHCP objectives, as described in Chapter 5 and outlined in Table 5-1. Site-specific management plans will be prepared by project proponents during their environmental review and/or the City for each complex included in the framework VPMMP, consistent with the requirements and regulations in the VPHCP and City LDM Biology Guidelines, and must be approved by the City and Wildlife Agencies. For existing preserves under City control (see Appendix B), the approved Natural Resource Management Plans will be updated, as applicable, to reflect goals and objectives of the VPHCP per their existing schedule (every 5 years). The management and monitoring provisions in the VPHCP, which are based on updated vernal pool mapping and surveying information, will replace the older MSCP provisions from the MSCP Framework Management Plan (FMP) for vernal pools and the seven covered subject species upon approval of the VPHCP.

The MHPA is characterized as a mixture of vernal pool resources in a matrix of urbanized and future urbanizing lands. While several larger intact blocks of vernal pool series and native open space remain (e.g., Del Mar Mesa, Otay Lakes, Proctor Valley), numerous other conserved pools are within a heavily urbanized landscape (e.g., Mira Mesa, Kearny Mesa, and Otay Mesa). As a result, long-term management and monitoring of conserved lands are critical in maintaining the persistence of vernal pool resources. Management using benign neglect (i.e., “let nature take care of itself”) does not result in sustainability (Chase 1987; Botkin 1990). Management and monitoring of the vernal pool resources must be both proactive and continuous to achieve the goal and objectives of the VPHCP (as defined in Chapter 5). A strategic approach is necessary to implement an adaptive framework where information collected over time is used in future decisions (Atkinson et al. 2004), while at the same time utilizing available funds effectively and efficiently (refer to Chapter 10 for further detail regarding VPHCP implementation costs and funding).

7.1 VERNAL POOL CONCEPTUAL MODEL

Conceptual models have been identified as a key part of the adaptive management framework (Gross 2003, WWF 2005, Hierl et al. 2007). These models can come in many forms from a basic narrative or flow chart, to a complex diagram with

numerous inter-connected elements. All of these types of models serve to formalize our current understanding of system process and dynamics, identify critical linkages and relationships within the system, and facilitates the articulation of assumptions of how we think a system works, provides us an opportunity to document the source of that knowledge (e.g., expert opinion, published research), and helps direct future management, monitoring, and research efforts by identifying critical sources of uncertainty. Conceptual models also facilitate constructive communication among stakeholders with different expertise and experiences (e.g., scientists, land managers, rangers, and planners; see Etienne et al. 2011, Evely et al. 2011). - Excerpt from Lewison et al. 2012

Unlike a conceptual model constructed to explore the biological and ecological mechanisms underpinnings of a natural system or species, conceptual models for monitoring and management are focused and tailored to address specific management issues (Lewison et al. 2012). The challenge in the development of management and monitoring models is the identification of specific threats/stressors and the appropriate response variables to management actions that can be measured. As with any model, the creators of the model must balance the complexity of a natural system with parsimony.

Figure 7-1 illustrates a conceptual model for the City's vernal pools. Although the model is simplified, it identifies the key stressors/threats and natural history variables associated with vernal pools and this assists in the understanding of monitoring and management issues.

7.2 OVERVIEW OF ADAPTIVE MANAGEMENT

The Habitat Conservation Planning and Incidental Take Permit Processing Handbook (USFWS 1996a) and its Addendum (USFWS 2000) encourages the use of an adaptive management approach for implementation of HCPs. Adaptive management is a cyclic, goal-driven process. It continually tests one's conceptual understanding of complex systems through an iterative, learning-based, decision-making process (Figure 7-2). This approach requires the establishment of (1) a conceptual model (Figure 7-1), (2) goals and objectives (Chapter 5), (3) a management and monitoring strategy, (4) an analysis of actions based on monitoring observations, and (5) adaption for future management actions. As Bormann et al. (2007) state, "*Formalized learning and adaptive steps is deemed essential to shifting the reliance on general data and scientists' opinion to site-specific knowledge and data.*"

Adaptive management has been described at length in the literature (Journal of Environmental Management 2011).

**Figure 7-1
Vernal Pool Conceptual Model**

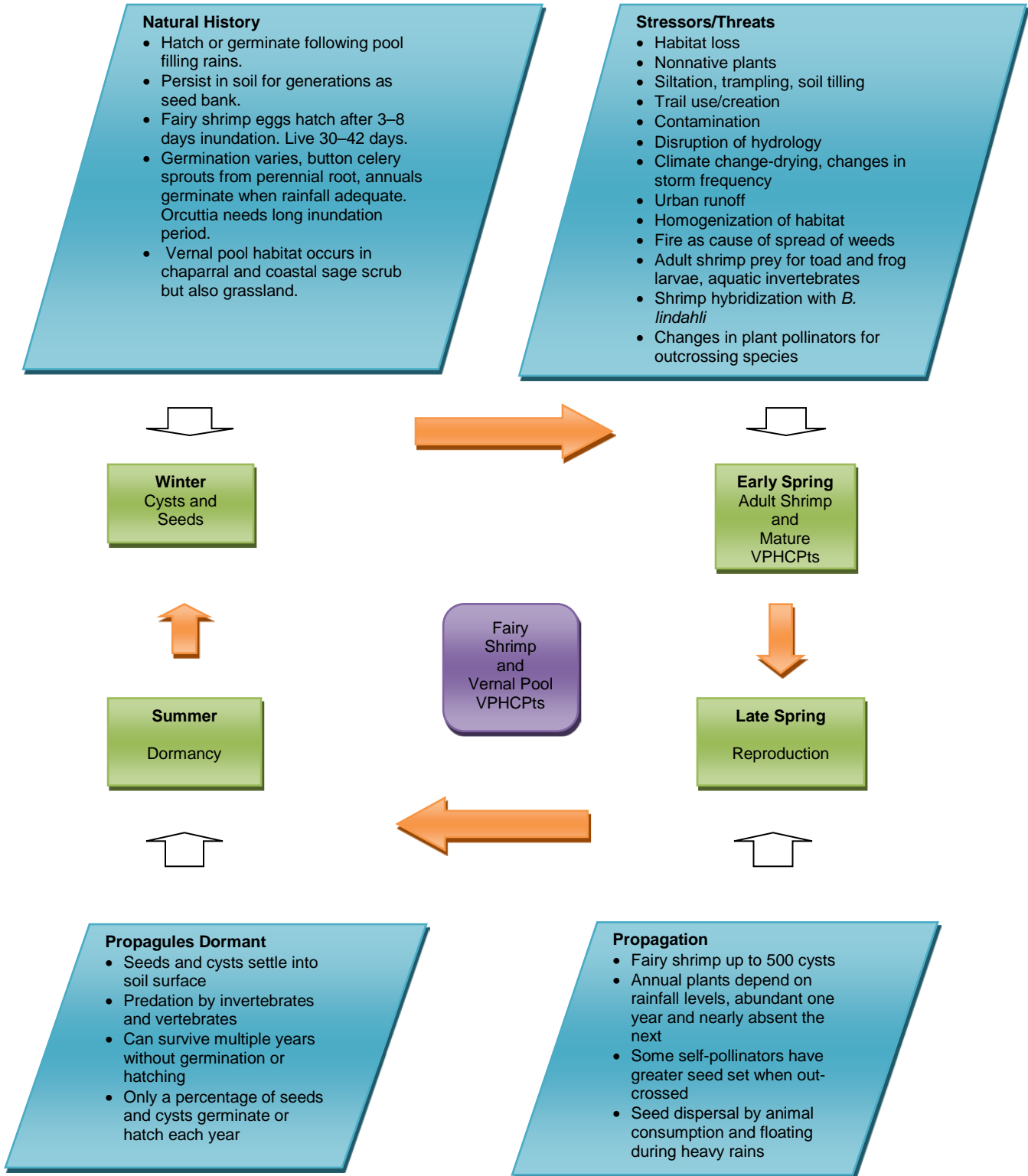
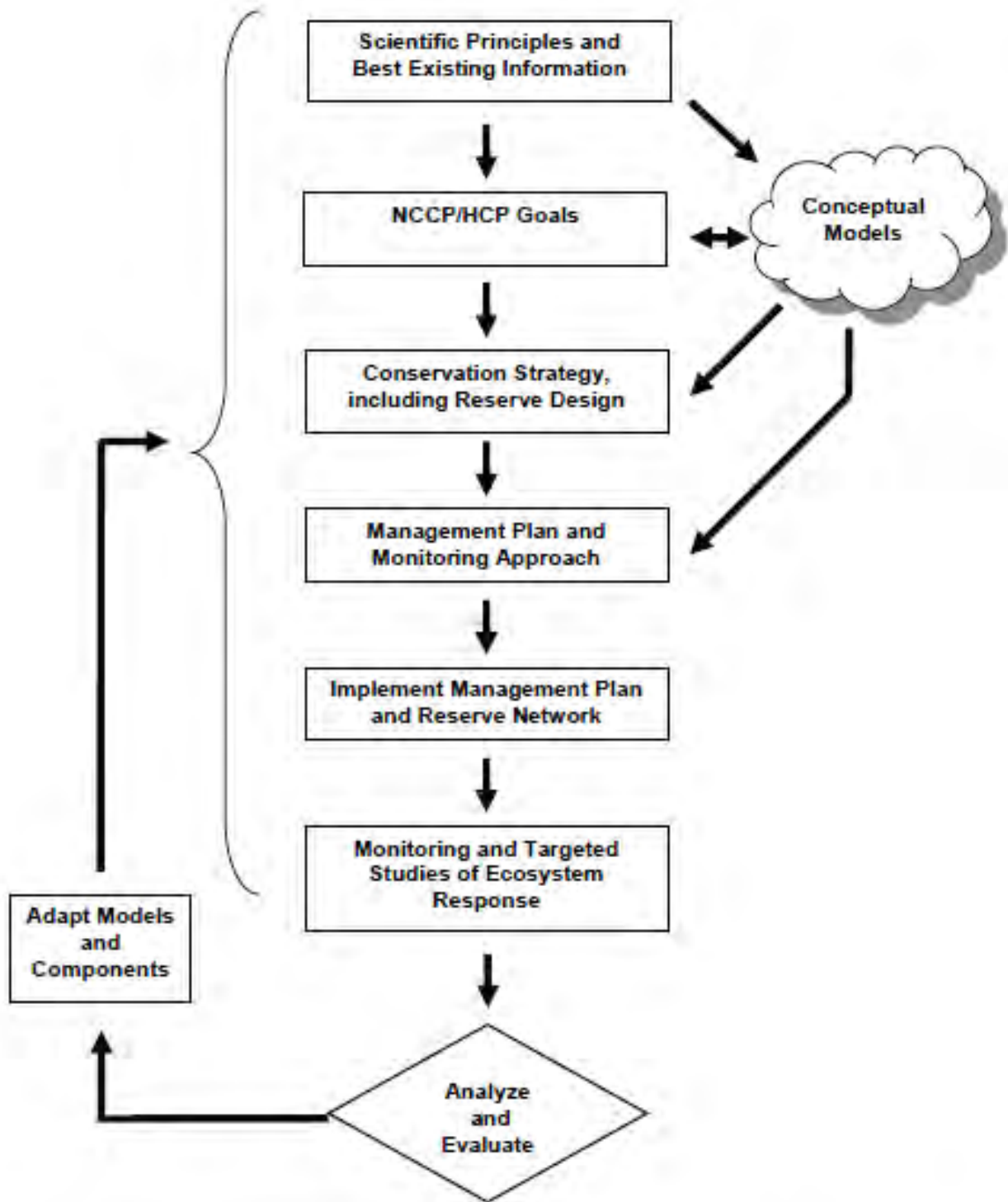


Figure 7-2
HCP Adaptive Management Feedback Loop (Atkinson et al. 2004)



For the VPHCP, the following terminology is used in reference to management and monitoring:

- *Stewardship Management*: General land management for which clearly identified actions for the protection of vernal pool resources are implemented and for which there is a high certainty of success. These management actions do not need an experimental approach; however, documentation of their effectiveness is required. Examples include installing signage, fencing, and interpretative features to preclude anthropogenic impacts, as well as actions to prevent trespass and damage from unwanted access.
- *Adaptive Management*: A scientific approach to resource management that rigorously combines management, monitoring, and research to effectively manage complex ecosystems in the face of uncertainty (Atkinson et al. 2004). In a practical sense, it utilizes monitoring to assess the status of a species or habitat and, if the status is declining, it proposes active management remedies through an iterative process in which management actions are refined utilizing new monitoring and other scientific information.
- *Research*: Areas of potential academic and management research to increase the understanding of vernal pool functions and covered species and their management. The VPHCP does not require research, but the City will promote and collaborate with researchers studying vernal pools where possible and where funding may be available via grants or other non-City funding sources.

7.3 VPMMP STANDARDS

To achieve the VPHCP objectives (Chapter 5), complex-specific management actions are required to be implemented via the framework VPMMP. To assess the status and need for complex-specific management actions, the following standards will be implemented and monitored under the framework VPMMP. These standards were developed using the “SMART” method: **S**pecific, **M**easurable, **A**chievable, **R**esults-oriented, and **T**ime-fixed (Adamcik et al. 2004). The standards for management and monitoring at each vernal pool complex that will be managed under the framework VPMMP are:

- A. Annually identify threats (invasive species, trampling, OHV activity, etc.) to all pools monitored, as well as to overall watershed integrity, and implement actions to prevent or reduce those threats.

- B. Prevent an average decline of at least one cover class⁹ of any covered plant species over 3 years for years having at least 55% average rainfall.
- C. Prevent a 20% decline in the density of the covered shrimp species over 3 years (average within complex).
- D. At complexes with 10% or greater average total nonnative species cover, prevent an increase in one cover class for nonnative cover over 3 consecutive years, regardless of rainfall.
- E. Maintain vernal pool watershed and hydrological network (i.e., inlet and outlet features) and water storage (maximum depth within +/-10% of baseline) functions.

These standards will be monitored under the tiered adaptive monitoring and management approach described in this chapter to assess the success of complex-specific management actions and inform adaptive management decisions.

7.4 OVERVIEW OF VPHCP MONITORING AND MANAGEMENT STRATEGY

The VPMMP uses a tiered three-level approach to adaptive monitoring and management that is applied to individual vernal pool complexes. The levels are linked to the VPHCP objectives (Table 5-1) and monitored via the VPMMP standards (Section 7.3). Levels of monitoring and maintenance are assigned at the complex level based on evaluation of the existing habitat conditions and population status of the seven covered species within a complex. The objectives of complex-wide management and monitoring at each management level are as follows:

- Level 1 – *maintain* existing habitat conditions and covered species populations within conserved complexes (as defined in Chapter 5, Table 5-1). This level is considered Stewardship.
- Level 2 – *stabilize* covered species population status by enhancing habitat conditions to a level that can support existing populations to achieve the VPHCP habitat and species-specific objectives (Chapter 5, Table 5-1).
- Level 3 – *restore* habitat conditions to a level that can increase covered species populations identified in the species-specific objectives (Chapter 5, Table 5-1).

⁹ Cover classes are adapted from California Native Plant Society (CNPS) plant cover methodology and are defined as a range of estimated percentage of plant cover. The cover classes are as follows: <1%, 1–5%, 5–10%, 10–25%, 25–50%, 50–75%, and 75%+. See also Section 7.5.4.

Specific monitoring and management actions are identified in Sections 7.5 and 7.6, respectively, for each of the three levels to achieve the VPHCP objectives. The monitoring and management actions have been developed to address the threats/stressors identified in the conceptual model.

The monitoring and management actions required at each level are determined by achievement of the VPMMP standards, which are directly tied to the VPHCP objectives. Management levels are implemented complex-wide and apply to particular population conditions within the complex. For example, a complex with a stable or increasing covered species population will be maintained in that condition, requiring Management Level 1 monitoring and management effort (i.e., Stewardship). A covered species population within a particular complex that is threatened by increased weed cover, for example, will need enhancement (Management Level 2). Finally, a population that has been impacted severely due to habitat loss will need restoration (Management Level 3). Certain complexes require species-specific efforts (e.g., seed bulking, translocation) to achieve the VPHCP objectives outlined for each species in Table 5-1.

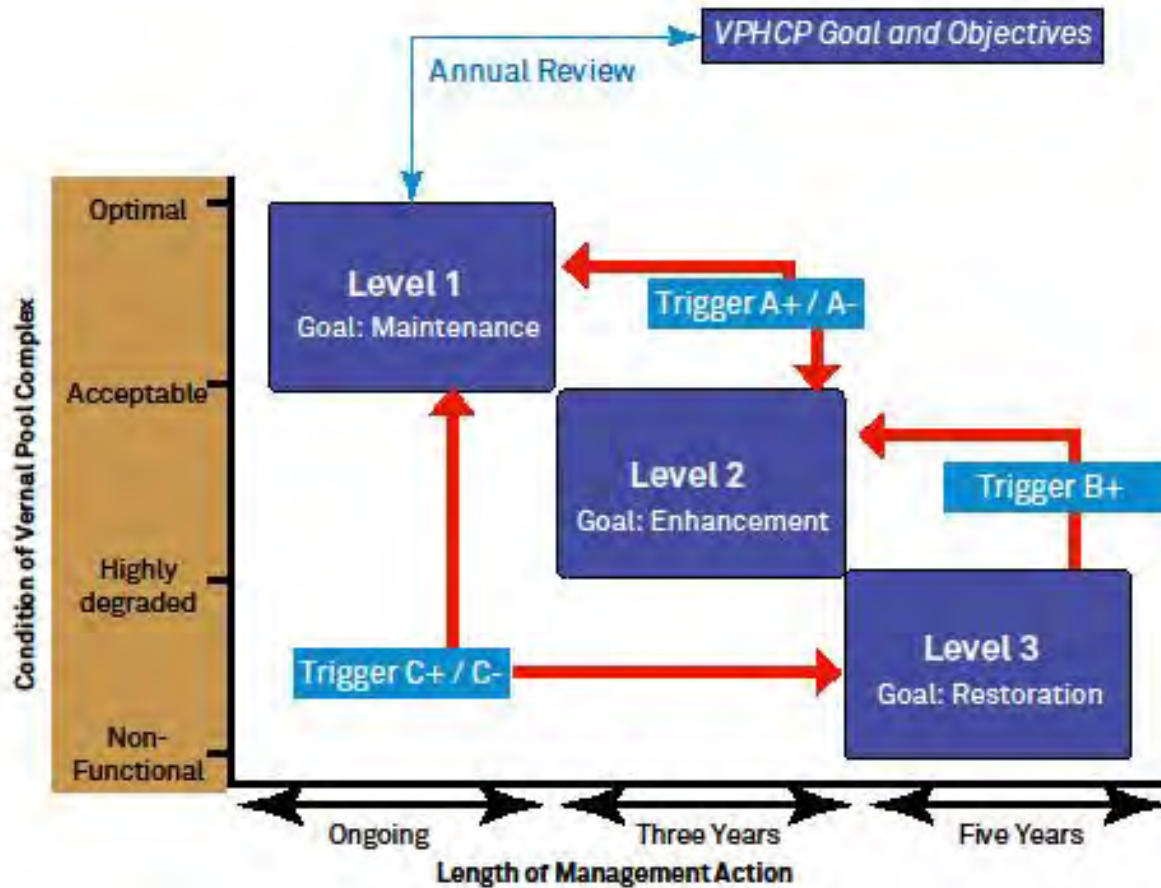
Monitoring within a complex will occur to determine changes in the status of the complex condition. Specific triggers linked to the VPMMP standards have been identified that could increase or decrease the management and monitoring level and thus the effort required. This is illustrated conceptually in Figure 7-3. The City's 2004 Vernal Pool Inventory (City of San Diego 2004) will serve as the baseline for comparison to achievement of VPMMP standards at each complex. In the future, where/if more recent data exist and are available, the more recent data will be used as the baseline for comparison to the VPMMP standards.

The overall goal of the VPHCP will be achieved if all habitat and species-specific objectives are accomplished and complexes managed under the framework VPMMP are maintained at a Level 1 condition in perpetuity as required under the existing State NCCP Permit, Section 10.6 of the MSCP Implementing Agreement, and the VPHCP.

7.5 MONITORING APPROACH

The monitoring methods and sampling design for the framework VPMMP were developed with the intent to collect data necessary to determine the complex-level condition of vernal pools and determine if VPMMP standards have been met or if a change in management actions is needed. The VPMMP monitoring methodology described herein allows for time- and cost-effective monitoring and data collection that evaluates and adaptively revises management actions based on the VPMMP standards. The data collected under the VPMMP are intended to efficiently inform management decisions with the ultimate purpose of achieving the VPHCP objectives.

Figure 7-3
VPHCP Management and Monitoring Levels and Triggers



The monitoring methods may change over time and will be coordinated closely with the regional monitoring efforts. Any new methods should provide comparable data for evaluating achievement of the VPMMP objectives and should be comparable in cost.

Several key methods have been used or proposed for use in monitoring vernal pool habitat, including the Hydrogeomorphic Model (HGM), California Rapid Assessment Method (CRAM), and USFWS protocols. Applicable elements from each of these methods have been adapted and integrated into the VPHCP monitoring approach, as discussed below.

The Hydrogeomorphic Model

Developing assessment methods that are both accurate and practical in application is challenging due to the variability of wetlands, including vernal pool habitat. Many methods for assessing wetlands are relatively rapid but often lack the resolution necessary to detect significant changes in wetland functions. To achieve an appropriate level of detail in a short time frame, a more

restrictive set of data needs to be considered. This is the primary goal of the HGM classification: to identify the most useful data for a comprehensive evaluation. The HGM classification method identifies groups of wetlands that function similarly using three criteria: geomorphic setting, water source, and hydrodynamics. Geomorphic setting refers to the landform and position of the wetland in the landscape. Water source refers to the primary water source in the wetland, such as precipitation, groundwater, or overland flow. Hydrodynamics refers to the level of energy and the direction that water moves through the wetland (Bauder et al. 2009).

The HGM approach has been applied to a wide range of wetland habitat types to develop functional indices to assess wetland functions and health (Brinson 1993; Smith et al. 1995). Recently, an HGM model was developed specifically for the vernal pool ecosystems in southern California (Bauder et al. 2009). With this methodology, users can assess the functional capacity of the selected wetlands and also assess them using a regional guidebook that offers standardized methods and evaluation protocols.

The HGM approach was originally conceived for use in a regulatory context, but it also has a variety of other potential applications, including evaluation of ecosystem restoration and preserve management. The HGM approach can also be applied as part of an overall planning context where it can be used to measure impacts to existing wetlands, locate and evaluate potential restoration sites, or evaluate the effectiveness of habitat management efforts and suggest corrective actions. However, the HGM approach is not necessarily practical for implementation of VPHCP monitoring for the following reasons:

- The HGM's five direct Function Indices measure and analyze data that are difficult to associate with real-world observations and conditions. Real-world observations and conditions are the best indicators for habitat health and focal species population viability. Data collection and analysis for habitat and species population conditions should be practical yet still provide the information necessary for management decisions. Once data are subjected to more complicated analyses, the information becomes more difficult to interpret in reference to habitat conditions, species health, and the management that should be applied. Data collection and analysis do not have to be complicated or highly technical to provide valuable input for management decisions.
- The type of monitoring and analysis prescribed in the HGM approach requires advanced technical skill and is time-intensive, and, thus, costly.
- The HGM's five indirect Function Indices provide a qualitative and efficient method for monitoring, but are based on substantial assumptions, the results of which are too inconclusive to use to adequately identify management needs.

- The primary parameter for Function 4 (Maintain Characteristic Plant Community) is diversity of native plants in the pools. HGM does not provide any methods to collect data on the percent cover or the population size, both of which are valuable parameters for tracking the health of the focal plant species.
- Similar to Function 4, the primary parameter for Function 5 (Maintain Characteristic Faunal Community) is crustacean species diversity. There is no parameter for overall population size and health. In addition, data collection for the faunal components requires extensive wet season sampling that is prohibitive for annual monitoring requirements in terms of cost and resources.
- While the HGM methods, analysis, and Function Indices are based on 10 years of scientific effort, that effort was limited to sampling a very small number of pools for each function. For Functions 1 and 2, a total of 45 pools were analyzed; for Function 4, 61 pools were assessed; and for Function 5, only 28 pools were analyzed.

Certain aspects of the HGM approach are useful in the context of the VPHCP because the fundamental evaluation criteria are based on the geomorphic and hydrologic setting of vernal pools (i.e., the vernal pool complex). The purpose of the VPHCP monitoring approach is to evaluate vernal pool habitat and focal species at a complex level to inform management decisions. Two of the HGM functions, Function 1 (Surface and Sub-Surface Water Storage) and Function 2 (Hydrological Networks), have been adapted for use in the VPHCP monitoring approach. The hydrological network features (basin inlets/outlets) and certain hydrological features relating to water storage (depth) for each vernal pool are monitored as part of the VPHCP.

California Rapid Assessment Method for Wetlands

CRAM requires collecting coarse data for monitoring wetland conditions. CRAM has been in development over the last 5-plus years in collaboration with the resource agencies and scientists throughout California. The overall goal of CRAM is to “provide rapid, scientifically defensible, standardized, cost-effective assessments of the status and trends in the condition of wetlands and related policies, programs, and projects throughout California.” Vernal Pool Systems and Individual Vernal Pools are two wetland subtypes that have developed field books under CRAM (California Wetlands Monitoring Workgroup 2012a, b, c).

A CRAM score, regardless of wetland type, is composed of four main attribute scores: buffer and landscape context, hydrology, physical structure, and biotic structure. The attributes are divided into metrics and submetrics that are scored based on defined conditions. The metrics, submetrics, and condition scores vary based on the wetland type being assessed (some submetrics do not apply to all wetland types). The final CRAM score is the sum of the four

attributes scores, which is then converted to the percentage of the maximum score achievable, theoretically ranging from 0 to 100%. The overall CRAM score is often less informative than the more specific metric and attribute scores when interpreting site conditions.

CRAM has been calibrated throughout California and in various wetland types. Therefore, CRAM scores can be compared for sites across California within the same wetland type. CRAM is designed to collect a coarse assessment of the site's ambient condition, but can also be used to measure progress toward meeting success criteria established for wetland function/condition. However, similar to HGM, CRAM in its full application is not practical for a Preserve-wide monitoring program; it is time-consuming and requires advanced technical skill, and does not adequately track population viability over time. Many of the issues associated with the use of CRAM are similar to those discussed above under the HGM approach. However, the qualitative monitoring in the VPHCP does incorporate some of the parameters used in CRAM, such as disturbance types and general habitat conditions.

USFWS Protocol Assessments

USFWS has specific methods and guidance for conducting assessment for the focal crustacean species (San Diego fairy shrimp and Riverside fairy shrimp). Currently, all wet season surveys for the focal crustacean species must be conducted by a permitted biologist and pursuant to the Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods (USFWS 1996b). USFWS protocols for shrimp surveys primarily capture presence/absence data for the focal shrimp species. Currently, the protocol requires a rough qualitative estimation of population size (USFWS 2008a).

According to the USFWS protocol, following the conclusion of fairy shrimp surveys, all of the pools within a project area must have been subject to either one wet season survey or one dry season survey, at a minimum. If winter rains are insufficient to inundate vernal pools, dry season surveys can also be completed. Dry season sampling follows the Andrew Bohonak method of extracting DNA from shrimp cysts (Vandergast et al. 2009). Dry season cyst sampling is incorporated into the VPMMP as a method for measuring shrimp density.

7.5.1 Monitoring Overview

The tiered three-level monitoring approach requires both qualitative and quantitative monitoring at vernal pool complexes that will be managed under the framework VPMMP (Table 7-1). Monitoring shall be performed on City-owned lands, lands that the City has a legal access to manage and monitor, and vernal pool sites conserved through the VPHCP. Specific complexes

that will be monitored under the VPHCP are included in the framework VPMMP (Appendix D). Monitoring would be conducted by City staff, paid consultants, nonprofits, or other trained individuals that have been approved by the Wildlife Agencies, provided that all follow a standard monitoring protocol consistent with the VPMMP and coordinated via the City's MSCP program. Monitoring would be coordinated with regional efforts conducted by other entities (e.g., USFWS, San Diego Management and Monitoring Program).

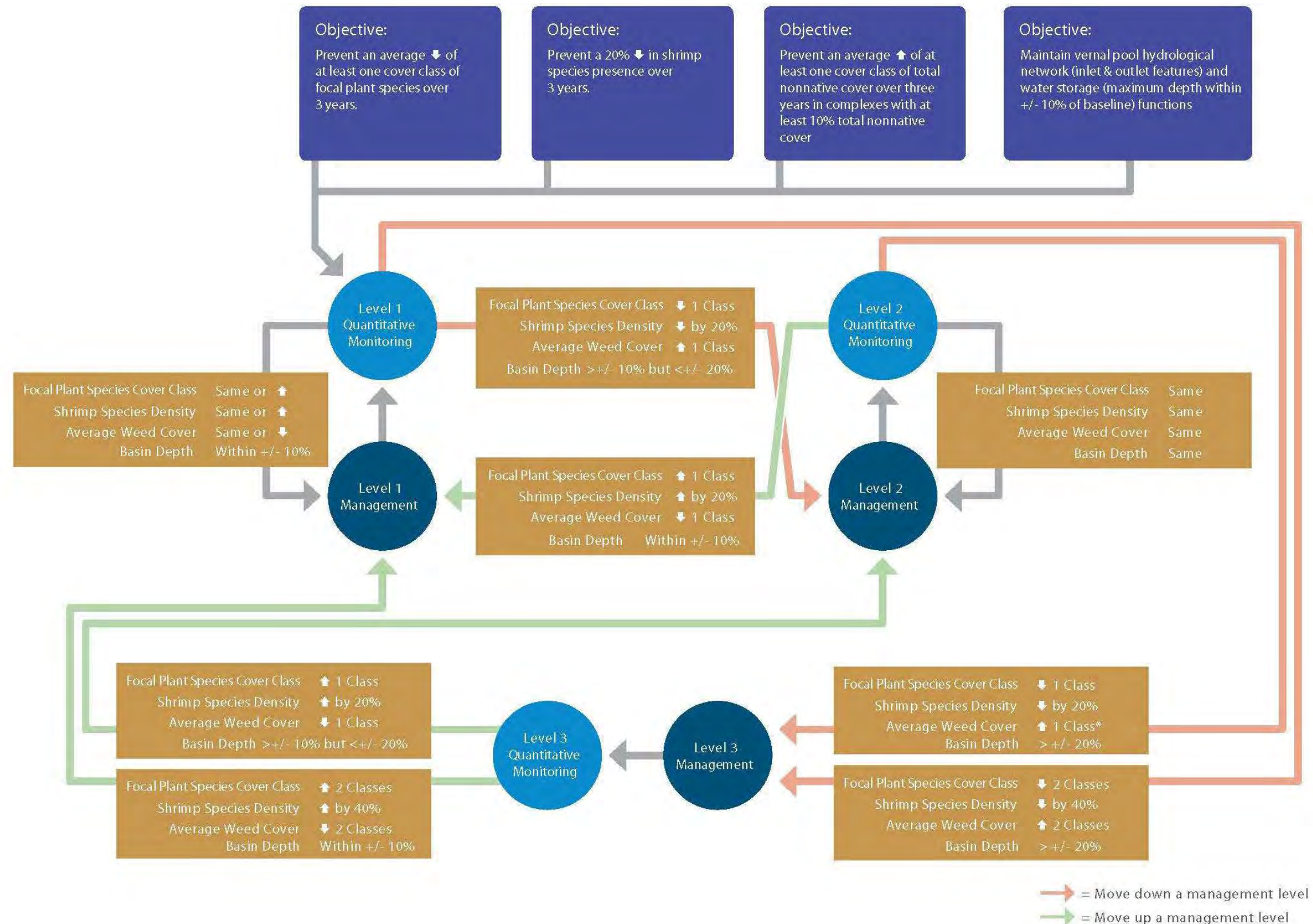
Table 7-1 provides an overview of the VPMMP monitoring methods and sample size for each level of monitoring (qualitative and quantitative). More detail is provided in the sections below on the monitoring methods associated with each of the three monitoring levels (Sections 7.5.2 through 7.5.4). The decision to move to a different monitoring level is based on triggers directly tied to the VPMMP standards identified in Section 7.3. Figure 7-4 illustrates the decision process for determining the appropriate monitoring and management level, based on the VPMMP standards applied at each level.

Table 7-2 illustrates an example of the annual monitoring cycle for Management Level 1 (Stewardship). As shown, each vernal complex managed under the framework VPMMP would receive at least 10 monthly visits during a year. Vernal pool complexes on Otay Mesa and Del Mar Mesa would be visited monthly throughout the year.

7.5.2 Baseline Hydrologic Surveys

Baseline hydrologic surveys will be conducted for all vernal pools within complexes managed under the framework VPMMP, regardless of the assigned VPMMP monitoring and management level. Baseline surveys will be based on the HGM Guidebook (Bauder et al. 2009), and will involve measuring maximum basin depth, and basin inlet and outlet locations using a laser transit. Baseline hydrologic data will serve as a benchmark from which to evaluate potential topographic and/or hydrologic disturbance observed during monitoring. Baseline hydrologic data will be used to guide management decisions at Management Levels 2 and 3 to repair observed topographic and/or hydrologic disturbance and restore hydrologic function.

Figure 7-4
VPHCP Monitoring and Management Level Flow Chart



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**Table 7-1
Monitoring Methods, Frequency, and Sample Size**

Survey Type	Frequency and Timing	Monitoring Method	Sample Size (based on Monitoring and Management Level)
Qualitative			
Threat assessment, pool inundation verification, and verification of fairy shrimp viability and reproduction	Three visits annually during wet season	Visual assessment.	All basins in complex (all Management Levels)
Quantitative			
Baseline hydrologic survey	One time (within 5 years of VPHCP permit approval for all complexes being managed under the framework VPMMP])	Measure maximum pool depth, pool inlet and outlet, and geomorphic setting of complex.	All basins in complex (all Management Levels)
Covered plant surveys	Annually, spring	Collection of cover class data of each covered plant species and each nonnative plant species. Nonnative species shall be aggregated into one cover class estimate for comparison to the triggers. Individual nonnative species and problematic invasive exotics shall be listed on the monitoring form (VPMMP Attachment A) to direct management actions for nonnatives.	Level 1: 10% of occupied pools in each complex OR if complex has <10 pools for each covered species, survey at least one pool for each covered species known to occur Level 2 and 3: All pools in complex with covered plant species
Fairy shrimp density surveys	As-needed based on qualitative observations (see above)	Dry season sampling with genetic identification of cysts.	Level 1: Only conduct if a notable change to hydrology or other vernal pool functions is observed, that would trigger a Level 2 or 3 management response Level 2: Up to 10 pools or 10% of pools with covered shrimp species, whichever is greater Level 3: Up to 10 pools or 20% of pools with covered shrimp species, whichever is greater
Topographic disturbance assessment	As needed, if topographic and/or hydrologic disturbance is observed during qualitative monitoring	Maximum basin depth shall be measured and inlet and outlet locations shall be recorded for comparison against baseline hydrologic data. If basin reconstruction is required to address topographic disturbance, then monitoring shall be performed to determine if restored hydrological function is achieved (measured by maximum pool depth and inlet/outlet location; refer to VPMMP Standard "E").	Topographically and/or hydrologically disturbed basins (all Management Levels)

**Table 7-2
Example Annual Schedule of Site Visits for Level 1 Monitoring and Management (Stewardship)**

Task	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Overview of Annual Site Visits												
MONITORING LEVEL 1												
Qualitative Visit												
Quantitative Floral Surveys												
Quantitative Shrimp Surveys												
Ponding Verification												
MANAGEMENT LEVEL 1												
Access Control Patrol/Access Repair												
Trash and Debris Removal (if needed)												
Edge Effect Repair (if needed)												
General Weed Control Level 1												
Vernal Pool Weed Control Level 1												
Maintenance Oversight												

 Site visit

 Site visit for complexes on Otay Mesa and Del Mar Mesa because monthly visits are required by USFWS

7.5.3 Qualitative Monitoring Methods

Qualitative monitoring corresponds to documenting observations during annual site visits, as well as incidental observations during management activities (e.g., weed control). Annual qualitative monitoring shall be conducted at each applicable vernal pool complex managed under the framework VPMMP, regardless of the designated monitoring level. General site assessment information shall be collected, including current or potential threats (such as invasive plants, dumping, OHV activity, and trampling), and recommendations for management shall be generated.

Each complex shall be assessed for the following conditions and threats:

- Fencing and Signage: The conditions of fencing or other site protection measures shall be checked to verify that the site is secured and that appropriate signage is in place.
- Edge Effects: Each complex shall be inspected for edge effects from landscaping (irrigation runoff, invasive species, herbicide application, etc.), water drainage (water quality, increased ponding, etc.), dust production, dumping, and other issues within the complex or on adjacent properties.
- Fire and Fire Suppression: Evidence of fire or disturbance from fire suppression shall be evaluated for impacts to the site (loss of native habitat, weed invasion, erosion, etc.).
- Trespass: Each complex shall be inspected for signs of trespass or illegal OHV activity.
- Topographic Disturbance: Each complex shall be evaluated for topographic disturbance or altered hydrology from vehicle damage, illegal trespass, or other landscape-damaging impacts. The qualitative assessment of topographic disturbance shall evaluate the following:
 - Pool integrity and hydrologic function
 - Shape and size of the disturbance and the overall pool
 - Depth and duration of ponding
 - Need for hand work or mechanical equipment for repairs
 - Need for watershed analysis and/or microtopographic plans
- Invasive Species: A general assessment of nonnative plant and animal invasion shall be made during each qualitative survey for the vernal pool and upland areas. Observations of invasive plant species and invasive wildlife presence shall be noted.
- Inundation: A visual check for pool inundation shall be performed; inundation of at least 1.5 inches in depth shall be noted.

- Other: Any additional observed disturbances that could affect habitat quality shall be noted.

In addition, the overall disturbance category of the complex shall be identified, based on the disturbance categories defined in the HGM Manual (Bauder et al. 2009). The categories range from minimal/no disturbance to severe disturbance.

Qualitative surveys shall also evaluate the presence of fairy shrimp (visual survey) and verification of fairy shrimp viability and reproduction (i.e., observation of gravid females).

Visits should occur in the winter and spring seasons (generally February through May). Qualitative monitoring can be conducted in conjunction with the quantitative monitoring (Section 7.5.4). An example of a combined qualitative and quantitative monitoring form that can be used for data collection is included as an attachment to the VPMMP (Appendix C). This form incorporates disturbance categories from the HGM Manual (Bauder et al. 2009).

The VPMMP monitoring form includes a section to identify if immediate management actions are deemed necessary based on qualitative monitoring observations. For example, if an invasive or problematic weed species is identified within a covered vernal pool, the biological monitor can note on the monitoring form that weed control is necessary immediately to address the weed issue.

In addition to an annual threat assessment, each vernal pool complex shall be visited up to three times a year during the wet season to check for pool inundation. These visits shall be timed, when feasible, to occur following a large rain event when inundation of the pools is expected.

7.5.4 Quantitative Monitoring Methods

Quantitative monitoring involves activities such as mapping and estimation of species cover, population size/density, and presence/absence at each complex. Quantitative monitoring requirements vary based on the three levels of monitoring, with higher levels collecting more data with greater precision to inform management actions. More data collection requires greater effort and cost. The sample size for covered plant and shrimp species monitoring will depend on the assigned monitoring level (see Table 7-1).

Annual quantitative monitoring shall be conducted at each vernal pool complex managed under the framework VPMMP. Surveys should be timed to coincide with the appropriate ecological conditions for the target species at a specific complex. For the covered plant species, timing should coincide with the optimal flowering time later in the season when detection and

identification of both early and late vernal pool plant species are possible. For the covered shrimp species, cyst collection visits should occur during the dry season.

Monitoring for floral and faunal components shall be conducted from the pool margins so that trampling of vernal pool resources and the inadvertent transferring of vernal pool propagules (plant seeds and shrimp cyst) are minimized.

Covered Shrimp Species Monitoring

Wet season sampling and/or dry season sampling of cysts with genetic identification to species shall be used to monitor the covered shrimp species.

An estimate of density for each covered shrimp species can be calculated as the number of cysts per volume of soil. The change in density can be tracked over time as an indicator of the population size of the pool. If the average cyst density is stable or increases across the occupied pools in a complex, it can be inferred that the population is stable or increasing at that complex. To verify that shrimp cysts are viable and that reproduction is occurring, a visual assessment during the wet season is required to observe hatched cysts and gravid females. These wet season verifications should be timed to occur in conjunction with inundation surveys performed as part of qualitative monitoring (Table 7-2).

Sampling for shrimp cyst density and identification shall be done in accordance with the USFWS protocol, as modified by Andrew Bohonak, PhD, at San Diego State University (USFWS 1996a; Bohonak and Simovich 2011), using the following guidelines:

- Samples should be collected within 1.0 meter from each pool's lowest point where shrimp cyst densities are the highest.
- Set up two perpendicular transects so that they intersect in each pool's deepest spot, and one transect should pass over the pool's second deepest point.
- Five core samples (2 inches in diameter and 2 inches deep) should be collected per pool as follows: one in the pool center, and one radiating out 1.0 meter in each of the four transect line directions, for a total of five samples per pool. The five samples shall be combined to determine the average density in the pool.
- The core samples should be taken when each pool's sediments are completely dry at the surface and subsurface.

- Core samples should be processed in the laboratory using standard washing protocol and cysts should be removed from the damp soil by trained personnel under a dissecting microscope.

If the average cyst density decreases across the occupied pools in a complex, it can be inferred that the covered shrimp population is decreasing at that complex. A reduction in shrimp population is likely the result of an indirect impact, such as change in pool inundation resulting from an impact to watershed hydrology or nonnative plant invasion. Thus, a decrease in a shrimp population would trigger additional monitoring, for instance to detect topographical or hydrological disturbance (Table 7-2).

If topographic or hydrologic disturbance is observed in a vernal pool, then maximum basin depth shall be measured, and inlet and outlet locations shall be recorded for comparison against baseline hydrologic data (Section 7.5.2). If topographic reconstruction is required, then monitoring shall be performed (Management Level 2 or 3) to determine if restored hydrological function achieves the VPMMP Standard “E” (Section 7.3).

Covered Plant Species Monitoring

Monitoring shall include cover estimates within the pool basins using a modification of cover classes taken from the California Native Plant Society’s (CNPS) plant cover methodology. The City began using the CNPS cover class methodology in 2006 to collect data on vernal pools following the McEachern et al. (2006) MSCP rare plant monitoring protocol. This methodology was also used during the Vernal Pool Inventory of the City’s vernal pool complexes (City of San Diego 2004). With the modified CNPS methodology that will be used under the VPHCP, some cover classes have been combined (the cover classes <1%, 1–5%, 5–10% are combined into one cover class <10%, and cover classes of 50–75% and 75%+ are combined to one cover class of 50%+) because the resolution of the cover classes below 10% and above 50% are not necessary to inform management decisions (e.g., need for weed control or remedial seeding). Therefore, estimated absolute percent cover of each covered plant species in a pool is grouped in the following classes to track changes in cover over time to inform management decisions: <10%, 10–25%, 25–50%, 50%+. Use of this modified class system allows for valuable data collection without the time required for other types of vegetation assessments (transects, plot-frames, etc.). In addition to the covered plant species, other native and nonnative vegetative cover can be estimated with this modified CNPS class system.

At Monitoring Level 1, quantitative monitoring shall be performed for a subset of the vernal pools containing covered plant species at each applicable complex. Using the CNPS cover class system described above, 10% of the vernal pools with covered plant species shall be assessed

quantitatively. If a complex has less than 10 pools for a particular covered species, survey shall take place for at least one pool where that covered species is known to occur. Only the covered species shall be assessed in each pool. Pools in a given complex with more than one covered species shall be preferentially chosen to reduce the total number of pools required for sampling. These intentionally chosen pools are considered sentinel pools. If all covered plant species in a complex do not co-occur in the same pools, the remaining needed pools shall be chosen randomly in each complex to meet the 10% criterion. The sentinel pools and the randomly chosen pools shall then be sampled every year to provide greater precision in changes observed in cover class estimates. While not random, the use of sentinel pools with multiple covered plant species, as well as the use of permanent sampling, shall increase the efficiency and precision of monitoring at Level 1.

The following is a hypothetical example that demonstrates the application of the 10% sample size and sentinel/random pool selection methods. Table 7-3 also details this example. A complex is known to contain 100 pools. Of those, 30 pools have San Diego button-celery, 20 pools have San Diego mesa mint, and five pools have spreading navarretia. Some pools contain more than one covered species. Based on the 10% rule, three of the 30 San Diego button-celery pools and two of the 20 San Diego mesa mint pools should be monitored. One of the five spreading navarretia pools in this complex should be monitored, since fewer than 10 pools have this particular covered plant species. If two pools in the complex contain all three species, these two pools would be preferentially chosen to be monitored and serve as sentinel pools. A third pool containing San Diego button-celery would be chosen randomly from the 30 pools known to contain San Diego button-celery to complete the required monitoring at this example complex. In this hypothetical monitoring year, three pools would fulfill the requirement for monitoring under Level 1, and these three pools would then be sampled every year that this hypothetical complex is at Monitoring Level 1.

At Levels 2 and 3, monitoring shall be conducted in all vernal pools occupied by covered plant species. At Levels 2 and 3, the covered plant species are declining (Level 2) or extirpated (Level 3) from a complex. Therefore, more intensive monitoring of occupied, or previously occupied, pools is necessary to determine the cause of the population decline and to determine where management actions should be focused.

Table 7-3
Monitoring Level 1 Example Vernal Pool Complex Sampling Selection

Complex Characteristics	Number of Pools¹	Sample Size (10% of occupied pools or at least 1 pool if <10 occupied pools)	Permanent Pool Selection²
Number of pools out of 100 with all 3 covered plant species	2	-	2 (Preferential selection of these two sentinel pools would satisfy sample size requirements for Otay Mesa mint and spreading navarretia, and 2 of 3 San Diego button-celery pools).
San Diego button-celery pools	30	3	1 (Randomly select 1 additional pool from these 30 to satisfy requirement for 3 total occupied San Diego button-celery pools.)
Otay Mesa mint pools	20	2	-
Spreading navarretia pools	5	1	-
Pools with no covered species	45	-	-
TOTAL	100	6	3

¹ Based on the number of occupied pools detected the previous monitoring year, or, for the first year of monitoring, based on the City's vernal pool database (2012), summarized in Appendix C.

² Pools for permanent sampling shall be selected for each complex the first year a complex is part of Monitoring Level 1.

7.6 MANAGEMENT APPROACH

The tiered monitoring program described in Section 7.5 will be used to evaluate site conditions for each complex managed under the framework VPMMP to determine the appropriate management level.

Rainfall amounts will determine whether the vernal pool flora and fauna are adequately expressed to determine covered species population status. The benchmark for annual survey assessments comparable to the VPMMP standards shall be 55% of the average rainfall for the VPHCP Plan Area, as recorded at two weather stations in the Central and South VPHCP planning units (Table 7-4). According to the HGM approach, approximately 55% of normal rainfall should be considered the minimum to express the full ecological parameters required for vernal pools in southern California (Bauder et al. 2009). For the VPMMP, the minimum rainfall required for adequate assessments is 55% of normal rainfall for the appropriate region for the period of July through June. The 55% of average rainfall years do not need to be sequential. Quantitative monitoring shall be conducted annually, regardless of rainfall; however, only those years with 55% average rainfall will be compared to the VPMMP standards described in Section 7.5.4.

Table 7-4
Weather Station and Mean Rainfall Information (1983 through 2013)

VPHCP Planning Unit	Regional Precipitation Station	Mean Rainfall (30 Years)	55% of Normal Rainfall (July through June)
North/Central	Miramar/ Montgomery Field	11.4 inches	6.3 inches
South	Brown Field	9.6 inches	5.3 inches

Source: <http://www.wrh.noaa.gov/sgx/obs/rtp/rtpmap.php?wfo=sgx> and San Diego County Department of Public Works

7.6.1 Management Action Triggers

The required management level (Management Level 1, 2, or 3) for each complex managed under the framework VPMMP is determined by evaluating monitoring results against the VPMMP standards. The triggers to move between management levels are outlined in Table 7-5 and illustrated in Figure 7-4.

Table 7-5
Quantitative Management Triggers

Management Trigger	Monitored Vernal Pool Resource	Monitoring Observation Compared to VPMMP Standards
A- (Management Level 1 to Level 2)	Covered Plant Species	An average decline of one cover class for any covered plant species present in the pools assessed over 3 years <u>with adequate rainfall</u> , OR An average increase of one cover class in combined nonnative cover in the vernal pools over 3 years, regardless of rainfall. This trigger only applies to complexes with at least 10% total nonnative cover.
	Covered Shrimp Species	A 20% decline in species density in the covered shrimp species present in the pools assessed over 3 years.
	Hydrologic Function	A change in the vernal pool hydrological network (i.e., inlet and outlet features) and water storage function such that the maximum depth of ponding is changed (increased or decreased) by more than +/-10% but less than +/-20% from the baseline recorded for the basin.
A+ (Management Level 2 to Level 1)	Covered Plant Species	An average increase of one cover class for ALL target covered plant species present in the pools assessed over 3 years with <u>adequate rainfall</u> , OR An average decrease of one cover class in combined nonnative cover in the vernal pools over 3 years, regardless of rainfall.
	Covered Shrimp Species	A 20% increase in species density in the covered shrimp species present in the pools assessed over 3 years.
	Hydrologic Function	Through active restoration and enhancement (i.e., topographic recontouring), a reestablishment of the baseline vernal pool hydrological network and water storage function to within +/-10% of the baseline recorded for the basin.

Management Trigger	Monitored Vernal Pool Resource	Monitoring Observation Compared to VPMMP Standards
B+ (Management Level 2 to Level 3)	Covered Plant Species	An average decline of two cover classes for any covered plant species present in the pools assessed over 3 years with <u>adequate rainfall</u> , OR An average increase of two cover classes in combined nonnative cover in the vernal pools over 3 years, regardless of rainfall. This trigger only applies to complexes with at least 10% total nonnative cover.
	Covered Shrimp Species	A 40% decline in species density in the covered shrimp species present in the pools assessed over 3 years. Additionally, if a complex has remained at Management Level 2 for 3 years with at least 55% of average rainfall, the complex would be elevated to Management Level 3 monitoring and management.
	Hydrologic Function	A change in the vernal pool hydrological network (i.e., inlet and outlet features) and water storage function such that the maximum depth of ponding is changed (increased or decreased) by +/-20% or more from the baseline recorded for the basin.
C- (Management Level 1 to Level 3)	Covered Plant Species	An average decline of two cover classes for any covered plant species present in the pools assessed over 3 years with <u>adequate rainfall</u> , OR An average increase of two cover classes in combined nonnative cover in the vernal pools over 3 years, regardless of rainfall. This trigger only applies to complexes with at least 10% total nonnative cover.
	Covered Shrimp Species	A 40% decline in species density in the covered shrimp species present in the pools assessed over 3 years. Additionally, if a complex has remained at Management Level 2 for 3 years with at least 55% of average rainfall, the complex would be elevated to Management Level 3 monitoring and management.
	Hydrologic Function	A change in the vernal pool hydrological network (i.e., inlet and outlet features) and water storage function such that the maximum depth of ponding is changed (increased or decreased) by +/-20% or more from the baseline recorded for the basin.
C+ (Management Level 3 to Level 1)	Covered Plant Species	An average increase of two cover classes for ALL target covered plant species present in the pools assessed over 3 years with <u>adequate rainfall</u> , OR An average decrease of one cover class in combined nonnative cover in the vernal pools over 3 years, regardless of rainfall.
	Covered Shrimp Species	A 40% increase in species density in the covered shrimp species present in the pools assessed over 3 years with at least 55% of average rainfall.
	Hydrologic Function	Through active restoration and enhancement (i.e., topographic recontouring), a reestablishment of the baseline vernal pool hydrological network and water storage function to within +/-10% of the baseline recorded for the basin.

7.6.2 Management Actions

Management levels were assigned to each complex in the framework VPMMP based on a review of existing available quantitative and qualitative data to site-specific management needs, and have been vetted with the Wildlife Agencies. The assigned management level for each complex is noted in Appendix A of the VPMMP.

Management Level 1 is considered the stewardship-level requirement for monitoring and management. A complex will remain at Management Level 1 in perpetuity unless the Management Triggers to move to Management Level 2 or Level 3 are met, as outlined in Table 7-5. Because of seasonal climate variability and resulting effects on the expression of both invasive species (weed germination, flowering, and seed-set; dispersal of invasive animals; etc.) and covered species (plant germination, flowering, and seed-set; shrimp hatching, development, and reproduction; etc.), management activities shall be applied for a minimum of 3 years for Management Level 2 and 5 years for Management Level 3. If, after 3 or 5 years of implementation of Management Level 2 or Level 3, respectively, the complex is not achieving the VPMMP standards to elevate to the next management level, then the respective management level will continue to be implemented until the VPMMP standards are achieved.

The following describes the overall desired activity for each management level. General management activities that will be required at each Management Level are described in Table 7-6.

Management Level 1

The objective of Management Level 1 is to *maintain* existing habitat conditions and existing covered species population status. Management Level 1 complexes are deemed functioning at an acceptable to optimal condition. The required management actions are expected to result in maintenance of those conditions. In general, the management can be characterized as stewardship where little maintenance is needed to achieve the habitat and species-level VPHCP objectives. It is assumed that routine access patrol and enforcement will occur at all Management Level 1 sites. Access patrol visits shall occur annually, at a minimum, at each site, or more frequently (e.g., monthly, weekly) as deemed appropriate by the City and Wildlife Agencies. An example annual management schedule for a Management Level 1 complex is provided in Table 7-2.

Management Level 2

The objective of Management Level 2 is to *stabilize* habitat conditions and covered species populations. Management Level 2 complexes are deemed functioning at an unacceptable condition and are perceived as declining in habitat quality and/or covered species persistence. In general, the management can be characterized as enhancement where maintenance is needed to achieve the habitat and species-level VPHCP objectives. Management Level 2 includes all activities listed for Management Level 1, plus the additional activities listed in Table 7-6. The required management actions are expected to result in an improvement in those conditions to Management Level 1.

**Table 7-6
Management Actions by Level**

Management Level	Management Action	Management Requirement
Level 1	Trash and Debris Removal	All complexes will be kept free of trash and debris through annual or as-needed removal.
	Fencing and Signage Maintenance	Every complex will be protected with site-appropriate fencing, vehicle barriers, and/or other access controls. Any complex without adequate protection will be fenced or protected by other types of access barriers. Status of access restrictions will be documented as part of the qualitative monitoring. If problems are identified, recommendations for repair or replacement will be made and implemented (e.g., replacement of locks, gates, signs, or fence repairs).
	Edge Effects Maintenance	Recommendations for addressing edge effects that are noted during qualitative monitoring will be implemented. This may include changes in irrigation designs or schedules, modification of landscape species, erosion-control measures, dust-suppression measures, and other adaptive efforts. If problems are being caused by adjacent land use and management, the City or other land manager will contact adjacent property owners/managers to address the issues.
	Fire and Fire Suppression Damage Repair	If a complex is affected by fire, there are general expectations for recovery and invasion by weeds. Following a fire, quantitative data should be carefully evaluated to identify short- and long-term impacts. Any damage resulting from fire suppression (fencing damage, vehicle damage, contamination from fire suppressant chemicals, etc.) will be addressed immediately.
	Trespass Damage Repair	During qualitative assessment, any signs of trespass will be assessed for damage. Unauthorized trails will be closed and signage installed, where appropriate. Damage that alters hydrology will be assessed and measures will be implemented to resolve the problem.
	Topographic Disturbance Repair	Qualitative assessment of topographic and/or hydrologic disturbance will include recommendations for repair measures, as appropriate. If damage occurs during the wet season, it may be necessary to postpone repair measures until the site is dry. Minor topographic damage (e.g., footprints, small tire ruts) will be repaired with hand tools.
	Covered Vernal Pool Weed Control	Covered Vernal Pool Weed Control Level 1 (two visits per spring) will be performed in vernal pools occupied by covered species to maintain acceptable nonnative cover levels.
	General Weed Control	The purpose of General Weed Control Level 1 (two visits per spring) is to target invasive nonnative species identified during qualitative monitoring in non-covered species vernal pools and/or associated upland watersheds. The primary goals are to prevent spread of invasive nonnative species into covered species pools and eradicate problematic invasive species upon detection.
Level 2	Trash and Debris Removal	Same as Level 1.
	Fencing and Signage Maintenance	Same as Level 1.
	Edge Effects Maintenance	Same as Level 1.
	Fire and Fire Suppression Damage Repair	Same as Level 1.

Management Level	Management Action	Management Requirement
Level 2 (Cont.)	Trespass Damage Repair	Same as Level 1.
	Topographic Reconstruction	Moderate topographic disturbance that affects pool integrity, ponding potential (depth and duration), or overall size will require microtopographic repair involving mechanized equipment and hand work. Where necessary, ponding characteristics, flow patterns, and other hydrological functions will be reestablished to within $\pm 10\%$ of the baseline conditions (as determined during the baseline hydrogeological surveys). These involve measuring maximum basin depth and inlet and outlet locations using a laser transit. Baseline hydrologic data will be used to guide management decisions to repair observed topographic and/or hydrologic disturbance and restore hydrologic function. A more detailed plan may be necessary for grading if equipment is used.
	Dethatching	Dethatching is recommended prior to other types of weed control. Although some complexes may require weed control without dethatching, this will be evaluated on a complex-by-complex basis. For example, dethatching is not needed to treat invasive forbs at a complex with limited thatch. For most complexes, dethatching will be applied to the basins and in a 20-foot (on average) watershed buffer around each basin. The actual buffer for each vernal pool will be determined on a site-specific basis, based on weed conditions. Thatch and nonnative seed control is important for both the pool and the upland watershed, as the watershed can be a major source of weed seed and nonnative thatch input.
	Covered Vernal Pool Weed Control	Covered Vernal Pool Weed Control Level 2 (two visits per spring) will be conducted in vernal pools with covered species plus an average 20-foot watershed buffer. An average 20-foot buffer around a pool is approximately equivalent to a 5:1 watershed-to-vernal pool area ratio (based on the average size of vernal pools managed under the framework VPMMP that have covered species). Management of the upland watershed habitat at this ratio is considered appropriate when the site needs stabilization of habitat and covered species populations. The actual buffer for each vernal pool will be determined on a site-specific basis, based on weed conditions. Weed control includes all aspects of invasive plant control such as hand weeding, mechanical weeding, and herbicide use.
	General Weed Control	Same as Level 1 except three visits per spring.
	Seed Collection, Bulking, and Redistribution	At Management Level 2, the seed bank is assumed intact but may be declining for certain covered species. Seed collection, bulking, and redistribution may be implemented for declining covered plant species to enhance existing covered species seed banks.
	Shrimp Cyst Collection and Reinoculation	If quantitative monitoring indicates a decline in density of one or both covered fairy shrimp species, additional monitoring will be necessary to determine the cause of population decline (e.g., hydrological disturbance resulting from edge effects). Once the cause is addressed, shrimp cyst soil may be collected from other occupied pools in the same complex for reinoculation into impacted pools. Shrimp cyst soil will only be collected from pools that do not contain versatile fairy shrimp. Cyst collection from off-site sources may be considered if the potential cyst bank on-site is gone or too limited for collection.

Management Level	Management Action	Management Requirement
Level 3	Trash and Debris Removal	Same as Level 1.
	Fencing and Signage Maintenance	Same as Level 1.
	Edge Effects Maintenance	Same as Level 1.
	Fire and Fire Suppression Damage Repair	Same as Level 1.
	Trespass Damage Repair	Same as Level 1.
	Pool Restoration	Existing pools will be restored where needed to increase the population of covered species in a complex. Restored pools will not impact the watersheds of extant pools except as appropriate to establish hydrological connections between restored and extant pools (see topographic reconstruction below).
	Topographic Reconstruction	Extensive topographic disturbance that affects pool integrity, ponding potential (depth and duration), or overall size will require microtopographic repair involving mechanized equipment and hand work. Where necessary, ponding characteristics, flow patterns, and other hydrological functions will be reestablished using hand tools and/or equipment, as appropriate. Hydrological function must be reestablished to within +/-20% of the baseline conditions to elevate from Management Level 3 to Management Level 2, and within +/-10% of the baseline conditions to elevate to Management Level 1. A more detailed plan may be necessary for grading if equipment is used.
	Dethatching	Same as Level 2, except assume an average 35-foot watershed buffer around each pool.
	Covered Vernal Pool Weed Control	Covered Vernal Pool Weed Control Level 3 (four visits per spring) will be conducted on the vernal pools with covered species plus a 35-foot watershed buffer. An average 35-foot buffer around a pool is approximately equivalent to a 10:1 watershed-to-vernal pool area ratio (based on the average size of vernal pools managed under the framework VPMMP that have covered species). Management of the upland watershed habitat at this ratio is considered appropriate when the site needs stabilization of habitat and covered species populations. The actual buffer for each vernal pool will be determined on a site-specific basis, based on weed conditions. Weed control includes all aspects of invasive plant control such as hand weeding, mechanical weeding, and herbicide use.
	General Weed Control	The purpose of General Weed Control Level 3 (four visits per spring) is to target invasive nonnative species identified during qualitative monitoring in non-covered species vernal pools and/or associated upland watersheds. The primary goals are to prevent spread of invasive nonnative species into covered species pools and eradicate problematic invasive species upon detection.
	Seed Reintroduction	At Management Level 3, certain covered species may be absent from the seed bank. Seed will be collected from off-site genetically appropriate populations, bulked in a greenhouse, and redistributed to restore covered species seed banks.
	Shrimp Cyst Collection and Reinoculation	Same as Level 2.
Container Plant Production/Installation	Under Management Level 3, container plant production will be conducted for the annual covered plant if timing is appropriate.	

Management Level 3

The objective of Management Level 3 is to *restore* habitat conditions and covered species populations. Management Level 3 complexes are deemed highly degraded and need restoration to meet the habitat and species objectives of the VPHCP. Management Level 3 includes all activities listed for Management Level 1, plus the additional activities discussed in Table 7-6. The required management actions are expected to result in an improvement in those conditions to Management Level 1.

Implementation of Management

Qualitative and quantitative monitoring is intended to inform management decisions at each vernal pool complex. Results and observations will be evaluated following completion of monitoring to determine if management actions are necessary to either maintain a complex at its current Management Level or, if Management Action Triggers are met, require additional management actions at a higher Management Level. As noted in Section 7.5.3, the VPMMP monitoring form includes a section to identify if immediate management actions are deemed necessary based on monitoring observations.

7.7 VPMMP DATA COLLECTION, ANALYSIS, AND REPORTING

Over time, the understanding of the status and conditions of the vernal pools and covered species, and ability to manage stressors will increase. Following the Atkinson et al. (2004) model for adaptive management (Figure 7-2), the monitoring data will be collected, analyzed, and then used in the decision-making on next steps and any necessary revisions to the VPHCP objectives, conceptual models, management actions, survey protocols, and/or triggers.

The City shall be responsible for determining how the monitoring data are collected on an annual basis. Monitoring data shall be collected by qualified City staff, consultants, nonprofits, or other trained individuals that have been approved by the Wildlife Agencies. Collection of the information shall be done in a standardized method, consistent with the VPMMP, and would include sufficient information needed to determine the status of a complex. The following actions would occur under the VPHCP:

- Within 1 year of Permit issuance, City departments that manage lands identified in the VPMMP shall coordinate with the Planning Department on implementation of the VPMMP.
- Each spring, all conserved vernal pool complexes (see Appendix B) managed under the VPMMP shall be monitored where legal access is available to the City.

- By July 31 of each year, the City’s Planning Department shall gather the management and monitoring data collected by the various parties, including private land managers as required by their development permit approvals. The monitoring results shall be summarized into a report along with information on any associated management activities.
- By September 30 of each year, the City shall provide the summarized results¹⁰ to the Wildlife Agencies for review and analysis. The Wildlife Agencies may choose to use outside assistance to analyze the data and formulate changes to the management and monitoring strategy.
- Each December, the Wildlife Agencies and the City shall meet to discuss the results of the monitoring and analysis. The parties shall also discuss any necessary adaptations to ongoing vernal pool management and monitoring.

Data shall be provided annually to the San Diego Management and Monitoring Program, a science-based program seeking to provide a coordinated approach to management and biological monitoring of conserved lands in San Diego County.

7.8 FUTURE REGIONAL POPULATION TREND ANALYSIS

Monitoring methods for the VPMMP are designed to identify trends in population decline and habitat degradation at the individual basin and complex level, which is tied directly to the VPHCP goals and objectives (see Table 5-1). Since many of the complexes are geographically isolated from each other, monitoring and management will be implemented specific to an individual complex. If, at some point, all of the complexes are stable and maintain Management Level 1 (Stewardship) status, then it will be assumed that the covered species populations are stable and The City may elect to track the covered species’ populations regionally. However, evaluation of regional population trends for the covered species is not an objective identified in the VPHCP and, therefore, is not a component of the VPMMP. However, qualitative and quantitative data collected for each complex may be aggregated as part of a regional trend analysis performed by the Wildlife Agencies or others.

7.9 OPPORTUNISTIC MANAGEMENT-RELATED RESEARCH

This section identifies opportunistic management-related research opportunities, which are not required under the VPHCP.

¹⁰ This summary could be included as an attachment to the City of San Diego required annual reporting on the implementation of the VPHCP due on March 15 of every year.

Options for research efforts to better understand covered species population dynamics include the following:

- Develop and test a methodology to better estimate population density or population size for fairy shrimp. This study would help to resolve the current lack of quality data collected from USFWS protocols for fairy shrimp population estimates. Improved data quality would allow for more accurate monitoring of management activities for fairy shrimp under the VPMMP.
- Conduct studies to determine the extent of hybridization with versatile fairy shrimp and its effects on San Diego fairy shrimp reproduction, population genetics, and viability.
- Conduct genetic studies for fairy shrimp to better understand population genetics and the relationships between and among vernal pool complexes.
- Conduct studies on how to eradicate versatile fairy shrimp from vernal pools.
- Research the relationship between covered plant and fairy shrimp presence and/or densities to better understand which species, or assemblage of species, are the best for use in habitat-quality evaluation benchmarks.
- Research which pollinators are important to each of the covered plant species, where these pollinators occur, and how these species can be targeted in habitat restoration and management.

San Diego Association of Governments (SANDAG) is currently funding research on the genetics, hybridization, and conservation of San Diego fairy shrimp. The research project is being conducted by Andrew Bohonak, PhD, at San Diego State University and will include the following tasks:

- Evaluation of San Diego fairy shrimp genetics at the landscape level by quantifying the genetic variation across the species' range for individuals, within pools, and within complexes. This will include an interpretation of the genetic patterns in terms of landscape connectivity, disturbance, recreational activities, and other environmental parameters. Microsatellite markers will be developed to provide insight of the biological meaning of the two potential clades identified in Dr. Bohonak's mitochondrial DNA research of the species.
- Determination of the level of hybridization between San Diego fairy shrimp and versatile fairy shrimp by developing and applying morphological and genetic hybrid

indices to the two species across southern California. This will include a morphological review of historic vouchered specimens.

- From the results of the first two tasks, provide recommendations for management, conservation, and mitigation in terms of impacts on the genetic integrity and recovery of San Diego fairy shrimp.

Options for data collection and analysis efforts to better understand covered species population dynamics include the following:

- Perform vernal pool monitoring using the CRAM Vernal Pool Module. CRAM is a statewide program that looks at various wetland types across California, and it is important to incorporate the City's vernal pool data into the statewide CRAM database.
- Perform vernal pool monitoring using the HGM approach. While the data collection methods for the covered plant species can be used in the HGM evaluation, the covered shrimp species data collection methods are not adequate for this model. Collection of HGM-level crustacean data will provide key information for use in an HGM model, providing another method for habitat evaluation and adding to the HGM model database.
- Perform long-term trend analysis on vernal pool complex monitoring data to develop individualized monitoring and management triggers for each complex to allow for complex differences that are not being evaluated with the current methods (i.e., universal triggers for all VPHCP complexes).

CHAPTER 8 IMPLEMENTATION

This chapter describes implementation of the VPHCP, including the processes for adding conserved lands to the MHPA Preserve, amending the MHPA boundary and existing state MSCP permit, and annexation of private lands. The roles and responsibilities for VPHCP implementation are also defined. Funding for implementation the VPHCP is discussed in Chapter 10.

8.1 IMPLEMENTATION OVERVIEW

The City shall fully implement the VPHCP, including responses to changed circumstances. The City shall implement the VPHCP through permanent protection of existing City-owned land for the conservation of vernal pools, conservation of private lands through the development entitlement process, the permanent management and monitoring of these lands, and annual reporting to the Wildlife Agencies that accounts for all take authorized, conservation achieved, and compliance and effectiveness monitoring. The City shall extend take coverage to third-parties (i.e., private entities that receive coverage under the VPHCP) through development entitlements or a Certificate of Inclusion after confirming that a project within its jurisdiction is eligible for coverage and the project proponent has complied with all application requirements and other relevant terms of the VPHCP. As part of the development entitlement process for approved covered and future projects, owners of private properties and third-parties must submit a site-specific management and monitoring plan that is consistent with the requirements of VPHCP, VPMMP, and the City's LDM Biology Guidelines for approval by the City and Wildlife Agencies. The City shall report the relevant details of approved covered and future projects to the Wildlife Agencies and for monitoring developer compliance with the VPHCP conservation measures (see Chapter 5) and VPMMP (Appendix D). The Wildlife Agencies intend to manage and monitor their lands within the VPHCP Plan Area consistent with the goals and objectives of the VPHCP.

8.2 MHPA PRESERVE ASSEMBLY

Implementation of the VPHCP will expand the MHPA by 275 acres to include a total of 2,409 vernal pools located within a total of 53 vernal pool complexes (see Chapter 5). The expanded MHPA will be assembled through the development entitlement process via application of the ESL Regulations and/or acquisition. Opportunistic acquisition by the City and/or other entities through grant funds is encouraged.

The MHPA hardline Preserve areas for covered projects identified in Chapter 4 have been or will be incorporated into adopted project plans and entitlements and will be made conditions of individual project approvals. Specific project conditions (e.g., restoration or enhancement) would be identified through the development entitlement process.

Future projects will be required to follow the siting criteria in Figure 1 of the City's Biology Guidelines and all development regulations described below. For the purposes of the VPHCP, as shown in Table C-1 of Appendix C, it is assumed that 25% of all private and public lands that have not been conserved and are wholly within the MHPA will be potentially impacted by development (i.e., 75% conservation). Development under the VPHCP will be restricted to minimize impacts to vernal pools while allowing some reasonable use of the property. Therefore, this is a conservative assumption since any proposed development will be required to avoid the MHPA if more than 25% of the parcel is outside the MHPA. In addition, the Biology Guidelines require avoidance of vernal pools inside the MHPA to the maximum extent practicable.

Project proponents shall be required to fund permanent management and monitoring of the on-site vernal pool resources consistent with Chapter 7 of this VPHCP and the City's Draft VPMMP (Appendix D) that will ensure that the site is maintained in Management Level 1 status. In addition, all lands conserved as part of the development entitlement process shall be dedicated in fee to the City or placed within a Covenant of Easement with the Wildlife Agencies named as third-party beneficiaries.

If vernal pool restoration and/or enhancement is required, a project proponent shall post a performance bond or letter of credit with the City for grading, planting, irrigation, and 5 years of maintenance and monitoring of vernal pool mitigation (including a 20% contingency to be added to the total costs). At the end of the 5-year restoration/enhancement period, the site must be at a Management Level 1 status. The bond or letter of credit is to guarantee the successful implementation of the mitigation construction, maintenance and monitoring.

Lands that are within the VPHCP Plan Area, but not under the City's land use jurisdiction (e.g., state-owned mitigation property), would not be afforded Take Authority under the VPHCP, unless the non-federal land-owning entity applied for development approval or a Certificate of Inclusion consistent with the City's ESL Regulations.

8.2.1 Implementation Tools

The City shall implement the requirements of the VPHCP through (1) permanent conservation and/or management of existing open space with vernal pools, (2) exaction of future open space

within the MHPA through the development entitlement process, and (3) annual reporting on the status of ongoing management and monitoring of conserved vernal pool sites. Implementation of the VPHCP shall be consistent with the implementation regulations set forth by the City's ESL Regulations. The City's ESL Regulations help protect, preserve, and restore lands containing steep hillsides, sensitive biological resources, coastal beaches, sensitive coastal bluffs, or Special Flood Hazard Areas (SFHAs) and are regulated within Chapter 14, Article 3, Division 1 of the City's Municipal Code. The intent of the ESL Regulations is to ensure that development occurs in a manner that protects the overall quality of the resources, encourages a sensitive form of development, retains biodiversity and interconnected habitats, maximizes physical and visual public access to and along the shoreline, and reduces hazards due to flooding in specific areas while minimizing the need for construction of flood control facilities. The development regulations and guidelines for environmentally sensitive lands also serve to implement the MSCP and the VPHCP by placing priority on the preservation of biological resources within the MHPA.

8.2.2 Implementation within Existing Conserved Lands

The following City departments own lands in the existing MHPA: Park and Recreation Department, Open Space Division; Public Utilities Department, Water/Wastewater Divisions; Environmental Services Department; and Real Estate Assets Department (READ), READ/Airport Division. Chapter 10 of the VPHCP discusses the funding and options for implementation of the VPHCP.

The City shall continue to manage their lands consistent with the standards and requirements of the MSCP SAP. In addition, for the vernal pool complexes within the MHPA, the City shall provide management, monitoring, and reporting consistent with Chapter 7 of the VPHCP and shall implement the City's VPMMP (Appendix D). Existing resource/land management plans shall be updated to reflect the vernal pool management and monitoring requirements per the schedule included in the VPMMP.

Activities that may impact vernal pools within the Preserve will be limited to those identified in Chapter 4. Mitigation in accordance with the VPHCP, ESL Regulations, and City's Biology Guidelines will be required for all impacts.

8.2.3 Discretionary Actions Required to Implement the VPHCP

The City's General Plan provides public policy for the distribution of future land use, both public and private. The Conservation Element of the General Plan includes goals and policies for the protection, preservation, and long-term management of the City's open space and MHPA lands.

The City will amend the General Plan concurrently with adoption of the VPHCP to add policies related to the VPHCP and to revise the existing MHPA discussion and maps/graphics to include the expanded boundaries.

The City's Community Plans contain more detailed land use designations and community-specific details that will be used in the review process for both public and private development projects. The City will amend the Otay Mesa and Kearny Mesa Community Plans concurrently with adoption of the VPHCP to revise the land use maps to include the expanded MHPA boundaries. Policies related to the protection, preservation, and permanent management of vernal pool resources were added to the Otay Mesa Community Plan as part of the 2014 update process. Similar policies will be added to the Kearny Mesa Community Plan. Policies include the following:

- Require preservation, restoration, management, and monitoring within identified vernal pool preservation areas in accordance with City, state, and federal policies and regulations. The boundaries of vernal pool Preserve areas should be of sufficient size and shape to protect the vernal pool basins, watersheds, functional buffers, and areas necessary to maintain vernal pool ecosystem function and species viability.
- Design, as feasible, the Preserve areas to provide connectivity between vernal pools, surrounding open space, and nearby vernal pool complexes.
- Conduct management and monitoring of preserved and restored vernal pool sites in accordance with the city-wide regulations and Biology Guidelines.

Land development within the City is regulated by the LDC (Chapters 11 through 15 of the City's Municipal Code). The LDC *"sets forth the procedures used in the application of land use regulations, the types of review of development, and the regulations that apply to the use and development of land in the City of San Diego. The intent of these procedures and regulations is to facilitate fair and effective decision-making and to encourage public participation"* (Section 111.0102.). In addition, technical documents that set forth standards and guidelines have been established by the City in the LDM. These regulations and guidelines currently provide the tools to implement the City's MSCP SAP and will be modified to implement the VPHCP concurrently with adoption of the VPHCP. Any modifications to the Biology Guidelines require approval of the Wildlife Agencies (see Section 9.12 of the Implementing Agreement for the MSCP).

The City will amend the LDC/ESL Regulations and the LDM Biology Guidelines concurrently with adoption of the VPHCP.

8.3 EXISTING CITY MSCP NCCP PERMIT

To streamline existing state NCCP permits already in place, the City may use the information in the VPHCP to serve as the basis to request CDFW to evaluate and process/issue any necessary amendment(s) to and/or findings of consistency with the City's existing MSCP SAP, IA and state 2835 NCCP authorization to maintain state coverage for vernal pool habitat and the seven covered vernal pool species addressed in the VPHCP. Elements of the VPHCP that could require amending existing state permits include (but are not limited to) replacing the take/impact levels for vernal pool habitat and species, incorporating the covered projects and activities, including hardlined projects identified in Section 4 (Covered Projects and Activities) of the VPHCP, and adopting the adaptive management, monitoring and funding program identified in Sections 7 (Management, Monitoring, and Reporting) and 10 (Preserve Management and Funding Mechanisms) of the VPHCP. The management and monitoring provisions in the VPHCP, which are based on updated vernal pool mapping and surveying information, will replace the older MSCP provisions from the MSCP Framework Management Plan (FMP) for vernal pools and the seven covered subject species.

8.4 AMENDMENTS

During the implementation of the VPHCP, changes may arise due to new information, requests from private or public development seeking entitlements, or other modifications that are unforeseen. Changes that relate to mapping corrections, boundary line adjustments, or airport actions under the circumstances identified in Section 8.4.1 (mapping corrections), Section 8.4.2 (boundary line adjustments), or 8.4.3 (minor amendments) do not require a major amendment. Changes that would affect the level of conservation envisioned by VPHCP may be accommodated, in specific cases, through major amendment to the VPHCP, as described in Section 8.4.4.

8.4.1 Mapping Corrections

Mapping corrections are the simplest type of VPHCP revisions. Parcel level information was used to develop the VPHCP; therefore, it is anticipated that corrections would not be needed. However, in the unlikely event an error occurs in the spatial accuracy of the information, the geographic information system (GIS) data layer will be reviewed to ensure that the development and preservation areas are correctly identified and a boundary line correction can be processed. Mapping corrections will be submitted to the Wildlife Agencies for review and written approval. If approved by the Wildlife Agencies, such corrections will not require a major amendment to the VPHCP. The City will be required to track and include these changes in the VPHCP Annual Report.

8.4.2 Boundary Line Adjustments

Boundary line adjustments to the MHPA within the VPHCP Plan area may be made without the need for a major amendment to the VPHCP in cases where the new boundary results in an area of equivalent or higher biological value in the MHPA. A proposed boundary line adjustment will be required to evaluate the change in conservation levels and the change in impacts to vernal pools and covered species that would occur with the adjustment. This evaluation will be provided in the biological technical report and summarized in the environmental document. The determination of the biological value of a proposed boundary line adjustment shall be made by the City in accordance with the MSCP Plan (Section 5.4.2) and the VPHCP, and must receive the written concurrence of the Wildlife Agencies, prior to release of the environmental document for public review. The City shall summarize and track changes from boundary line adjustments in the VPHCP Annual Report. An adjustment that either Wildlife Agency determines does not meet the equivalency test will require a major amendment to this VPHCP.

8.4.3 Minor Amendments to the VPHCP

The Minor Amendment Process has been identified for two airports: Montgomery-Gibbs Executive Airport and Brown Field Airport. The Minor Amendment Process would allow impacts to vernal pool habitat and VPHCP covered species located within the legal boundaries of the airport properties (Figures 2-3 and 2-4) while meeting health and safety requirements of the airports.

Approval of a Minor Amendment requires a project submittal by the Permittee (Real Estate Assets, Airports Division) to Wildlife Agencies (USFWS Field Office Supervisor and CDFW's NCCP Program Manager) for a consistency determination with the VPHCP. The consistency determination would be based on the VPHCP; the VPMMP; funding for the required management, monitoring, and reporting activities; and the City's ESL and Biology Guidelines. If a project is consistent with the VPHCP, the Wildlife Agencies will provide a Letter of Concurrence and the project will proceed in accordance with the VPHCP.

Projects processed via a Minor Amendment that are issued a Letter of Conformance would be afforded the VPHCP benefits of a streamlined environmental and permit process including:

- Wetland deviation is not required for impacts outside the MHPA;
- Mitigation ratios are set to ensure consistent standards;
- Includes VPNNP;
- Covered Activities include all required airport maintenance and operations activities; and

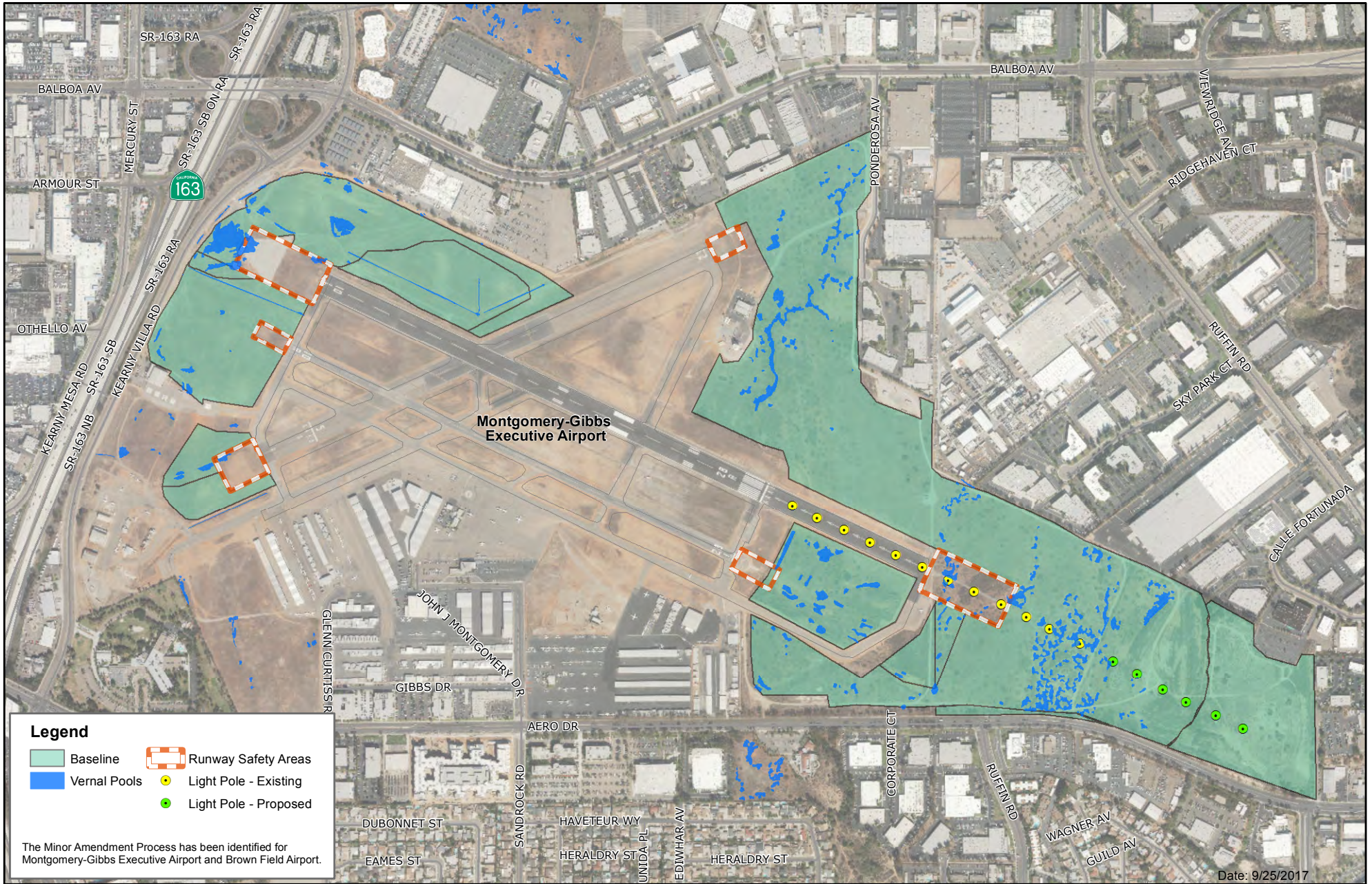
- If Section 7 consultation is required, USFWS issues a one-page Consistency Letter in lieu of a BO.

If a project is determined to be not in conformance, or if the Minor Amendment Process is not used, then the VPHCP benefits of the streamlined environmental and permitting process would not apply. Projects would be evaluated on a case-by-case basis consistent with the existing regulations for wetlands not covered by the VPHCP.

Montgomery-Gibbs Executive Airport

Montgomery-Gibbs Executive Airport totals 549 acres and consists of general aviation and non-aviation related businesses, runway, taxiways and aircraft and vehicle parking. General aviation encompasses all aviation except air carrier and military aircraft. General aviation aircraft include private, corporate, charter, air ambulance, law enforcement, fire rescue, flight training and cargo. The airport is located within the Kearny Mesa community planning area and is bounded by Aero Drive to the south, Kearny Villa Road to the west, Ruffin Road to the east, and Balboa Avenue to the north. Management and monitoring of on-site vernal pools are currently required pursuant to the City's MSCP/State NCCP permit and the 1994 BO for the Runway Extension (1-6-94-f-32).

A MHPA Boundary Line Adjustment (BLA) is being processed concurrently with the adoption of the VPHCP. The BLA would add vernal pools and surrounding habitat into the MHPA that have increased occupation by sensitive vernal pool resources and a higher habitat value. The addition acreage includes vernal pools with better hydrologic function and provides increased connectivity and better configuration of the vernal pool habitat located within the existing MHPA. The BLA results in a net increase of 13 acres to the existing MHPA and provides for the conservation of higher quality vernal pool habitat and sensitive species, as well as allowing for improved connectivity within the vernal pool complex and ability to restore, enhance, and manage the vernal pool resources. The BLA also removes the Runway Safety Areas (RSAs) from the MHPA in order to meet the Federal Aviation Administration (FAA) regulations and identifies areas of lower quality vernal pool habitat where development of aviation and non-aviation uses may occur. In addition, a wildlife hazard assessment study will be conducted and approved by the City and FAA to determine where, if any, mitigation could occur within the boundaries of Montgomery-Gibbs Field. Any impacts to vernal pool resources would be mitigated consistent with the VPHCP, Biology Guidelines, and ESL, in coordination with the FAA. Management and monitoring of the conserved vernal pool habitat would be consistent with the VPHCP and VPMMP. See Figure 8-1.



Path: S:\ERAIMSCP\VP\HCP\Vernal Pool HCP\DRAFT VPHCP 2016\MapFigures\MXD\VP\HCP_PlanArea_MontgomeryField_2016.mxd



VPHCP - Montgomery-Gibbs Executive Airport

THE CITY OF SAN DIEGO

Figure 8-1
(Minor Amendment Area)

Metropolitan Airpark at Brown Field

Metropolitan Airpark project (PTS No. 208889) at Brown Field includes the development and lease of supportive aviation and non-aviation facilities located on the 880-acre Brown Field Municipal Airport. The project consists of approximately 331 acres located north and south of the airport runway and is bound by La Media Road on the east, Otay Mesa Road on the south and Heritage Road on the west. Aviation uses would include a jet aviation fixed base operation and related support facilities; hangars, tie-downs, fuel station, and maintenance area for general and corporate aviation; a helicopter fixed base operation with hangars, a heliport, and an aviation hub for the San Diego Fire Department and other users. Supportive aviation and non-aviation related uses would include: a solar photovoltaic energy generation facility; an industrial park, and a commercial center that would include two business hotels, alternative fuels station, a bus transit station, and other commercial uses.

The project was approved at City Council on October 22, 2013 (Resolution 308483) and is currently in consultation with the USFWS to obtain a BO. Project impacts will be mitigated at a 5:1 ratio as part of the restoration, enhancement and long-term management of vernal pools and associated watersheds.

Metropolitan Airpark is in the process of obtaining a BO; however, the project is being included as take authorized areas in the VPHCP in case the VPHCP is authorized prior to the BO. Take authorized impacts would be mitigated consistent with the City's ESL Regulations, Biology Guidelines, and VPHCP, in coordination with the FAA. A wildlife hazard assessment study would be conducted and approved by the City and FAA to determine where, if any, mitigation could occur within the boundaries of Metropolitan Airpark.

8.4.4 Major Amendments to the VPHCP

Proposed actions that require Major Amendments to the VPHCP Plan include, but are not limited to, any of the following:

- Increased level of take/impact of a covered species.
- Addition of a covered species.
- Addition or substantial modification to a Covered Activity that could reduce conservation commitments in the VPHCP.
- Annexations that are inconsistent with the VPHCP.

- A material amendment, revision or update to the ESL or Biology Guidelines, General Plan or other local land use laws or ordinances that would affect implementation of the VPHCP in accordance with the Permit.

Major Amendments to the VPHCP shall require detailed analyses of the anticipated effects of the proposed action on the MHPA and covered species, sensitive habitats and species not addressed in the VPHCP, and the additional conservation to be provided through the Major Amendment process. Major Amendments shall be processed as Permit Amendments in accordance with all applicable federal and state statutory and regulatory requirements, including NEPA and CEQA. USFWS will provide technical assistance to the City during the amendment process. All Major Amendments to the VPHCP shall be memorialized through an addendum to the VPHCP and a Permit Amendment and shall be documented in the Annual Report.

8.5 TRANSFER OF TAKE AUTHORIZATION AND ANNEXATIONS

Take Authorization may be transferred to other jurisdictions who annex lands within the VPHCP Plan area, provided that the annexing jurisdiction commits to implement the VPHCP on the annexed lands. Transfer of Take Authorization shall be part of Annexation Agreements negotiated through the annexation process overseen by the Local Agency Formation Commission, and in addition, for purposes of the Permit, must be approved by the USFWS through partial transfer of the Permit and accompanying Assumption Agreement under 50 C.F.R. 13.25(b) and (c). If the conservation goals cannot be met or found equivalent, the VPHCP must be amended as described in Section 8.4.4, including CEQA and NEPA requirements.

Future annexations of land by adjacent jurisdictions must be consistent with the VPHCP's requirements, including the project review and approval process (see Section 8.2) if development is proposed in the annexed area. Conservation goals must not be compromised by development proposed in annexed areas. For all annexations to or from the VPHCP Preserve, the following steps must be taken:

- Notify the Wildlife Agencies in writing of all annexation proposals affecting the VPHCP Preserve boundary.
- Submit to the Wildlife Agencies, in the appropriate GIS format, proposals to adjust VPHCP boundaries.
- Submit findings that impacts proposed are consistent with the overall conservation goals and objectives and Preserve design strategy of this VPHCP.

- If no approved HCP/NCCP Plan exists for the jurisdiction to which the land is being annexed, the annexing jurisdiction must assure the City and the Wildlife Agencies that the jurisdiction will conform to this Plan and through transfer of the Permit and execution of the Assumption Agreement under 50 C.F.R. 13.25 (b) and (c).
- If an approved HCP/NCCP Plan exists for the jurisdiction to which the area is being annexed, the existing approved plan must be modified through the appropriate amendment process and the monitoring and management portion for that HCP/NCCP must be modified to assure that development design is consistent with overall conservation goals and the Preserve design strategy of this VPHCP. In addition, the annexing jurisdiction and the City must enter into an Assumption Agreement and comply with permit transfer regulations at 50 C.F.R. 13.25(b) and (c).

8.6 ROLES AND RESPONSIBILITIES

The City will administer the VPHCP, which will include oversight and coordination, habitat management and monitoring, comprehensive planning, and review and processing of public and private development projects for compliance with the VPHCP. Implementation of the VPHCP will require the coordinated action of several City departments to ensure compliance. City departments have been coordinating on the implementation of the City MSCP SAP since 1997. The implementation of the VPHCP will be folded into the existing implementation structure.

8.6.1 Permittee Responsibilities

Upon approval of the VPHCP, USFWS will issue the City a permit for take of impacts to the seven covered species. The City shall fully perform and fund all obligations assigned to it or carried out on its behalf by third parties under the VPHCP and the Permit, including but not limited, to the preserve assembly, management and monitoring obligations, the requirement to amend all applicable City ordinances as necessary to implement the VPHCP, funding of the VPHCP, and implementation of planned responses to Changed Circumstances. The City is responsible for ensuring compliance with the terms of the VPHCP and the Permit by third parties under the jurisdiction of the City as described in the VPHCP and shall use its police powers to enforce the terms of the VPHCP and the Permits.

Through the discretionary process, the City may extend VPHCP coverage to private entities within the permit area that are under the City's jurisdiction. Projects or activities to be covered by the VPHCP must be implemented in accordance with the terms and conditions of the VPHCP, and state and federal permits.

The City shall be responsible for implementing the following actions:

- Review proposed discretionary land use projects for consistency with the provisions of the VPHCP, the City LDC, LDM Biology Guidelines, General Plan, applicable Community Plan and implement VPHCP requirements through development approvals for each project.
- Adopt concurrently with the VPHCP amendments to the Land Development Code/ESL, Biology Guidelines, General Plan, Otay Mesa Community Plan, and Kearny Mesa Community Plan to ensure that they are consistent with the VPHCP.
- Facilitate and resolve issues, as applicable, related to the VPHCP with project proponents, public stakeholders, Wildlife Agencies, and City departments.
- Track and report annually on the all take authorized, conservation achieved and compliance and effectiveness monitoring as identified for the public and private sites in the Vernal Pool Management and Monitoring Plan consistent with Section 14 of the MSCP Implementing Agreement. Included in the annual report shall be an accounting of funds expended for management and monitoring as well as identification of the funding mechanisms for the following year.
- Implement management and monitoring efforts of vernal pool resources on City-owned lands consistent with the VPMMP and applicable area-specific Natural Resource Management Plans (NRMP) in perpetuity.
- Ensure that management and monitoring of vernal pool resources on third party lands that were used as mitigation for take authorized under the MSCP SAP and/or the VPHCP occurs in perpetuity, consistent with the VPMMP.
- Determine the acceptance and conditions of any land offered to the City from private owners through the land use entitlement process.
- Manage special funds established for vernal pool management and monitoring.
- Coordinate between City departments to implement the VPHCP management and monitoring strategy and to provide information for the annual VPHCP reporting.
- Coordinate with City departments for early review of lands with vernal pool resources within the MHPA that are being considered for lease or sale to ensure compliance with the VPHCP.
- Coordinate on the development of information for property owners requiring brush management to make sure they comply with the VPHCP. Utilize City-wide vernal pool

mapping in fire prevention planning and identification of access points that would avoid impacts to vernal pools. Coordinate with the Wildlife Agencies on the development of any wildfire access and management plans for consistency with the VPHCP.

- In the event of a conflict between the VPHCP requirements and other City development criteria, the City shall coordinate with the Wildlife Agencies to ensure that the requirements of the VPHCP and Permit are met.

Notify the Wildlife Agencies in writing of, and request their comment on, any proposed material amendments, revisions or updates to the Land Development Code/ESL, Biology Guidelines, General Plan, Otay Mesa Community Plan, and Kearny Mesa Community Plan that may affect implementation of the VPHCP a minimum of 60 days prior to adoption of such amendment, revision or update by the City. Any amendment, revision or update to such local laws, ordinances and policies that would impair the City's ability to implement the VPHCP and Permit may result in suspension or revocation of the Permit.

8.6.2 Wildlife Agency Responsibilities

The Wildlife Agencies will not be involved in approving take authorization for the City nor for private development projects to which the City extends take authorization under the Permit on a project-by-project basis except in limited circumstances or as required by this VPHCP. A small subset of the covered activities/projects will require additional review and approval by the Wildlife Agencies (i.e., projects that include an ESL/Wetland Deviation/biologically superior option) to ensure that the project is adequately analyzed, is consistent with the VPHCP and ESL/Wetland Deviations, and incorporates the conservation measures described in Chapter 5. Early consultation with the Wildlife Agencies for projects within the MHPA that require a wetland deviation will occur to ensure that concurrence is obtained prior to the release of the environmental document.

The primary responsibility of the Wildlife Agencies will be to review the City's compliance with the state and federal permits, and VPHCP. Reviewing and commenting on annual reports, monitoring reports (see Chapter 7), and CEQA documents will be a key means for the Wildlife Agencies to monitor compliance with the requirements of the VPHCP. In addition, the Wildlife Agencies intend to manage and monitor their lands that support vernal pool resources within the City, consistent with the biological goals and objectives of the VPHCP and governing state and federal law. As indicated above, CDFW could use the information in the VPHCP as the basis to evaluate and process/issue any necessary amendment(s) to and/or findings of consistency with the City's existing MSCP SAP, IA and state 2835 NCCP authorization (California Endangered

Species Act [CESA]/Permit No. PRT-830421) to maintain state coverage for vernal pool habitat and the seven covered vernal pool species addressed in this VPHCP.

8.7 TERMINATION

Upon ninety (90) working days written notice to Wildlife Agencies, the City may surrender the Permit. Consistent with the requirements of 50 C.F.R. §§ 17.32(b)(7) and 17.22(b)(7), the City will provide written evidence to the Wildlife Agencies that they have complied with all take minimization and mitigation obligations incurred under the Permit in full compliance with the VPHCP up to the date of withdrawal.

Notwithstanding surrender of the Permits, the City will remain obligated to minimize and fully mitigate for all take that occurred under the Permit up to the date of when the Permit was surrendered. Such mitigation obligations include the on-going duty to carry out all of its long-term management and monitoring obligations assumed under the VPHCP, the Permits with respect to habitat conserved/managed, or required to be conserved/managed, under the VPHCP, prior to the City's surrender of their Permit.

On and after the date of the City's surrender of their, no additional take under the Permit will be authorized, except for take resulting from Covered Activities that were approved by the City prior to surrender of the Permit in conformance with the VPHCP and Permit and for which all minimization and mitigation obligations have been satisfied or are assured. In particular, take associated with land development Covered Activities, approved by the City, and for which mitigation has been assured as provided in Sections 4.0 and 5.0 of the VPHCP will continue to be authorized under the terms of the Permit provided the City continues to carry out its obligations under the VPHCP, and the Permit with respect to such take.

In accordance with 50 C.F.R. §§ 17.22(b)(7) and 17.32(b)(7), USFWS will cancel the Federal Permit only upon its written determination that all take authorized under the surrendered Permit has been minimized and mitigated in accordance with the terms of the Plan, this Agreement, and the Permit.

CHAPTER 9

CHANGED AND UNFORESEEN CIRCUMSTANCES

On February 23, 1998, the Department of the Interior, USFWS, and the Department of Commerce, National Marine Fisheries Service codified the assurances provided through HCPs issued under Section 10(1)(1)(B) of FESA (USFWS and NMFS 1998). The USFWS “No Surprises” rule is codified at 50 C.F.R. 17.3, 17.22(b)(5) and 17.32(b)(5). This chapter addresses Unforeseen Circumstances (Section 9.1) and Changed Circumstances (Section 9.2), consistent with the “No Surprises” rule.

Unforeseen Circumstances is defined under the “No Surprises” rule as changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers and USFWS at the time of the conservation plan’s negotiation and development and that result in a substantial and adverse change in the status of the covered species.

Changed Circumstances is defined under the “No Surprises” rule as changes in circumstances affecting a species or geographic area covered by a conservation plan that can reasonably be anticipated by plan developers and USFWS and that can be planned for.

9.1 UNFORESEEN CIRCUMSTANCES

9.1.1 Assurances for Unforeseen Circumstances

Under the “No Surprises” rule, USFWS will not require the commitment of additional land, water, or financial compensation, or additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed to for species covered by the HCP without the consent of the City. Under the rule, USFWS will honor these assurances as long as a City is properly implementing the terms and conditions of the VPHCP, permit, and other associated documents. As indicated in the “No Surprises” rule at 50 C.F.R. 17.22(b)(6) and 17.32(b)(6): “Nothing in this rule will be construed to limit or constrain the Director, any Federal, State, local or Tribal government agency, or a private entity, from taking additional actions at its own expense to protect or conserve a species included in a conservation plan.” This provision only applies to species considered “adequately covered” under the VPHCP.

9.1.2 Finding of Unforeseen Circumstances

Pursuant to the No Surprises Rule at 50 CFR Section 17.22(b)(5)(iii)(C), USFWS has the burden of demonstrating that Unforeseen Circumstances exist using the best scientific and commercial data available. The findings must be clearly documented and based upon reliable technical information regarding the status and habitat requirements of the affected species. In its evaluation, the USFWS will consider, but not be limited to, the following factors:

- Size of the current range of the affected species.
- Percentage of range adversely affected by the VPHCP.
- Percentage of the range conserved by the VPHCP.
- Ecological significance of that portion of the range affected by the VPHCP.
- Level of knowledge about the affected covered species and the degree of specificity of the species' conservation program under the VPHCP; and
- Whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the affected species in the wild.

If either of the Wildlife Agencies or the City becomes aware of the existence of a potential Unforeseen Circumstance, they will immediately notify the other Agencies of the existence of the potential Unforeseen Circumstance. Except where there is substantial threat of imminent, significant, adverse impacts to a covered species, USFWS will provide the City and CDFW written notice within thirty (30) calendar days of a finding of Unforeseen Circumstances, during which time the Wildlife Agencies will meet with the City to discuss the proposed finding, provide the City an opportunity to submit information to rebut the proposed finding, and consider any proposed changes to the conservation strategies for the Preserve (i.e., the area conserved within the MHPA and existing conserved lands) and the VPHCP's operating conservation program. During the time necessary to determine the nature and extent of any additional or modified mitigation, the City will avoid contributing to appreciably reducing the likelihood of the survival and recovery of the affected species in the wild.

Pursuant to the provisions of the No Surprises rule, USFWS may impose additional mitigation or other measures on the City without its consent only to the extent allowed by and in conformance with the No Surprises rule currently codified at 50 CFR 17.22(b)(5)(iii)(A) and 17.32(b)(5)(iii)(A).

9.1.3 Effects of Unforeseen Circumstances or Jeopardy on Take Authorization

Notwithstanding the limits on conservation and mitigation framework identified above, the Permit for this HCP may be revoked for cause under 50 C.F.R. 13.28(a)(1) through (a)(4) or if USFWS determines that continuation of the covered activities would be inconsistent with the criterion set forth in 16 U.S.C. 1539(a)(2)(B)(iv). See 50 CFR 17.22(b)(8).

9.2 CHANGED CIRCUMSTANCES

Overview of Changed Circumstances

Changed Circumstances addressed by this VPHCP are limited to the following:

- Fire
- Vandalism
- Invasive plants
- Versatile fairy shrimp
- New listings of threatened or endangered species or designation/revision of critical habitat for a listed species
- Climate change
- Plane crash

The Changed Circumstances listed above represent all Changed Circumstances to be addressed by this VPHCP, with the exception of the new listing of a threatened or endangered species or designation or revision of critical habitat for a listed species, these Changed Circumstances are limited to those that are in or affect the MHPA. If Changed Circumstances occur within the MHPA, but before the land is lawfully dedicated or conveyed to the MHPA, the City is responsible for enforcing Planned Responses implemented by private property owners.

Each of the defined Changed Circumstances includes an assessment of risk, a description of preventative measures (where feasible), and a summary of Planned Responses (measures to be undertaken in the case of Changed Circumstances) as provided below. Preventative measures are those measures that are, or shall be, undertaken by the City to reduce the potential for occurrence of the Changed Circumstance, and/or that reduce the potential for damage to the MHPA resulting from a Changed Circumstance. Planned Responses are the specific responses that shall be undertaken in the event of a Changed Circumstance. Planned Responses will not include any actions beyond those identified in this chapter, nor for any event not identified as a Changed Circumstance. Planned Responses shall be implemented in a manner that is consistent with

protection of public health and safety requirements. Planned Responses shall be implemented by using the funding sources described in Chapter 10 for Changed Circumstances.

Relationship of Changed Circumstances to Adaptive Management

Preventative measures and responses to Changed Circumstances are generally addressed through the adaptive management element of this VPHCP. The adaptive management program requires monitoring of species and habitat conditions, with a management response to observed threats. In anticipating and reacting to Changed Circumstances, adaptive management allows for revisions to the operating conservation program, thereby enhancing future strategies for the conservation of species and their habitat. Changed Circumstances allow specific triggers and management actions to be applied to foreseeable threats. The funding calculations and funding commitments by the City include the costs of carrying out the preventative measures and adaptive management actions for Changed Circumstances described below. The adaptive management program presented in the VPMMP (Appendix D) allows this VPHCP to be revised as new information on the life history or ecology of covered species is gained through continuing research and/or as data regarding the effectiveness of mitigation measures (gained through the monitoring programs) are generated. As a result, revisions may be made to several of the VPHCP's conservation components, including land management and monitoring of covered species.

Changed Circumstances Considered but Rejected

Other potential changed circumstances were considered but rejected. For example, emergency situations and their corresponding remedial actions are not addressed under the VPHCP. While over the course of a 31-year permit term there will likely be emergency situations, it is impossible to predict exactly what types of emergencies may occur. Past emergency situations in the VPHCP Plan Area include, for example, pipeline breaks and police activity. Because of the difficulty in predicting the size, type, frequency, and effect of emergency situations, the City does not consider such events to be Changed Circumstances under the VPHCP. If such an emergency event occurs as a result of the City's facility or action, the City is responsible for any take, or harm to vernal pool species or habitat that may occur. The City will assume responsibility for the emergency situation and remedial measures if and when they do occur in the future, just as they would in the absence of a VPHCP permit.

9.2.1 Fire

Risk Assessment

Fires are natural phenomena in the Mediterranean climate of southern California. Frequent and intense fires can modify the natural landscape and pose a threat to public safety. Fire frequency and intensity influence community regeneration, composition, and extent. Due to the fragmented nature of most vernal pool complexes in the VPHCP Plan Area, a large-scale fire that would burn multiple vernal pool complexes is unlikely and, therefore, considered an Unforeseen Circumstance. However, a localized fire that burns an individual complex (e.g., Del Mar Mesa) is a foreseeable Changed Circumstance.

For purposes of this VPHCP, it is assumed that a catastrophic fire will burn two average-size vernal pool complexes (i.e., 50 vernal pools, based on the average number of pools within each complex in the VPHCP Plan area,) once every 10 years (based on average fire cycle for southern California).

Impacts from fire can occur within vernal pool complexes from the fire itself, as well as from the fire suppression activities. If not controlled, increased erosion and weed invasion may occur following a fire due to loss of upland vegetation in the watershed. In addition, pools may be damaged by emergency response vehicles and personnel during the fire suppression. Erosion is addressed below and weed invasion is addressed in Section 9.2.3.

Increased fire risk associated with climate change is addressed in Section 9.2.6.

Preventative Measures

The City has adopted Fire Safety and Brush Management Guidelines to reduce the risk of fire and create defensible space between structures and potential fuel sources (e.g., native vegetation). This defensible space slows down the fire, giving fire safety personnel time to stage and protect structures. In addition, during major wildfires, fuel breaks and backfires are often used to proactively fight fires. Preventative measures to reduce the likelihood of, and harm from, a single fire in the preserve are included in the adaptive management provisions in the VPMMP. In addition, such measures will be more specifically identified in the site-specific Resource Management Plans (that will be developed for each vernal pool site under the VPMMP framework), which will include a comprehensive strategy for reducing risks of negative effects from wildfire, including preventative actions and planning for fire suppression activities in advance.

Planned Responses

The Resource Management Plans will include fire management and protection measures that will minimize the risk of damage to habitats and natural communities from fire outside the normal range of wildfires. Preventative measures include the following actions:

- Create or redesign fuel breaks to limit fire spread.
- Work with local fire agencies to improve fire suppression preparedness and strategies to protect habitat during fire response.
- Incorporate public awareness programs into recreational plans and preserve site-specific Resource Management Plans.

Should a fire take place, preserve managers will follow protocols established in Resource Management Plans and work closely with local fire response crews to ensure that impacts on sensitive communities and covered species are minimized within safety limits. In addition, landscape-level monitoring will assess changes to land cover type, and natural community-level monitoring will assess the response of exotic plants. In the event of habitat loss, land management and habitat restoration measures will be implemented within affected preserve sites to ensure the reestablishment of native vegetation through active or passive management, as appropriate.

Within 30 days of a fire, City staff biologists and/or Preserve manager(s) will make a preliminary assessment of the effects of the fire within the Preserve areas. Based on the extent and severity of fire damage, as determined by City staff biologists and/or Preserve manager(s) with concurrence of the Wildlife Agencies, the City will develop and implement specific adaptive management tasks in accordance with the VPMMP and/or Resource Management Plans for specific preserve areas. Restoration, maintenance, and management activities are assumed similar to those described under Level 3 Management to restore covered species (see Chapter 7). Within 90 days of a fire, City staff biologists and/or preserve manager(s) will initiate management of burned Preserve areas, including: monitoring of natural regrowth within the damaged area for a period of 5 years, implementing measures to minimize the invasion by exotic species, and assessing potential for and implementing measures to prevent excessive soil erosion and/or changes to hydrology (i.e., recontouring may be needed to repair impacts from emergency vehicles). Qualitative and quantitative monitoring will be implemented to evaluate post-fire restoration success (based on pre-fire conditions). As data are gathered, adaptive management actions will be implemented and modified as needed to reduce potential threats and their adverse impacts. It is assumed that, following 5 years of post-fire restoration, a burned complex will be elevated to Stewardship (i.e., Management Level 1) monitoring and management, as described in Chapter 7. However, if the Wildlife Agencies, in coordination with the City, conclude that a burned

complex has not achieved Management Level I status within 5 years, the City will continue management actions until Management Level I status is achieved or the Wildlife Agencies conclude such actions are no longer necessary or effective.

9.2.2 Vandalism

Risk Assessment

While access control is required under the VPMMP, vandalism is still possible. Structures in the Preserve System such as gates, fences, or signs could be vandalized during the permit term. Such damage is considered reasonably likely to occur during the permit term and is therefore considered a changed circumstance. Remedial measures funded in the VPHCP include the repair or replacement of structures or facilities damaged by vandalism. In addition, the vernal pools themselves maybe impacted from intentionally damaging, destroying, or removing covered species. Examples include (but are not limited to) unpermitted grading, construction and use of new trails by mountain bikers, and off-road vehicle use. Vandalism can result in permanent impacts to covered species and reduce vernal pool ecological functions.

Preventative Measures

Measures to prevent vandalism include access control (installing and/or maintaining fencing and/or signage) and patrolling, which are activities that will be implemented by the City as part of Stewardship management (i.e., Level 1), as discussed in Chapter 7.

Planned Responses

If vandalism does occur, enhancement and/or restoration activities (see Chapter 7 for details) will be promptly implemented by the City to restore impacted areas to pre-impact conditions. For example, topographic reconstruction may be required to address illegal grading of vernal pool basins or watersheds. Seeding and/or installation of container plants may be necessary to restore impacted covered plant species. The time frame to complete enhancement and/or restoration of habitat and covered species populations will depend on the severity of impact from vandalism and will be determined by the City with the concurrence of the Wildlife Agencies.

9.2.3 Invasive Plants

For the purpose of defining Changed Circumstances, invasion of invasive exotic species is defined as an introduction of a species within a Preserve that has either (a) not previously been known to occur in the vicinity of the Preserve and has been noxious elsewhere; or (b) is a particularly noxious variety of nonnative species that is resistant to typical control measures.

Unforeseen Circumstances (which are not covered under this VPHCP) are defined as invasion within a Preserve of a species not currently known to be noxious elsewhere, but that becomes so upon introduction to the Preserve.

Risk Assessment

Invasive plant species are considered the greatest risk to the VPHCP covered species. Although invasive, exotic, or pest species of plants may currently exist within the areas identified for inclusion in the MHPA, they will be controlled through the adaptive management process. An unexpected and/or sudden increase in new invasive species may create the potential for a significant adverse effect on one or more of the covered species. Opportunities for increases in invasive species could occur as urban development expands in areas surrounding the MHPA (primarily in Otay Mesa) and/or increases in recreational use around the MHPA occur.

Preventative Measures

The VPHCP Management and Monitoring Strategy (Chapter 7) contains extensive preventative actions to monitor and manage exotic species both within the vernal pool basin areas and in the surrounding uplands. In addition, as site-specific Resource Management Plans are developed, they will identify specific actions to monitor, reduce, and/or eliminate such species. Invasive species will be monitored annually along with the conditions of the complex and the status of the covered plant species. Methods that will be implemented by the City as necessary to promote native species cover (thereby reducing potential for invasion of nonnatives) include weed control, seed bank enhancement and/or restoration, and installation of container plants.

Planned Responses

Responses to minimize or eliminate invasion by exotic species are incorporated into the VPMMP and will be included in the Resource Management Plans developed for individual preserve areas. If an invasion by exotic species occurs as a result of another Changed Circumstance identified in this section, the City staff biologists and/or preserve manager(s) will notify the Wildlife Agencies of this Changed Circumstance. The City staff biologists and/or preserve manager(s) will assess the damage caused by the invasion by exotic species and implement the following actions:

- Map invasive species and note abundance at each location;
- Recommend actions to address the threat(s) resulting from the invasion by invasive species (such actions may involve efforts to improve habitat conditions);

- Implement responses prescribed in the VPMMP or Resource Management Plans or as recommended by City staff biologists and or Wildlife Agencies; and
- Monitor the response of species/habitats to the action(s) taken.

If the influx of invasive species involves a species included on the California Invasive Plant Council (Cal-IPC) “List A” or state or federal “noxious” weeds, within 30 days of such notice to the Wildlife Agencies, City staff biologists and/or preserve manager(s) will assess and implement changes to adaptive management actions that may be necessary to control the invasive species. If the influx of invasive species involves a species listed on the Cal-IPC “Red Alert” list, City staff biologists and/or Preserve manager(s) will also notify other relevant agencies as recommended by Cal-IPC. Within 30 days of obtaining responses from the agencies contacted, recommendations of the agencies will be used by the City, with concurrence of the Wildlife Agencies, to determine appropriate modifications to adaptive management procedures in the affected portion of the Plan area and to implement appropriate responses.

9.2.4 Versatile Fairy Shrimp

Risk Assessment

Specific threats to the San Diego fairy shrimp include the hybridization and direct competition with the versatile fairy shrimp. The versatile fairy shrimp is common throughout western North America, is found in a wide variety of habitats, and tends to inhabit disturbed sites (Gonzalez et al. 1996). The versatile fairy shrimp has been documented within the range of the San Diego fairy shrimp in relatively disturbed pools at Otay Mesa, MCAS Miramar, Carmel Mountain, and MCB Camp Pendleton. The two species are known to hybridize in the laboratory (Fugate 1998) and in the field (Simovich et al. in press). If hybridization becomes too frequent in the natural environment, the unique genetics of San Diego fairy shrimp could be lost. Although the known distribution of versatile fairy shrimp is still fairly limited within the range of the San Diego fairy shrimp, hybridization and competition could threaten the San Diego fairy shrimp in the future should the range of the versatile fairy shrimp expand (USFWS 2008a).

Another recent issue of concern for San Diego fairy shrimp reproduction and genetics is the cytoplasmic incompatibility induced by *Wolbachia* (or similar) endoparasitic bacteria. These bacteria reside in the intracellular space of reproductive tissue of many invertebrates and are maternally inherited from generation to generation. If males and females are infected with different strains of the bacteria, they are usually not reproductively compatible. Because of this, the bacteria can initiate lineage isolation and speciation (Werren et al. 2008). In addition to incompatibility, the bacteria also can lead to biased sex ratios, parthenogenesis (female asexual

reproduction), feminization of males, and a high juvenile male mortality. There is substantial evidence that the versatile fairy shrimp harbors feminizing endoparasitic bacteria (Krumm 2006). While there is no evidence of the bacteria in San Diego fairy shrimp, the potential hybridization of the two species suggests that this could be a concern for the genetics and reproduction of the San Diego fairy shrimp.

Preventative Measures

To prevent introduction of versatile fairy shrimp in vernal pools, the City will require that staff and contractors performing monitoring or restoration of vernal pools clean their shoes and equipment to avoid any artificial dispersal of fairy shrimp cysts. The City will also require additional measures to prevent introduction of versatile fairy shrimp at vernal pool complexes as identified in Chapter 5 (Section 5.3.2).

Planned Responses

If monitoring detects versatile fairy shrimp at a vernal pool complex managed under the VPMMP, management priorities will be adjusted to use existing funds (see Chapter 10) to adaptively manage and monitor the complex to address this issue as directed by USFWS.

9.2.5 New Listing or Designation of Critical Habitat

Risk Assessment

The future listing of a species that is not covered by the VPHCP or the designation or revision of critical habitat of a listed species is a Changed Circumstance.

Planned Responses

The City will evaluate the potential impacts of covered activities on the newly listed species or newly designated/revised critical habitat. The City will avoid taking action that would result in take of or jeopardy to a newly listed species or adverse modification of critical habitat of a listed species as determined by the Wildlife Agencies in coordination with the City.

In the event that a non-covered species is proposed for listing, City and Wildlife Agencies will jointly identify measures that the City could follow to include the newly listed species as a covered species under the VPHCP. The City may request that USFWS and CDFW add the species to the Section 10(a)(1)(B) permit and NCCP permit, respectively. In determining whether to seek incidental take coverage for the species, the City will consider, among other things,

whether the species is present in the permit area and if otherwise lawful activities could result in incidental take of the species. If incidental take coverage is desired, the Plan and permits could be modified or amended. Alternatively, the City could apply for new and separate permits. If the City does not implement the agreed upon measures, prior to the City's issuance of any permit for land development, clearing, and/or grubbing, project proponents must obtain independent incidental take authority for any listed, non-covered species through appropriate federal and/or state permit processes.

9.2.6 Climate Change

To manage for the variable risks that may result from climate change, a robust decision-making approach is used. A robust decision-making approach is more useful when considering climate change as it may result in a range of various conditions, rather than an adaptive management approach, which tends to focus on meeting specific conditions that can be difficult to approach or may not happen (Stein et al. 2014). Risks to vernal pools and covered species associated with climate change include (but are not limited to):

- Drought (i.e., less than 55% average rainfall for 7 consecutive years)
- Increased fire (frequency and/or area burned)
- Weed invasion

Drought

Drought is a cyclical weather phenomenon that is beyond human control. Drought is not uncommon in southern California, and it is a phenomenon to which vernal pool habitats and vernal pool species have, of necessity, adapted over time through development of seed and cyst banks.

The climate change model simulations indicate that San Diego will retain its strong Mediterranean climate with relatively wetter winters and dry summers. Projections of future precipitation have mixed results: three of the simulations become drier (12–35% drier than historical annual average) and three are wetter (12–17% wetter than historical annual average) overall. This reflects the reality that precipitation cannot yet be modeled with the same degree of consistency as other climate change parameters. The models vary in their projections of storminess, but none show a significant change from past patterns. One important aspect of all of the climate model projected simulations is that the high degree of variability of annual precipitation that the region has historically experienced will prevail during the next five decades. As such, the VPHCP will use the historical precipitation record to help identify drought conditions.

Indirect impacts to covered species from drought may include a reduction in basin ponding time and/or frequency, thereby reducing species viability and reproduction potential.

The potential for drought to impact vernal pool plant and crustacean species increases with the length of a drought. Per the VPHCP's monitoring strategy (Chapter 7), 55% of average rainfall represents a dry year where proper expression of vernal pool flora and fauna cannot occur. A review of the past 162 water years (Water Year, 1850–2012),¹¹ has indicated that 21 (12.9%) of the years have received less than 55% (13.9 centimeters at Lindbergh Field) of average rainfall. Bauder et al. (2009) includes the timing of precipitation as well as the annual total. The Bauder definition results in 43 (26.5%) dry years within the 162-year record, with 3 years having occurred only three times and never for 3 consecutive years.

For the purposes of this VPHCP, a drought consisting of 7 consecutive dry years (less than 55% of average rainfall, including timing of precipitation) is considered a Changed Circumstance. A drought lasting longer than 7 years is not foreseeable and would be considered an Unforeseen Circumstance.

Increased Fire

Climate change can also influence fire frequency within the VPHCP Plan Area. Fire occurrence in California has been correlated with drought, moisture availability, and biomass (fuel) accumulation (Lenihan et al. 2003). Although climate change models predict different climate scenarios, many predict a dryer and warmer climate, which would result in more frequent or longer drought periods. An increase in drought frequency or longevity has the potential to increase fire frequency. For purposes of addressing Changed Circumstances in this VPHCP, it is assumed that fire occurrence frequency and area burned will increase by 25% by 2050.

Weed Invasion

Drought induced by climate change may also indirectly result in increased weed invasion in native habitats, including vernal pools and surrounding watersheds. Weed invasion is likely following a fire event. A reduction in native plant populations as a result of drought could lead to invasion of drought-tolerant invasive plant species.

¹¹ Data are from Lindbergh Field.

Source: 1850–1913: <http://www.wrh.noaa.gov/sgx/climate/san-pcpn.htm>

Source: 1914–2005: <http://www.wrcc.dri.edu/cgi-bin/cliMONtpre.pl?casand>

Source: 2006-2012: <http://www.wrh.noaa.gov/sgx/obs/rtp/linber.html>

Preventative Measures

Conservation measures in the VPHCP are not sufficient and comprehensive enough on their own to prevent the effects of climate change on vernal pool resources. However, certain risks associated with climate change can be minimized with preventative measures. Preventative measures are provided for fire in Section 9.2.1 and weed invasion in Section 9.2.3.

Planned Responses

Drought

To address drought, in coordination with the Wildlife Agencies, conservation of existing species populations will be implemented through collection of seed and shrimp cysts for storage and possible future reintroduction at a time deemed appropriate by City and the Wildlife Agencies.

Increased Fire

Planned Responses for fire are provided in Section 9.2.1. It is assumed that the frequency and/or duration of Planned Responses for fire would increase as a result of climate change. No additional planned responses to increased fire due to climate change are warranted.

Weed Invasion

Planned Responses for weed invasion are provided in Section 9.2.3. It is assumed that the frequency and/or duration of Planned Responses for weed invasion would increase as a result of climate change. No additional responses to weed invasion due to climate change are warranted.

9.2.7 Plane Crash

Risk Assessment

The vast majority of airplane crashes occur during the approach or landing stages of flight. During these phases, airplanes are closer to the ground and more vulnerable to an accident. Therefore, it is reasonable to assume that an airplane crash would most likely occur at the City's existing airports (Brown Field, Montgomery-Gibbs Executive Airport). An airplane crash at an existing City airport that impacts vernal pools is considered a change circumstance, A crash outside of the airport boundary (and impacting a vernal pool complex that is not within airport property) would be considered unforeseen.

Preventative Measures

The City cannot prevent a plane crash, but measures to reduce the potential for an airplane crash at the City's airports include implementation of and adherence to the airport and Federal Aviation Administration's standard safety protocols and procedures.

Planned Responses

In the unlikely event of an airplane crash at one of the City's airports, necessary emergency response would be deployed. If impacts to vernal pools occur as a result of a plane crash or subsequent emergency response activity, post-crash impacts would be evaluated by the City and mitigation would be required consistent with the Mitigation Framework in the VPHCP.

CHAPTER 10

VPHCP FUNDING

This chapter is based on a financial analysis prepared for the City by SANDAG’s Service Bureau (SANDAG 2012). Please refer to that document for an overview of the City’s finances, the process used to identify and select funding mechanisms, the amount of funding required for implementation of the framework VPMMP, and proposed funding options for the VPHCP. The detailed cost analysis for the VPMMP is provided in Appendix E. The information included in these two documents was used to determine the potential funding amounts and mechanisms for implementation of the VPHCP as described below in this chapter.

10.1 FUNDING OVERVIEW

The City relies on many sources of revenue to pay for operations, such as taxes, fees, licenses, permits, interest earnings and dividends, and rents and concessions, as well as revenue from federal and other agencies (e.g., federal and state grants, allocations of federal and state funds for transportation and public safety programs). Revenues included in the City’s budget are the following seven funds: General, Enterprise, Special Revenue, Internal Service, Capital Improvement Program and Capital Project Funds. The General Fund, about 39.5% of the City’s total budget, is the only fund from which expenditures are authorized by the City Council and is, therefore, discretionary. The latter five funds account for about 60.5% of total fiscal year (FY) 2017 budgeted revenues of \$3.4 billion and are allocated to specific uses. For example, one of the Special Revenue Funds (Environmental Growth) was established for the “exclusive purpose of preserving and enhancing the environment of the City in whatever manner is deemed appropriate by the City Council.”^{12,}

The City’s expenditures are budgeted from the same seven funds listed above, in addition to a Capital Improvements Program (CIP), as shown in Figure 10-1. These funds are described below in order of magnitude, from largest to smallest.

¹² City of San Diego Charter Section 103.1a.

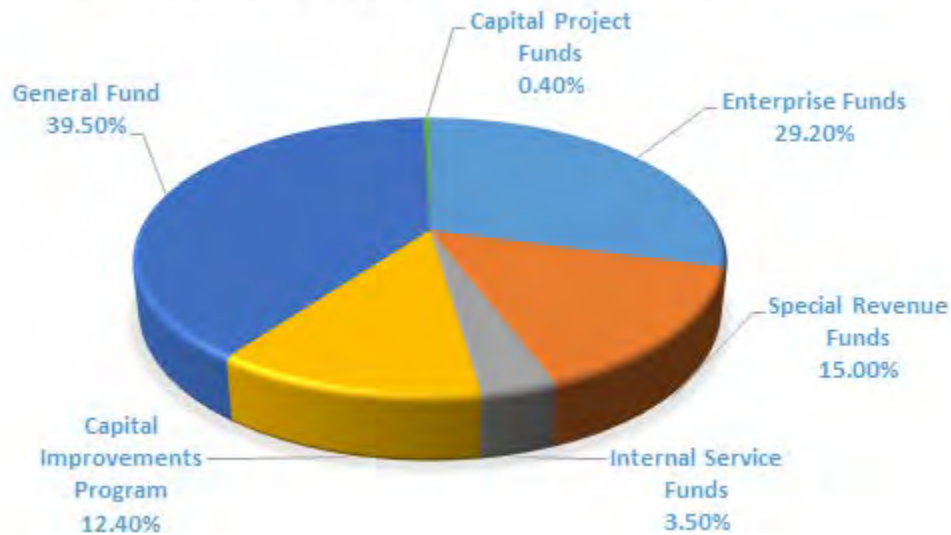


Figure 10-1. City of San Diego Expenditures FY 2017 Adopted Budget: 3.4 Billion

10.1.1 General Fund

The General Fund is used to provide community services, such as public safety (police and fire protection and rescue), transportation, storm water, parks and recreation, library services, public works, and refuse collection. It also supports administrative functions including finance, legal, and human resources. Over half of the revenue for the General Fund comes from property tax and sales tax. Other major revenue sources include a portion of the transient occupancy tax, which is a tax imposed on occupants of hotel and motel rooms in the City of San Diego, as well as franchise fees, which are fees resulting from agreements with private utility companies in exchange for use of the City's ROWs. The General Fund accounted for 39.5%, or \$1.3 billion, of the City's total FY 2017 expenditures.

10.1.2 Enterprise Funds

There are several Enterprise Funds that account for specific services funded directly through user fees. A user fee is a charge for use or consumption of a specific public service. These funds include Water, Sewer, Refuse Disposal, Recycling, Golf Course, and Airports. Revenue generated from these funds must be spent on the purpose for which the fund was generated. For example, sewer fees must be spent on sewer infrastructure. Typically, these funds are intended to be fully self-supporting and are not subsidized by the General Fund. The Enterprise Funds account for 29.2%, or \$990.8 million, of the City's total FY 2017 expenditures.

10.1.3 Special Revenue Funds

Special Revenue Funds account for revenues received that must be used for specific purposes. There are nearly 40 such funds in the City's FY 2017 approved operating budget, the largest of which are the Transient Occupancy Tax Fund and the Underground Surcharge Fund. For example, transient occupancy taxes are to be directed toward promoting the City as a tourist destination, general government purposes (the General Fund), and other purposes approved by the City Council. Surcharges on San Diego residents' electricity bills are collected in the Underground Surcharge Fund and are to be used for under-grounding overhead utilities such as electricity, telephone, and cable. The Special Revenue Funds account for 15%, or \$506.9 million, of the City's total FY 2017 expenditures.

The special funds that will be used for the VPHCP are the Environmental Growth Fund (EGF Fund No. 200111) and Open Space Special Funds. The EGF comes from franchise fees and was established for the exclusive purpose of preserving and enhancing the environment of the City (City Charter Section 103.1a). Most of the Open Space Special Funds may be used only in specific vernal pool complexes (i.e., Carroll Canyon) while others, such as the Vernal Pool Preservation Program, may be used City-wide for research and maintenance of vernal pools and habitat.

10.1.4 Internal Service Funds

Internal Service Funds are created to finance and account for services provided by one City department to another City department. As such, the fund's expenses are repaid by fees or fund transfers from other City departments and account for 3.5%, or \$117.9 million, of the City's total FY 2017 expenditures.

10.1.5 Capital Project Funds

Capital Project Funds are primarily used for the acquisition or construction of major capital facilities. The FY 2014 budget is composed of the Capital Outlay Fund, *TransNet* Extension Fund, and *TransNet* ARRA Exchange Fund (American Recovery and Reinvestment Act of 2009). The Capital Project Funds account for 0.4%, or \$13.3 million, of the City's total FY 2017 expenditures.

10.1.6 Capital Improvements Program (CIP)

The FY 2017 budget includes a Capital Improvements Program (CIP) for large construction projects such as the development of park land, the construction of an overpass, the acquisition of land, or the construction or remodeling of City buildings. Funds for these projects are derived from the issuance of bonds, water and sewer fees, a one-half cent local sales tax for

transportation improvements (*TransNet*), state and federal grants, and development impact fees. CIP spending represents 12.4%, or \$421.0 million, of total FY 2017 expenditures.

10.2 VPHCP FORECASTED COSTS

The City will administer the VPHCP, which will include oversight of habitat management and monitoring, comprehensive planning, and review and processing of public and private development projects for compliance with the VPHCP. The staffing within each department is programmed annually and resources will be allocated to ensure City responsibilities are met.

10.2.1 Preserve Assembly Costs

Assembly of the preserve does not require public acquisition of private property. Instead, lands were added to the MHPA under the VPHCP based on existing conserved lands with vernal pools as well as land inside the VPHCP Plan Area with vernal pools and/or where vernal pools could be restored that will be added to the MHPA through the project entitlement process and opportunistic acquisition (refer to Chapter 5 and Chapter 8 for more detail).

10.2.2 Management and Monitoring Costs

A detailed programmatic cost analysis for implementing monitoring and management of vernal pools conserved under this VPHCP over the life of the MSCP permit (assumed 31 years) has been prepared, and is included in Appendix E. The cost analysis is intended to estimate a total program cost for implementation of the monitoring and management associated with the VPMMP, including one-time and ongoing annual costs.

The cost estimate is based on 2014 dollars, not including inflation. The City assumes, in general, an inflation rate of 2 to 3% will be applied when determining the budget for the VPHCP program on an annual basis. Annual budget allocation for the VPHCP management and monitoring program will be guided by the programmatic cost estimate included herein, but will be further refined, as needed, based on a variety of factors, including (but not limited to) results of annual monitoring and associated management recommendations and anticipated environmental conditions (e.g., El Nino, drought).

Monitoring and management costs are estimated based on the activities outlined in the City's framework VPMMP (Appendix D), which was developed using the Adaptive Management and Monitoring Strategy discussed in Chapter 7. The VPMMP is a framework plan that provides management and monitoring strategies, directives, and recommendations for lands containing vernal pools in the MHPA to manage and/or restore their biological functions, with particular

attention on the seven covered species. With adoption of the VPHCP, the City shall be responsible for implementing the VPMMP on lands subject to City jurisdiction or under City ownership. As additional vernal pool preserve areas on private lands are added to the MHPA through the development process, the City shall require the landowner to provide the funding necessary to permanently manage the conserved pools to the level identified in the VPMMP.

Cost estimates for implementation of the VPMMP are based on the assigned management and monitoring level for each site (Appendix A of the VPMMP). Refer to Appendix E for more details on the costs associated with each management and monitoring level (Management Level 1, 2, or 3). Management Level 1 (Stewardship) requires the least amount of management and monitoring (compared to the level of effort and resources required for activities under Management Levels 2 and 3) and, therefore, is the least costly. Management Level 3 (Restoration) requires the most intensive amount of management and monitoring (generally includes all Management Level 1 activities, plus additional restoration activities) and, thus, is the most costly.

While implementation costs have been generated for each vernal pool complex managed under the VPHCP, the costs have been generated based on broad, program-level assumptions. For example, some estimated costs were developed using preserve-wide assumptions based on average complex size, average occurrence of vernal pool focal species, average number of vernal pools within a complex, etc. These assumptions are summarized in the following sections and described in further detail in the attached tables. The purpose of this cost analysis is to identify a program-level cost estimate for implementation of the overall VPHCP management and monitoring program so that the City can target appropriate funding sources. At a site-specific level, some sites may require more funding and some may require less, therefore site-specific costs will be reevaluated when management and monitoring are implemented at a specific site. Costs can and should be tailored to reflect specific management and monitoring needs identified for a complex beyond what is assumed in this program-level cost analysis. The amounts shown in Tables 10-1, 10-2, and 10-3 are intended to provide a realistic estimate of management and monitoring costs for purposes of evaluating and selecting funding options. Notwithstanding the broad cost estimates provided in this chapter, the City commits to fully fund the VPHCP for the life of the permit, as well as perpetual management and monitoring of conserved lands.

Table 10-1 summarizes the one-time costs for implementation of the VPMMP-required restoration and enhancement of complexes at Management Level 2 or 3, improving to Management Level 1. One-time costs are for an initial 3-year period of monitoring and management for Level 2 complexes and a 5-year period for Management 3 complexes, as well as one-time hydrological surveys (for all complexes) and fence and sign installation (for complexes where needed; refer to Table E-12 in Appendix E). The North Planning Unit does not have any

one-time costs because all complexes are already at Management Level 1. While these costs are identified as one-time costs, the City understands that management and monitoring of particular sites at a Management Level 2 or Level 3 management due to Changed Circumstances, or otherwise, may be necessary under the VPHCP and commits to fund the necessary level of management and monitoring as necessary notwithstanding the amounts shown in Table 10-1.

Table 10-1
One-Time Costs (2014 dollars) to Restore and Enhance Vernal Pool Complexes
within the VPHCP to Management Level 1*

Planning Unit**	City Costs	Non-City Costs	Total Costs
North	0	0	0
Central	31,347	47,455	78,802
South	296,289	1,040,791	1,337,080
Subtotal	327,635	1,088,246	1,415,881
Fence/Sign Installation	180,681	450,892	631,573
Baseline Hydrological Surveys	77,482	71,694	149,176
TOTAL ONE-TIME COSTS	585,798	1,610,832	2,196,630

* The estimates in this table are program-level; at a site-specific level, it is understood that site-specific costs will be reevaluated when management and monitoring are implemented.

**VPHCP Planning Units (See Figure 2-1):

North – North of SR 52, east of I-5, and some areas along I-15 and SR 78

Central – South of SR 52, north of SR 94, and west of I-5

South – East of I-805, south of SR 94, and north of the international border between the U.S. and Mexico

Table 10-2 summarizes the annual ongoing costs to maintain each complex managed under the VPMMP at Management Level 1.

Table 10-2
Annual Ongoing Costs (2014 dollars) for
Management Level 1 Vernal Pool Complexes

Planning Unit*	City Costs	Non-City Costs	Total Costs
North	85,914	137,409	223,323
Central	69,056	25,616	94,672
South	123,230	161,533	284,762
Subtotal of Planning Units	278,199	324,558	602,757
Reporting/Data Tracking and Analysis	35,360	0	35,360
Changed Circumstances	58,402	0	58,402
Annual Contingency	30,687	0	30,687
TOTAL ANNUAL ONGOING COSTS	402,647	324,558	727,205

*VPHCP Planning Units (See Figure 2-1):

North – North of SR 52, east of I-5, and some areas along I-15 and SR 78

Central – South of SR 52, north of SR 94, and west of I-5

South – East of I-805, south of SR 94, and north of the international border between the U.S. and Mexico

Table 10-3 includes a total cost estimate for VPMMP implementation over the 31-year life of the Permit (in 2014 dollars). The total cost for VPMMP implementation during the permit term was estimated based on the total of the one-time costs for the required monitoring and management level (for applicable complexes) plus the annual ongoing Management Level 1 costs for all complexes managed under the VPMMP. These costs do not include the annual costs of permanent management and monitoring once the permit ends. The annual costs of perpetual monitoring and management will be the same as what is shown in Table 10-2 (as adjusted for inflation).

Table 10-3
Total One-Time and Annual Ongoing Costs (2014 dollars)
for Vernal Pool Complexes within the VPHCP

Planning Unit*	City Costs	Non-City Costs	Total Costs
North	2,663,325	2,667,408	5,330,733
Central	1,925,818	858,630	2,784,448
South	4,046,736	4,941,957	8,988,693
Subtotal	8,635,879	8,467,995	17,103,874
Baseline Hydrological Surveys	77,482	71,694	149,176
Fence/Sign Installation	180,681	450,892	631,573
Reporting/Data Tracking and Analysis	1,096,160	0	1,096,160
Changed Circumstances	1,810,448	0	1,810,448
Total Contingency	951,288	0	951,288
TOTAL COSTS	12,751,938	8,990,581	21,742,518

*VPHCP Planning Units (See Figure 2-1):

North – North of SR 52, east of I-5, and some areas along I-15 and SR 78

Central – South of SR 52, north of SR 94, and west of I-5

South – East of I-805, south of SR 94, and north of the international border between the U.S. and Mexico

Annual ongoing costs assume that all complexes will be maintained at Management Level 1 monitoring and management. However, over time, it is realistic to anticipate that some complexes may decline to Management Level 2 or Level 3. Therefore, an annual contingency is assumed to account for potential additional monitoring and management costs associated with a decline in a complex's management level (e.g., Changed Circumstances such as weed invasion or vandalism, as described in Chapter 9). An annual contingency of \$30,687 (in 2014 dollars) is appropriate to account for additional costs associated with complexes declining from Management Level 1 (refer to Appendix E for further assumptions related to the contingency amount). In addition, costs are estimated at a programmatic level and based on average costs across all complexes managed under the VPMMP. It is expected that costs may fluctuate between complexes and between years of implementation. The City shall allow for unexpended project funds, including any contingency funds, to be used in future years. The City would be responsible for contingency costs up to a total of an estimated \$ 951,288 and costs of change circumstance up to a total of an estimated \$1,810,448 during the life of the Project (31 years). See Appendix E for more detail.

It should be noted that the costs shown in Tables 10-1, 10-2, and 10-3 are in 2014 dollars, as indicated. When determining final funding amounts on an annual basis, the City will adjust costs based on the previous year's inflation rate. For example, assuming an annual inflation rate of 3% applied to the cost estimates as shown in Table 10-3 and the VPHCP is adopted in 2017, the total cost estimate for One-Time Costs and Annual Ongoing Costs would be approximately \$2,400,317 and \$794,637, respectively

10.3 VPHCP FUNDING MECHANISMS

There are several existing funding sources that would be applied, in part or entirely, toward vernal pool HCP funding. These include monies appropriated within the City's budget, and special funds within the Park and Recreation, Open Space Division designated for vernal pools management (Table 10-4).

Table 10-4
Balances for EGF and Other Special Funds

Fund Name	Fund Number	Fund Balance*	Resolution Numbers	Purpose
Environmental Growth Fund – Maintenance & Operations (1/3)	200111	\$886,310	O-19159	Preservation and enhancement of the environment.
Vernal Pool Preservation Fund	200400	\$291,147	R-306373	City-wide: Purchase, research, and maintenance of vernal pools and associated habitats.
Land Management Fund for 2009 Section 6 Grant Properties	200699	\$97,861	R-305008	Management, maintenance, and monitoring of properties acquired with 2009 Section 6 grant: Clayton, Southwest Village 1-acre (APNs 645-074-06, 645-074-19, 645-074-09, 645-074-12, 645-0756, and 645-075-20).
The Environmental Trust Fund (TET) Growth Fund	820063	\$331,671 non-spendable and \$6,430.89 spendable	R-302151	Management and monitoring of properties acquired through TET bankruptcy: Wruck Canyon, West Otay Mesa B and C, Southwest Village 1 acre (APNs 645-075-08, 645-074-08, 645-074-18, and 645-075-09).
Carroll Canyon Vernal Management Fund	200407	\$155,717	R-306373 R-277584 RR-277584	Development Agreement with Bob Baker Enterprises for management, maintenance, and preservation of Carroll Canyon Vernal Pool Preserve.
Carroll Canyon Vernal Pool Mitigation (Salk MOU)	200711	\$2,482,370 non-spendable and \$58,534 spendable.	R-308060	Restoration, management, monitoring, and preservation of Carroll Canyon Vernal Pool Preserve.
Crescent Heights Habitat Management	200701	\$122,189 non-spendable and \$8,502 spendable	R-307497 and RR307497.	Management, monitoring, and preservation of vernal pool at Crescent Heights.

*Balance as of April 11, 2017.

Park and Recreation Department Open Space funding originates from the General Fund and, as such, the dollar amount appropriated annually (i.e., how it is to be used) is ultimately directed by the City Council. Park and Recreation Department has determined that funding of the annual management and monitoring of their lands consistent with the VPMMP would be achieved through the EGF (80%), General Fund (15%), and Special Funds (5%). These percentages are approximate and may vary from year to year.

Management and monitoring activities on vernal pool lands owned/managed by City of San Diego Public Utilities Department would be funded through the department's Operations and Management Fund numbers 700000, 700001, and 700011. The Marron Valley Cornerstone Lands Conservation Bank is owned by the Public Utilities Department. Funds generated from this bank may also be used to maintain and manage the Cornerstone Lands including Proctor Valley, Marron Valley, and Otay Lakes, which contain vernal pools. The endowment subaccount is funded by the endowment fee of \$3,000 collected for every mitigation credit sold and may only be used for management at Marron Valley. Funding of management and monitoring activities on vernal pool lands owned/managed by Environmental Services would be funded through the Refuse Disposal Fund number 700039.

10.3.1 Funding for One-Time Costs

One-time costs would be incurred to restore and enhance the vernal pools to a Management Level 1 condition, as detailed in Chapter 7. Potential funding sources for one-time costs are listed below:

- **Private Exactions:** As additional vernal pool Preserve areas on private lands are added to the MHPA through conditions on the development entitlement process, the City would require the funding necessary to maintain conserved pools to the level identified in the VPMMP. All impacts to vernal pool resources would require mitigation as described in Chapter 5 and funding for permanent management in perpetuity in accordance with ESL Regulations and the City's Biology Guidelines. As such, privately owned pools would not require public funding under the VPHCP. Vernal Pool Preserve areas would either be transferred to the City of San Diego in Fee Title or conserved via a covenant of easement.
- **Vernal pool lands owned/managed by City departments utilizing Enterprise Funds (i.e., Public Utilities Department/Water and Wastewater Divisions and Environmental Services Department)** would continue to fund the management of vernal pools on lands within their control as a cost of normal operations.
- **Vernal Pool Preservation Program Fund:** The Vernal Pool Preservation Program Fund (Park and Recreation Department Special Fund No. 200400) would be applied to the one-

time cost to restore and enhance the City's vernal pools (Management Levels 2 and 3) to achieve a Management Level 1 condition.

- **Special Funds:** Monies from Park and Recreation Department, Open Space Special Funds such as the Otay Mesa/East Elliott Property Maintenance Fund and the Environmental Trust Bankruptcy Fund.
- **EGF:** The EGF (Fund No. 200111) was established for the exclusive purpose of preserving and enhancing the environment of the City (City of San Diego Charter Section 103.1a). EGF receives an annual allocation from 25% of money derived from revenues accruing to the City from any franchises for the transmission and distribution of gas, electricity, and steam within the City of San Diego. EGF would provide the funds necessary to cover the City's one-time costs for VPHCP implementation not funded by other sources.

Chapter 4 of this VPHCP describes development projects designated as covered projects pursuant to this VPHCP. These projects have delineated "hard lines" for development areas and for on-site conservation. Coverage for these projects is based upon the ensured conservation or/and dedication of the open space related to each project and through implementation of project-specific mitigation programs.

The City shall require each individual project developer or property owner to fully fund the management tasks that are required as conditions for coverage for the covered projects. These tasks may include restoration of habitat and/or requirements to ensure retention of habitat values on land that will be dedicated and/or conserved in the MHPA as a condition of City approval and the development entitlement process. Compliance with all requirements found in the City's VPMMP will be ensured by the City prior to issuance of any project grading/construction permits. Compliance is ensured by the City through permit conditions, ESL Regulations, and the City's Biology Guidelines.

10.3.2 Funding Mechanisms for Annual Costs

Recurring annual costs are those that would be incurred to maintain vernal pools at Management Level 1 conditions. However, over time, it is realistic to anticipate that some complexes may decline to Management Level 2 or Level 3. Therefore, the City's financial plan to fund the VPHCP will also include an annual contingency amount (as discussed in Section 10.2) to account for potential additional permanent monitoring and management costs associated with a decline in a complex's management level.

Funding sources for recurring annual costs are listed below:

- **General Fund:** The General Fund is currently used to fund Park and Recreation/Open Space staff including Park Rangers and Biologists who manage and monitor the City's open space Preserve/MHPA areas where the vernal pool resources are located. Current activities include tasks that benefit the vernal pool areas such as signage, fencing, maintenance of trails, enforcement, coordination with volunteers on projects to protect biological resources (i.e., placement of rocks to delineate vernal pool boundaries), and grant coordination with nonprofit groups (i.e., restoration/enhancement of vernal pools in Carmel Mountain). The General Fund would continue to be used to pay for these Park and Recreation/Open Space positions and activities.
- **Private Exactions:** As additional vernal pool Preserve areas on private lands are added to the MHPA through conditions on the development entitlement process, the City would require the funding necessary to maintain conserved pools to the level identified in the VPMMP.
- **Vernal pool lands owned/managed by City departments** utilizing Enterprise Funds (Public Utilities Department/Water and Wastewater Divisions and Environmental Services Department) would continue to pay for managing vernal pools on lands within their control as cost of normal operations.
- **EGF:** Annual allocations or by creation of a nonwasting endowment from the EGF would be used for recurring costs associated with VPMMP-required Management Level 1 through Level 3 management and monitoring for existing City vernal pools and any new vernal pool lands acquired by the City. EGF receives an annual allocation from 25% of money derived from revenues accruing to the City from any franchises for the transmission and distribution of gas, electricity, and steam within the City of San Diego.
- **Special Funds:** Park and Recreation Department's Open Space Special Funds would be applied toward recurring costs for City's vernal pools. Vernal pool lands acquired through the extraction process as discussed in Section 10.6.1 above and transferred to the City in Fee Title would include funding for monitoring and management in accordance with the VPMMP, ESL Regulations, and the City's Biology Guidelines. These funds would be placed in a site-specific Open Space Special Fund.

The use of both short-term and permanent financing tools together will, when established, provide the financial resources to accomplish the following:

1. Accomplishment of conservation goal and objectives of the VPHCP (see Chapter 5).
2. Funding to respond to Changed Circumstances within the VPHCP (see Chapter 9).

10.3.3 Annual Reporting of Funds

The VPHCP requires an annual accounting of the funds expended for implementation of the VPMMP as well as identification of the amount and source of funding necessary for the following year based on the results of the annual management and monitoring (See Section 8.6.1, Permittee Responsibilities). If, based on the annual accounting of funds, it is determined that the annual funding mechanism(s) for any single source would need to be modified by 20% or more, the City will present those changes to the Wildlife Agencies for approval.

10.4 FUNDING MECHANISMS FOR CHANGED AND UNFORESEEN CIRCUMSTANCES

Chapter 9 defines the potential for Changed and Unforeseen Circumstances within the lands under the VPHCP and presents a series of planned responses that will be undertaken if and/or when a Changed Circumstance event should occur. Planned responses for Changed Circumstances will be funded through the financing mechanisms established by this VPHCP and described in Appendix E.

CHAPTER 11

ALTERNATIVES TO TAKE

FESA requires that applicants for incidental take permits specify in an HCP what alternative actions to the take were considered and the reasons why those alternatives were not selected. The *Endangered Species Consultation Handbook* (USFWS and National Marine Fisheries Service 1998) identifies two alternatives commonly used in HCPs: (1) an alternative that would reduce take below levels anticipated for the proposed project and (2) an alternative that would avoid take and hence not require a permit from USFWS. The NCCP Act requires that project alternatives be considered in the EIR prepared for the NCCP (Section 2820[e]) but not in the NCCP itself.

This chapter identifies alternative measures considered that would avoid or minimize the potential for take of the two wildlife species covered in this VPHCP: Riverside fairy shrimp and San Diego fairy shrimp. The following discussion is limited to wildlife species because FESA requires alternatives to *Take*. Take of listed plants is not prohibited by FESA, and projects subject to Section 7 consultations will evaluate listed plants in the Biological Assessment and BO associated with that consultation. As of the effective date of the Federal Permit, take of covered species that are currently federally listed will be authorized as described in the VPHCP (see Chapters 5 and 6). Project alternatives are considered in more detail in the draft EIR/EIS that accompanies this VPHCP. This chapter evaluates alternatives to take of the two fairy shrimp covered by the VPHCP:

11.1 ALTERNATIVES TO TAKE OF SAN DIEGO FAIRY SHRIMP

11.1.1 Reduced Take Alternative

To meet the first type of alternative required by FESA (i.e., an alternative that would reduce take below levels anticipated for the proposed project), the City and Wildlife Agencies developed the Expanded Conservation Alternative to reduce take of San Diego fairy shrimp from the VPHCP (Table C-3 of Appendix C). The Expanded Conservation Alternative adds additional lands to the MHPA (approximately 233 acres), beyond those added under the Project, that include vernal pools occupied by San Diego fairy shrimp. These additional lands are located in the following four vernal complexes:

- J13 S (South Otay J13 S)
- J13 N (South Otay 1 Acre Private)
- J21 (La Media Swale)
- U 19 (Cubic)

Table 11-1 includes a comparison of conservation and take of San Diego fairy shrimp under the VPHCP (i.e., the Project) and the Expanded Conservation Alternative. As shown, the Expanded Conservation Alternative would conserve two more pools occupied by San Diego fairy shrimp than the Project (or 0.3% more of total occupied pools within the VPHCP Plan Area), thereby resulting in less take as a result of development.

Table 11-1
Comparison of Conservation San Diego Fairy Shrimp
VPHCP vs. Expanded Conservation Alternative

Alternative	Total Occupied Pools in VPHCP Plan Area	Occupied Pools Conserved*	% Occupied Pools Conserved
VPHCP (Project) Total	517	462	89.4%
Expanded Conservation Alternative Total	517	464	89.7%
Take Reduced by Expanded Conservation Alternative	-	2	0.3%

*Based on 0% or 75% conservation level of complexes with vernal pools occupied by San Diego fairy shrimp

The Expanded Conservation Alternative would primarily add additional lands with suitable habitat for vernal pool restoration (e.g., soils, slopes). While take of San Diego fairy shrimp would be marginally reduced by just two pools (representing a 0.3% increase in conservation) and conservation of vernal pool habitat would be greater than the Project, implementation of this alternative is not necessary to meet the objectives of the VPHCP for San Diego fairy shrimp (Table 5-1). The Expanded Conservation Alternative would not reduce take of Riverside fairy shrimp or any of the covered plant species.

Additionally, the Expanded Conservation Alternative would reduce industrial development potential in the Kearny Mesa Community Plan Area. Although the expanded area does not contain vernal pool resources, it is designated as critical habitat for the San Diego fairy shrimp per the USFWS. This alternative would also further reduce residential and industrial development potential in the Otay Mesa Community Planning area, and would require an additional amendment to the Community. In particular, the uses within the Southwest Village Specific Plan Area would be greatly reduced, including density planned for the area. With a decrease in density, the Otay Mesa community would in turn experience a loss of housing, new park acreage, commercial and employment opportunities, and funding potential for infrastructure improvements, including roads (i.e. contributions towards Development Impact Fees [DIF] and Facilities Benefit Assessment [FBA]).

11.1.2 No Take Alternative

Under the No Take Alternative, no impacts to the 517 vernal pools occupied by San Diego fairy shrimp within the VPHCP Plan Area would occur. Individual pools occupied by San Diego fairy shrimp would be avoided during project construction. In addition, under the No Take Alternative, the vernal pool complexes occupied by San Diego fairy shrimp would not be managed to avoid potential take associated with management and monitoring activities. Other covered activities that would potentially impact vernal pools occupied with fairy shrimp (e.g., road grading and maintenance, maintenance of public utilities, police and fire activity, public trail installation and maintenance, etc.) would not be authorized. The No Take Alternative would, therefore, prevent take of San Diego fairy shrimp.

The isolated pools would be subject to increased indirect effects due to fragmentation. Individual pools could be surrounded by development similar to the avoided areas on Shaw Lorenz, Rhodes Crossing, and Mira Mesa Market Center. Without the ability to develop a biologically superior alternative that may allow some impacts in exchange for a more ecologically functional preserve design, extant vernal pools could be completely surrounded by development (e.g., residential buildings, roads, and commercial development) with little to no habitat buffers between the vernal pools and development.

The continued existence of vernal pool species, including San Diego fairy shrimp, is dependent upon the long-term viability of a functioning vernal pool ecosystem. Although ecological processes in vernal pools may be viewed at relatively small temporal (e.g., weeks to months during wetting and drying cycle) and spatial (e.g., tens of square feet) scales, these processes are greatly influenced by large-scale landscape processes (e.g., hydrology, plant and animal dispersal) (Leidy and White 1998). Fragmentation and isolation of vernal pools can threaten the important ecological and mutualistic processes that link vernal pools to each other and the surrounding uplands (USFWS 1998A). Such ecological and mutualistic processes involve insects that pollinate the vernal pool plants, mammals and birds that disperse flora and fauna between vernal pools, and amphibians that reproduce in vernal pools.

Watershed contiguity augments gene flow in populations already naturally low in variability (Davies 1996) by allowing flooding between pools. Vernal pool organisms are typically defined by the complex in which they occur, in part because gene flow between complexes appears extremely low (Fugate 1993; Davies 1996). Isolation of pools, or modification of the natural watershed, potentially compromises gene flow, resulting in a loss of genetic variability and an increased susceptibility to extinction and reduced fitness (Bohonak 2005; Soule 1986).

Preserving small, isolated, fragmented preserves may not sustain the multiscale ecological processes associated with vernal pools (Leidy and White 1998). As such, the scientific community repeatedly recommends that conservation of vernal pools include the surrounding upland habitats (Bauder 1987; Thorp and Leong 1995, 1998; Hanes and Stromberg 1998; Leidy and White 1998; USFWS 1998A). These surrounding upland habitats influence vernal pool hydrology, species composition, and essential interactions between the species that inhabit them. Fragmenting vernal pools from each other can disrupt dispersal and gene flow between populations of vernal pool flora and fauna, increase their vulnerability to stochastic events, and hinder their ability to reestablish after local extinctions.

Because the No Take Alternative would potentially result in isolation and fragmentation of vernal pools, and would not allow for management and monitoring of vernal pools occupied with San Diego fairy shrimp, this alternative would not meet the objectives of the VPHCP (Table 5-1). In addition, this alternative would prohibit necessary installation and maintenance of City infrastructure and public land uses. Therefore, the No Take Alternative was not selected.

11.2 ALTERNATIVES TO TAKE OF RIVERSIDE FAIRY SHRIMP – NO TAKE

Under the No Take Alternative, no impacts to the 131 vernal pools occupied by Riverside fairy shrimp within the VPHCP Plan Area would occur because take would not be authorized. This alternative would provide the same level of conservation for Riverside fairy shrimp as the VPHCP (i.e., all occupied pools would be conserved). However, under the No Take Alternative, the vernal pool complexes occupied by Riverside fairy shrimp would not be managed to avoid potential take associated with management and monitoring activities. In addition, other covered activities that could potentially impact vernal pools included in the VPHCP would not be authorized (e.g., road grading and maintenance, maintenance of public utilities, police and fire activity, public trail installation and maintenance, etc.). Further, Riverside fairy shrimp are also susceptible to similar indirect impacts resulting from potential isolation and fragmentation as described above for San Diego fairy shrimp.

As described in Section 1.1.1 (Purpose and Need) of the VPHCP, the City's state NCCP permit is still valid and covers take/impacts to and conservation of vernal pool habitat and the seven vernal pool species addressed in this VPHCP; therefore, the Existing Conservation/No Action Alternative would include the City operating under existing state NCCP/MSCP authorizations for vernal pool habitat and species. Under this alternative, individual pools occupied by federally listed animal species (i.e., San Diego fairy shrimp and Riverside fairy shrimp) would need to be avoided under the state's existing MSCP permit, unless impacts are specifically authorized by the FWS through the ESA [e.g., Section 10(a), Section 7, etc.].

Because the No Take Alternative would potentially result in isolation and fragmentation of vernal pools, and would not allow for management and monitoring of vernal pools occupied with Riverside fairy shrimp, this alternative would not meet the objectives of the VPHCP (Table 5-1). In addition, this alternative would prohibit necessary installation and maintenance of City infrastructure and public land uses. Therefore, the No Take Alternative was not selected.

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CHAPTER 12

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CHAPTER 13

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The VPHCP has been prepared by the City of San Diego in coordination with the USFWS and CDFW. The following City, Agency, and consultant staff participated in the preparation of the VPHCP.

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APPENDIX A

VERNAL POOL INDICATOR SPECIES LIST

**INDICATOR SPECIES FOR VERNAL POOLS
(USACE 1997; Bauder and McMillan 1998)**

FLORAL LIST

Apiaceae

Eryngium aristulatum var. *parishii*
Eryngium armatum
Eryngium vaseyi
Eryngium pendletonensis sp. *nova*
(Pendleton)
Eryngium sp. *nova* (San Quintin)

Asteraceae

Belnospermum nanum
Hemizonia perennis
Lasthenia glabrata ssp. *coulteri*
Psilocarphus brevissimus
Psilocarphus oregonus
Psilocarphus tenellus

Boraginaceae

Plagiobothrys acanthocarpus
Plagiobothrys bracteatus
Plagiobothrys stipitatus
Plagiobothrys undulatus
Plagiobothrys leptocladus

Brassicaceae

Sibara virginica
Lepidium latipes

Callitrichaceae

Callitriche heterophylla
Callitriche marginata
Callitriche verna

Campanulaceae

Downingia bella
Downingia cuspidata
Downingia concolor var. *brevior*

Crassulaceae

Crassula aquatica

Elatinaceae

Bergia texana
Elatine californica
Elatine chilensis

Hydrophyllaceae

Nama stenocarpum

Isoetaceae

Isoetes howellii
Isoetes orcuttii

Juncaginaceae

Lilaea scilloides

Lamiaceae

Pogogyne abramsii
Pogogyne nudiuscula
Pogogyne douglasii
Pogogyne serpylloides

Limnanthaceae

Limnanthes gracilis ssp. *parishii*

Malvaceae

Malvella leprosa

Marsileaceae

Marsilea vestita

Pilularia americana

Onagraceae

Epilobium pygmaeum

Plantaginaceae

Plantago bigelovii

Poaceae

Alopecurus saccatus

Deschampsia danthonioides

Orcuttia californica

Phalaris caroliniana

Phalaris lemmonii

Phalaris paradoxa

Hordeum intercedens

Polemoniaceae

Navarretia fossalis

Navarretia prostrata

Primulaceae

Centunculus minimus

Ranunculaceae

Myosurus minimus

Myosurus minimus var. *apus*

Myosurus minimus var. *filiformis*

Scrophulariaceae

Mimulus latidens

Solanaceae

Petunia parviflora

Verbenaceae

Verbena bracteata

FAUNAL LIST

Anostraca

Branchinecta sandiegonensis
Branchinecta lindahli
Branchinecta lynchii
Linderiella sp.
Streptocephalus woottoni

Cladocera

Alona cf. *diaphana*
Ceriodaphnia dubia
Daphnia magna
Daphnia rosea
Macrothrix hirsuticornis
Moina micrura
Scapholebris cf. *rammneri*
Simocephalus sp.

Cypria pustulosa
Cypriconcha sp.
Cypridopsis vidua
Cypris pubera
Cypris virens
Eucypris sp.
Herpetocypris sp.
Heterocypris sp.
Lymnocythere sp.
Potamocypris sp.
Prionocypris sp.
Pseudoilicypris sp.

Themidaceae

Brodiaea orcuttii
Brodiaea terrestris var. *kernensis*

Chenopodiaceae

Atriplex coronata var. *notatior*

Copepoda

Acanthocyclops robustus
Acanthocyclops vernalis

Cyperaceae

Eleocharis acicularis
Eleocharis macrostachya

Juncaceae

Juncus bufornius

Lythraceae

Rotala ramosior

Ostracoda

Bradleycypris sp.

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APPENDIX B

VERNAL POOL COMPLEX DATA

Appendix B
Vernal Pool Complex Data for the City of San Diego Vernal Pool Habitat Conservation Plan

Complex ID	Complex Name	Planning Unit	Inside or Outside VPHCP Plan Area	Number of Pools per Complex by Ownership			Total Surface Area of Pools	Soils within Complex	Pool Geomorphology	Inside or Outside Existing MHPA	Focal Species Critical Habitat Present*	Number of Pools Occupied by Focal Species						
				Total	City, CDFW, or USFWS Controlled	Other Ownership						PONU	POAB	NAFO	ERAR	ORCA	RFS	SDFS
N 7	Serra Mesa Library	Central	Inside	26	26	0	0.41	RdC, RhC	Hard pan	Within	None	0	0	0	0	0	0	
N 8	General Dynamics	Central	Inside	22	22	0	0.40	RdC	Hard pan	Within	None	0	20	0	2	0	0	
NC	Uj Collins	North	Inside	2	0	2	0.04	HrE2, LeE, OhC	Hard pan	Within	None	0	0	0	0	0	0	
	Kelton	South	Inside	3	3	0	0.02	HrE2, LeE, OhC	Hard pan	Within	None	0	0	0	0	0	0	
OO	Salk Institute	North	Inside	15	0	15	0.09	CbB, CFB	Hard pan	Within	None	0	0	0	0	0	0	
	Mission Trails Regional Park	Central	Inside	17	17	0	0.25	OhF, RdC, ReE, VbB	Hard pan	Within	None	0	0	0	0	0	0	
Q2	Mission Trails Regional Park School District	Central	Outside	2	0	2	0.02	OhF, RdC, ReE, VbB	Hard pan	Within	None	0	0	0	0	0	0	
	Castlerock	North	Inside	5	0	5	0.02	DoE	Hard pan	Outside	None	0	0	0	0	0	0	
QQ	Tecolote Canyon	Central	Inside	9	9	0	0.09	CqC, GaF, HrC, TaF	Hard pan	Within	None	0	0	0	0	0	0	
R 1	Proctor Valley	South	Inside	126	0	126	1.46	DoE, FxE, OhC, OhE, PFC, Rm, SnG, VbB	Hard pan	Within	NAFO	0	0	0	0	0	3	
U 15	SANDER	Central	Inside	39	39	0	0.83	RdC, ReE	Hard pan	Outside	SDFS	0	1	0	0	0	2	
U 19	Cubic	Central	Inside	23	0	23	0.37	RdC	Hard pan	Outside	SDFS	0	1	0	2	0	6	
	Magnatron	Central	Inside	1	0	1	0.05	RdC	Hard pan	Outside	SDFS	0	0	0	0	0	1	
X 5	Nobel Drive	North	Inside	11	11	0	0.10	HrE2, RdC	Hard pan	Within	NAFO	0	0	1	0	0	6	
X 7	Nobel Research	North	Inside	28	28	0	0.10	RdC	Hard pan	Within	None	0	0	0	0	0	1	
N/A	MCAS Miramar	Central	Outside	7,531	0	7,531	ND	ND	Hard pan	Outside	ND	0	1,112	6	1,795	2	4,051	
Total				10,607	1,827	8,780						398	1,480	119	2,658	63	214	4,738
Total Inside VPHCP Plan Area				2,591	1,825	766						369	337	95	732	58	131	517

PONU = Otay Mesa mint; POAB = San Diego Mesa mint; NAFO = Spreading navarretia; ERAR = San Diego button-celery; ORCA = California Orcutt grass; RFS = Riverside fairy shrimp; SDFS = San Diego fairy shrimp

ND= No Data

*= Critical habitat is designated by USFWS for spreading navarretia (NAFO), Riverside fairy shrimp (RFS), and San Diego fairy shrimp (SDFS) only.

**= Sites owned by the Wildlife Agencies are included in the VPHCP Plan Area because the Wildlife Agencies are signatory parties to the MSCP Permit.

***= If a Caltrans-owned complex is transferred to the City, CDFW, or USFWS, the site would be managed consistent with the VPHCP.

= Land not owned by City of San Diego.

= Land not owned by City of San Diego or under the City of San Diego's land use authority.

Soil Types Legend

MUSYM	Description	Category
BsC	Bosanko clay, 2 to 9% slopes	Bosanko clay
CbB	Carlsbad gravelly loamy sand, 2 to 5% slopes	Carlsbad gravelly loamy sand
CbC	Carlsbad gravelly loamy sand, 5 to 9% slopes	Carlsbad gravelly loamy sand
CfB	Chesterton fine sandy loam, 2 to 5% slopes	Chesterton fine sandy loam
CgC	Chesterton-Urban land complex, 2 to 9% slopes	Chesterton-Urban land complex
DaF	Diablo clay, 30 to 50% slopes	Diablo clay
DcD	Diablo-Urban land complex, 5 to 15% slopes	Diablo-Urban land complex
DoE	Diablo-Olivenhain complex, 9 to 30% slopes	Diablo-Olivenhain complex
FxE	Friant rocky fine sandy loam, 9 to 30% slopes	Friant rocky fine sandy loam
GaF	Gaviota fine sandy loam, 30 to 50% slopes	Gaviota fine sandy loam
GP	Gravel pits	Gravel pits
HrC	Huerhuero loam, 2 to 9% slopes	Huerhuero loam
HrC2	Huerhuero loam, 5 to 9% slopes, eroded	Huerhuero loam
HrE2	Huerhuero loam, 15 to 30% slopes, eroded	Huerhuero loam
LeE	Las Flores loamy fine sand, 15 to 30% slopes	Las Flores loamy fine sand
LsE	Linne clay loam, 9 to 30% slopes	Linne clay loam
LsF	Linne clay loam, 30 to 50% slopes	Linne clay loam
LvF3	Loamy alluvial land-Huerhuero complex, 9 to 50% slopes, severely	Loamy alluvial land-Huerhuero complex
MIC	Marina loamy coarse sand, 2 to 9% slopes	Marina loamy coarse sand
OhC	Olivenhain cobbly loam, 2 to 9% slopes	Olivenhain cobbly loam
OhE	Olivenhain cobbly loam, 9 to 30% slopes	Olivenhain cobbly loam
OhF	Olivenhain cobbly loam, 30 to 50% slopes	Olivenhain cobbly loam
PfC	Placentia sandy loam, thick surface, 2 to 9% slopes	Placentia sandy loam
RdC	Redding gravelly loam, 2 to 9% slopes	Redding gravelly loam
ReE	Redding cobbly loam, 9 to 30% slopes	Redding cobbly loam
RfF	Redding cobbly loam, dissected, 15 to 50% slopes	Redding cobbly loam
RhC	Redding-Urban land complex, 2 to 9% slopes	Redding-Urban land complex
RhE	Redding-Urban land complex, 9 to 30% slopes	Redding-Urban land complex
Rm	Riverwash	Riverwash
SmE	San Miguel rocky silt loam, 9 to 30% slopes	San Miguel rocky silt loam
SnG	San Miguel-Exchequer rocky silt loams, 9 to 70% slopes	San Miguel-Exchequer rocky silt loams
SuA	Stockpen gravelly clay loam, 0 to 2% slopes	Stockpen gravelly clay loam
SuB	Stockpen gravelly clay loam, 2 to 5% slopes	Stockpen gravelly clay loam
SvE	Stony land	Stony land
TeF	Terrace escarpments	Terrace escarpments
TuB	Tujunga sand, 0 to 5% slopes	Tujunga sand
VbB	Visalia gravelly sandy loam, 2 to 5% slopes	Visalia gravelly sandy loam
W	Water	Water

APPENDIX C

CONSERVATION ANALYSIS TABLES AND MODELED VERNAL POOL HABITAT DATA

Table C-1: Baseline Conservation of Vernal Pools and Focal Species

Complex ID	Name	Planning Unit	INSIDE or OUTSIDE Baseline (Subject to City Jurisdiction)	Conservation Level (75% or 100% Conserved)	Total Pools ¹			Total Pools Conserved Inside Baseline *	Pools Conserved on City, USFWS, or CDFW Controlled Land *	Pools Conserved on Other Ownership Land*	Total Surface Area of Pools (Acres)	Surface Area Conserved (Acres)*	Conserved on City, USFWS, or CDFW Controlled Land (Acres)*	Surface Area Conserved on Other Ownership Land (Acres)*	Focal Species Critical Habitat Present**	Occupied Focal Species Pools: Total (Inside and Outside Baseline) ¹ and Total Conserved in the Baseline*												Complex Identified as Necessary to Stabilize the Following Focal Species Populations ²	Complex Identified as Necessary to Reclassify the Following Focal Species Populations ²						
					PONU total	PONU Cons	POAB total									POAB Cons	NAFO total	NAFO Cons	ERAR total	ERAR Cons	ORCA total	ORCA Cons	RFS total	RFS Cons	SDFS total	SDFS Cons									
R 1	Proctor Valley	South	Inside	100	126	126	0	126	126	0	1.46	1.46	1.46	0.00	NAFO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	ERAR, NAFO	None identified
U 15	SANDER	Central	Outside	0	39	39	0	39	39	0	0.83	0.00	0.00	0.00	SDFS	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	None identified	ERAR, POAB, ORCA, SDFS		
U 19	Cubic	Central	Outside	0	23	0	23	23	0	23	0.37	0.00	0.00	0.00	SDFS	0	0	1	0	0	0	2	0	0	0	0	0	0	6	0	None identified	ERAR, POAB, ORCA, SDFS			
	Magnatron	Central	Outside	0	1	0	1	1	0	1	0.05	0.00	0.00	0.00	SDFS	0	0	0	0	0	0	0	0	0	0	0	0	1	0	None identified	ERAR, POAB, ORCA, SDFS				
X 5	Nobel Drive	North	Inside	100	11	11	0	11	11	0	0.10	0.10	0.10	0.00	NAFO	0	0	0	0	1	1	0	0	0	0	0	0	6	6	SDFS	None identified				
X 7	Nobel Research	North	Inside	100	28	28	0	28	28	0	0.10	0.10	0.10	0.00	None	0	0	0	0	0	0	0	0	0	0	0	0	1	1	None identified	None identified				
Total Inside and Outside Baseline¹					2,591	1,983	608				45.1				Total¹	369	-	337	-	95	-	732	-	58	-	131	-	517	-						
Total Inside Baseline¹					2,199	1,833	366	2,183	1,832	352	35.4	34.7	29.1	5.5	Total Inside Preserve¹	369							332			94		719		58		128		431	
% Occupied Pools Conserved¹																100%						99%			99%		98%		100%		98%		83%		

☐ = Land not owned by City of San Diego.

*= Under Baseline, all vernal pools are conserved within the MHPA

**= Critical habitat is designated by USFWS for San Diego fairy shrimp (SDFS) and spreading navarretia (NAFO), and Riverside fairy shrimp (RFS).

¹On Land Subject to City Jurisdiction

²Based on Recovery Plan (USFWS 1998)

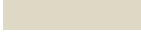
Note: The Baseline includes sites that are within the City's Multi-Habitat Planning Area, are conserved lands, have an approved USFWS Biological Opinion, and/or are "pipeline projects" (i.e., in a stages of the City project approval process where conservation and loss of lands has been determined)

Note: The table does not include Caltrans sites current under restoration. If a Caltrans-owned complex is transferred to the City, CDFW, or USFWS, the site would be managed consistent with the VPHCP.

PONU = Otay Mesa mint; POAB = San Diego Mesa mint; NAFO = Spreading navarretia; ERAR = San Diego button-celery; ORCA = California Orcutt grass; RFS = Riverside fairy shrimp; SDFS = San Diego fairy shrimp

Table C-3: VPHCP Expanded Conservation Alternative - Conservation of Vernal Pools and Focal Species

Complex ID	Name	Planning Unit	INSIDE or OUTSIDE MHPA	Conservation Level (75% or 100% Conserved)	Total Pools ¹			Total Pools Conserved Inside MHPA *	Pools Conserved on City, USFWS, or CDFW Controlled Land *	Pools Conserved on Other Ownership Land*	Total Surface Area of Pools (Acres)	Surface Area Conserved (Acres)*	Area Conserved on City, USFWS, or CDFW Controlled Land	Surface Area Conserved on Other Ownership Land (Acres)*	Focal Species Critical Habitat Present**	Occupied Focal Species Pools: Total (Inside and Outside MHPA) ¹ and Total Conserved in the MHPA*												Complex Identified as Necessary to Stabilize the Following Focal Species Populations ²	Complex Identified as Necessary to Reclassify the Following Focal Species Populations ²												
					Total	City, USFWS, or CDFW Controlled	Other Ownership									PONU total	PONU Cons	POAB total	POAB Cons	NAFO total	NAFO Cons	ERAR total	ERAR Cons	ORCA total	ORCA Cons	RFS total	RFS Cons			SDFS total	SDFS Cons										
R 1	Proctor Valley	South	Inside	100	126	126	0	126	126	0	1.40	1.40	1.40	0.00	NAFO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	ERAR, NAFO	None identified
U 15	SANDER	Central	Inside	100	38	38	0	38	38	0	0.49	0.49	0.49	0.00	SDFS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	None identified	ERAR, POAB, ORCA, SDFS		
			Outside	0	1	0	1	0	0	0	0	0.34	0.00	0.00	0.00	SDFS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	None identified
U 19	Cubic	Central	Inside	100	23	0	23	23	0	23	0.37	0.37	0.37	0.00	SDFS	0	0	1	1	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	6	6	None identified	ERAR, POAB, ORCA, SDFS		
	Magnatron	Central	Outside	0	1	0	1	1	0	1	0.05	0.00	0.00	0.00	SDFS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	None identified	ERAR, POAB, ORCA, SDFS		
X 5	Nobel Drive	North	Inside	100	11	11	0	11	11	0	0.10	0.10	0.10	0.00	NAFO	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	6	SDFS	None identified		
X 7	Nobel Research	North	Inside	100	28	28	0	28	28	0	0.10	0.10	0.10	0.00	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	None identified	None identified			
Total Inside and Outside Preserve¹					2,591	1,982	609				45.1			Total¹	369	-	337	-	95	-	732	-	58	-	131	-	517	-													
Total Inside Preserve¹					2,460	1,901	559	2,511	1,961	550	38.8	38.0	30.5	7.5	Total Inside Preserve¹	369			335		94		727		58		131														
														% Occupied Pools Conserved¹	100%			99%		99%		99%		100%		100%															

 = Land not owned by City of San Diego.

*= Based on Conservation Level, conservation of vernal pools rounded up to the nearest whole number

**= Critical habitat is designated by USFWS for San Diego fairy shrimp (SDFS) and spreading navarretia (NAFO), and Riverside fairy shrimp (RFS).

¹On Land Subject to City Jurisdiction

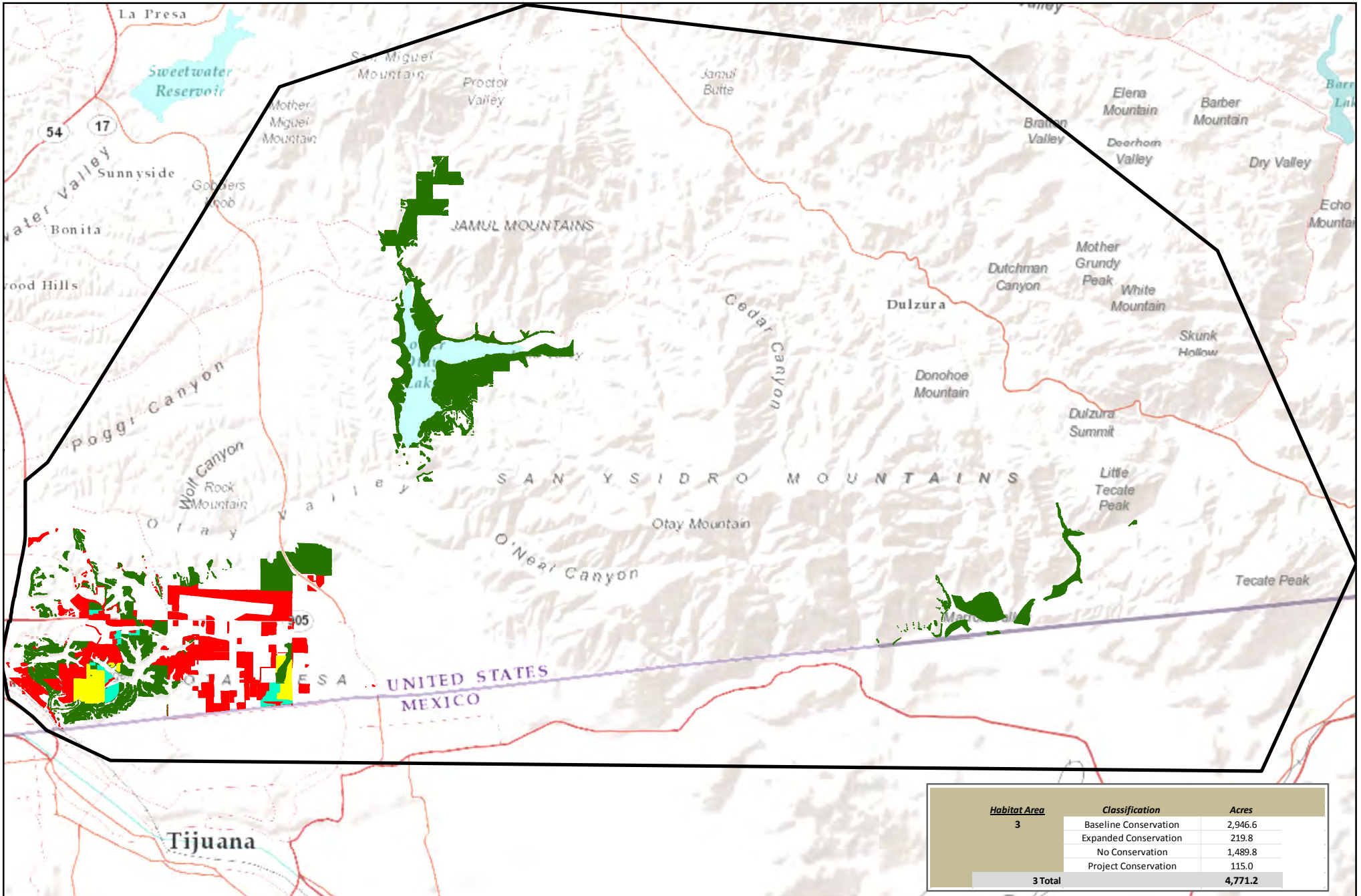
²Based on Recovery Plan (USFWS 1998)

Note: The table does not include Caltrans sites current under restoration. If a Caltrans-owned complex is transferred to the City, CDFW, or USFWS, the site would be managed consistent with the VPHCP.

PONU = Otay Mesa mint; POAB = San Diego Mesa mint; NAFO = Spreading navarretia; ERAR = San Diego button-celery; ORCA = California Orcutt grass; RFS = Riverside fairy shrimp; SDFS = San Diego fairy shrimp

Modeled Vernal Pool Habitat

A Geographic Information System model was developed to map vernal pool habitat within the City of San Diego. The model included data on soils that are suitable for vernal pools (i.e., Chesterton, Huerhuero, Linne, Olivenhain, Placentia, Redding, Stockpen), with slopes less than 12 percent, in 8 target areas that contain known or potential vernal pool habitat. Expert opinion was used to refine the model results. Developed or otherwise unsuitable areas were manually eliminated from, and suitable areas not previously captured were manually added to, the model. Model results are shown in the following Figures 1 through 8.

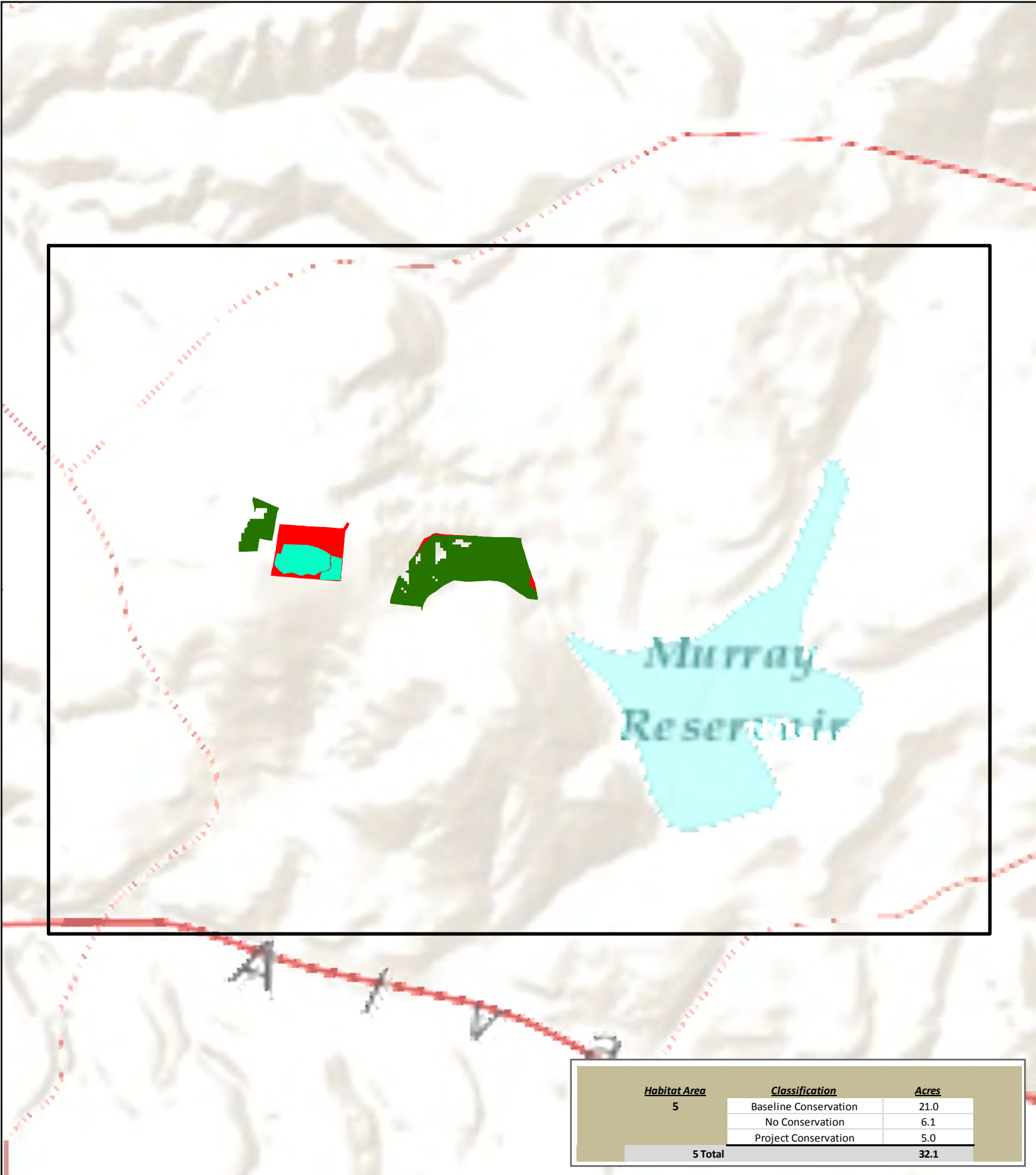


PRODUCED BY GIS SERVICES
 CARLSBAD FIELD OFFICE
 GIS CONTACT: ED TURNER
 BIOLOGY CONTACT: DAVID ZOUTENDYK, SUSAN WYNN
 (760) 431-9440
 DATA SOURCE: USFWS
 IMAGE SOURCE: ESRI Basemap -
 World Terrain Base, NAIP 2014 1m
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Vernal Pool HCP Modeled Potential Habitat

- Baseline Conservation
- Expanded Conservation
- Project Conservation
- No Conservation



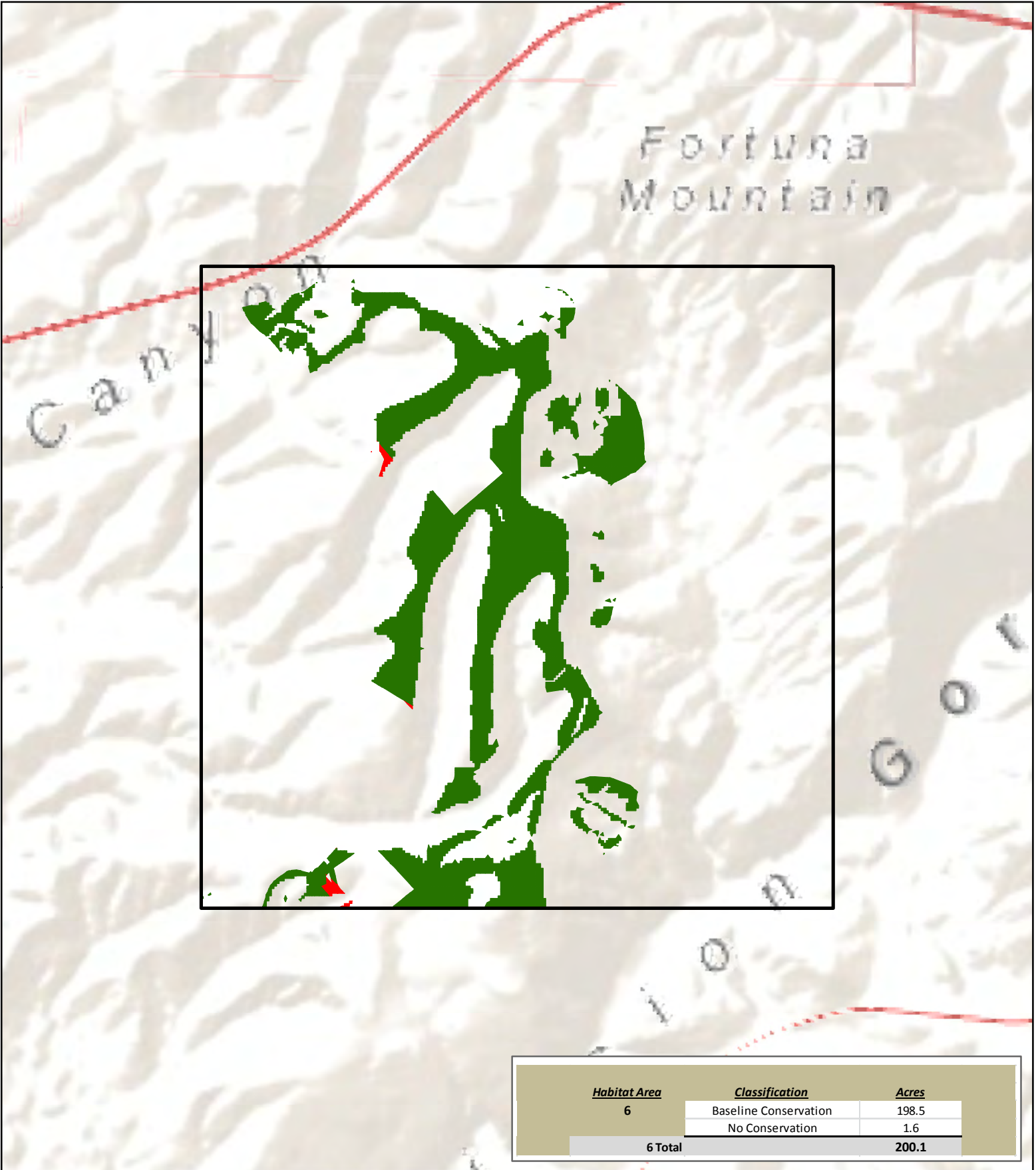
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 BIOLOGY CONTACT: DAVID ZOUTENDYK, SUSAN WYNN
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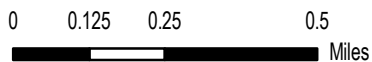
Vernal Pool HCP Modeled Potential Habitat

- Baseline Conservation
- Project Conservation
- No Conservation



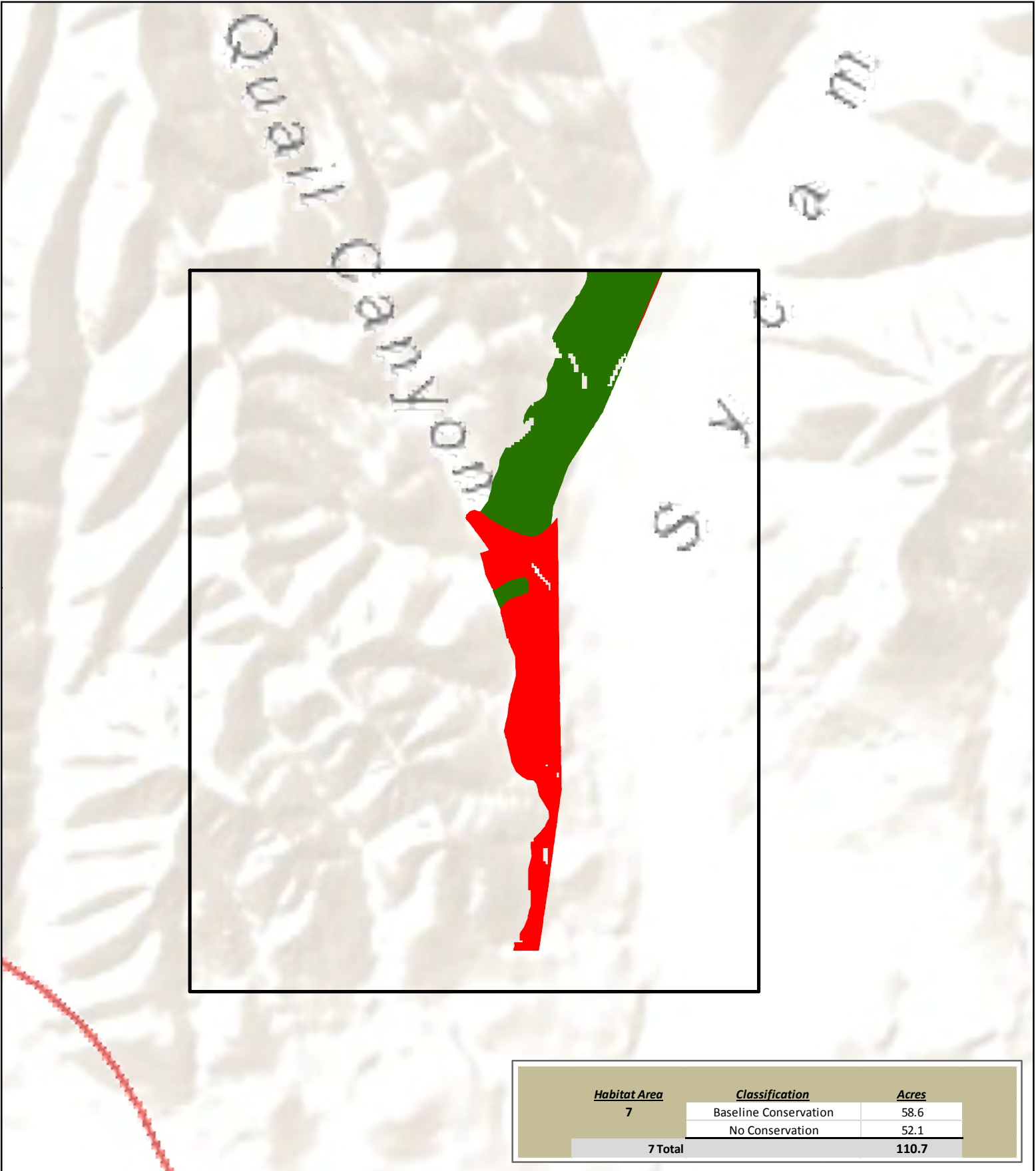
<u>Habitat Area</u>	<u>Classification</u>	<u>Acres</u>
6	Baseline Conservation	198.5
	No Conservation	1.6
6 Total		200.1

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 CARLSBAD FIELD OFFICE
 GIS CONTACT: ED TURNER
 BIOLOGY CONTACT: DAVID ZOUTENDYK, SUSAN WYNN
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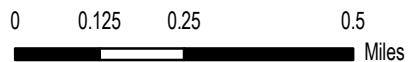


Vernal Pool HCP Modeled Potential Habitat

- Baseline Conservation
- No Conservation

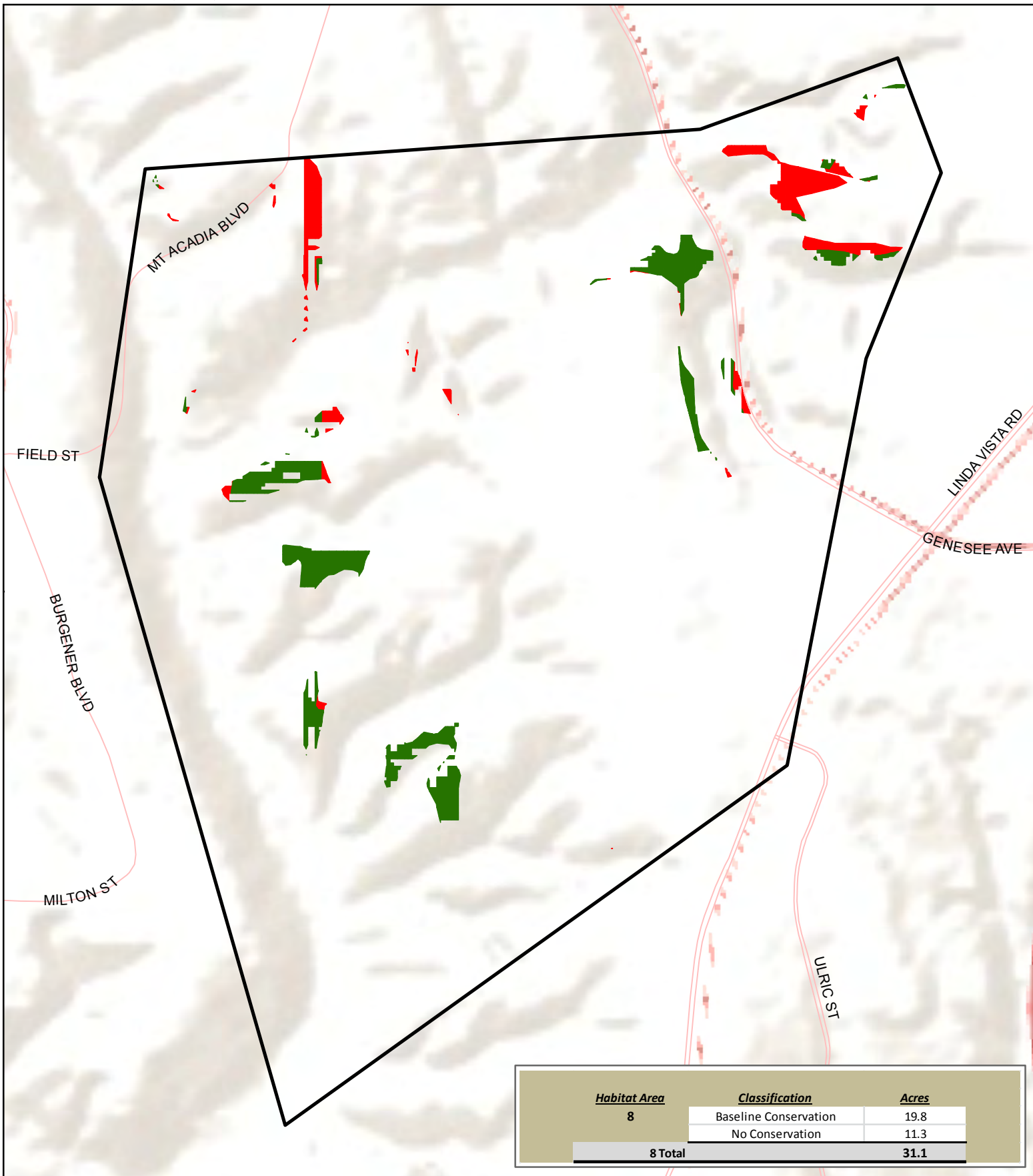


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 GIS CONTACT: ED TURNER
 BIOLOGY CONTACT: DAVID ZOUTENDYK, SUSAN WYNN
 (760) 431-9440
 DATA SOURCE: USFWS
 IMAGE SOURCE: ESRI Basemap -
 World Terrain Base, NAIP 2014 1m
 Sep 25, 2017
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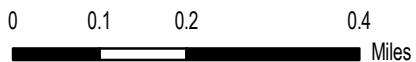


Vernal Pool HCP Modeled Potential Habitat

- Baseline Conservation
- No Conservation

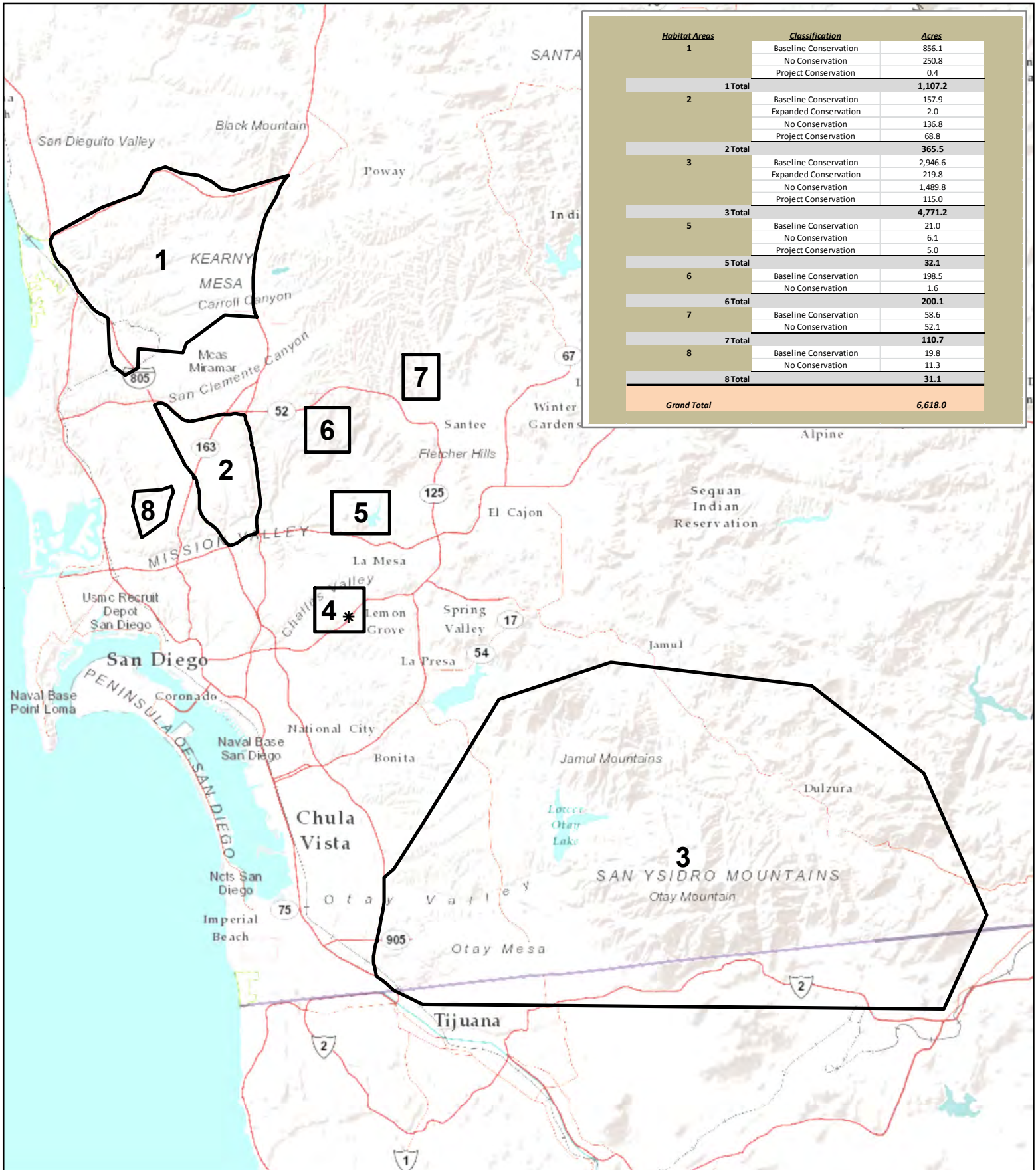


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Vernal Pool HCP Modeled Potential Habitat

- Baseline Conservation
- No Conservation



Habitat Areas	Classification	Acres
1	Baseline Conservation	856.1
	No Conservation	250.8
	Project Conservation	0.4
1 Total		1,107.2
2	Baseline Conservation	157.9
	Expanded Conservation	2.0
	No Conservation	136.8
	Project Conservation	68.8
2 Total		365.5
3	Baseline Conservation	2,946.6
	Expanded Conservation	219.8
	No Conservation	1,489.8
	Project Conservation	115.0
3 Total		4,771.2
5	Baseline Conservation	21.0
	No Conservation	6.1
	Project Conservation	5.0
5 Total		32.1
6	Baseline Conservation	198.5
	No Conservation	1.6
6 Total		200.1
7	Baseline Conservation	58.6
	No Conservation	52.1
7 Total		110.7
8	Baseline Conservation	19.8
	No Conservation	11.3
8 Total		31.1
Grand Total		6,618.0

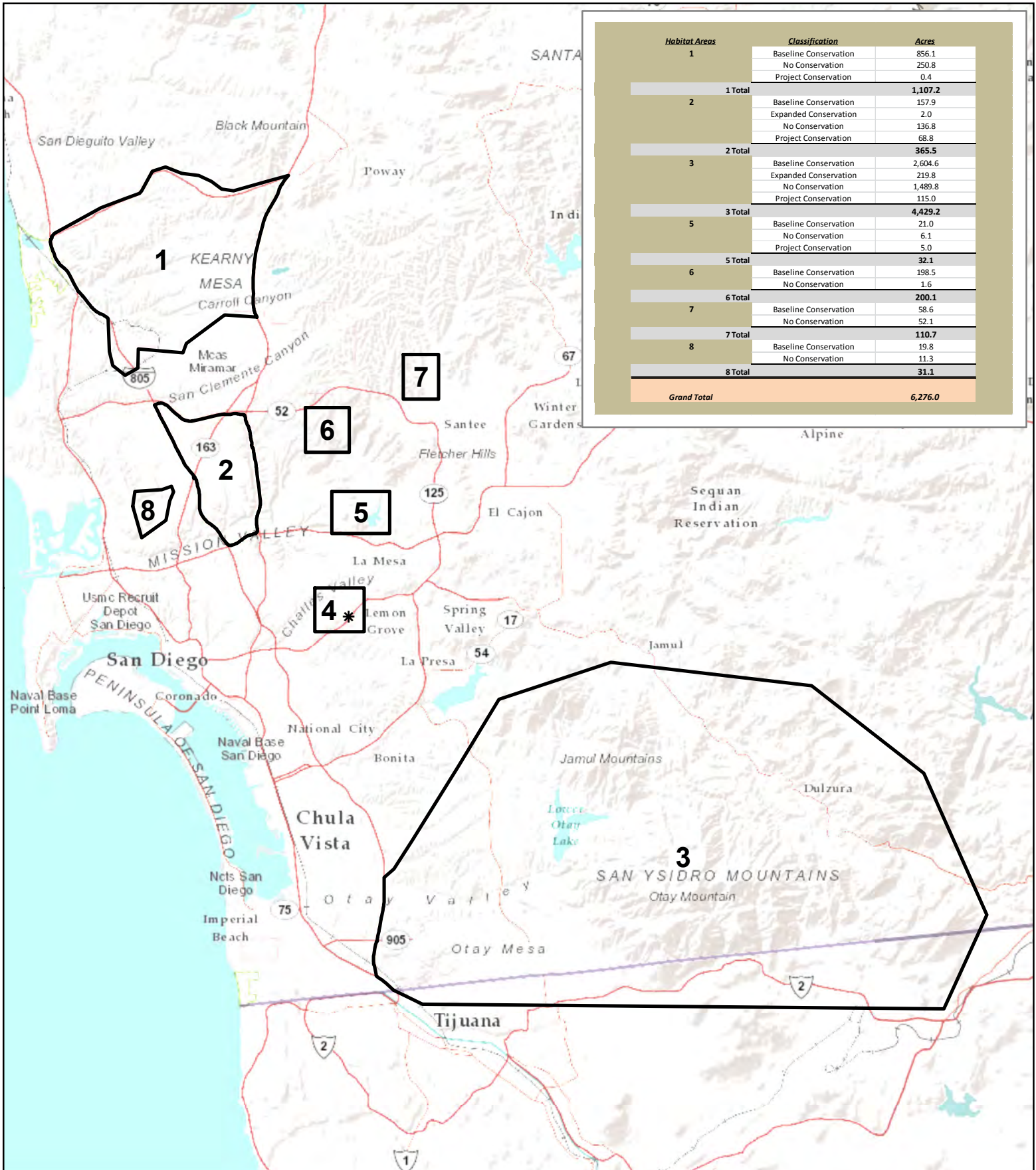
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Legend

 Vernal Pool HCP Modeled Potential Habitat Areas

* No Modeled Potential Habitat in area 4



Habitat Areas	Classification	Acres
1	Baseline Conservation	856.1
	No Conservation	250.8
	Project Conservation	0.4
1 Total		1,107.2
2	Baseline Conservation	157.9
	Expanded Conservation	2.0
	No Conservation	136.8
	Project Conservation	68.8
2 Total		365.5
3	Baseline Conservation	2,604.6
	Expanded Conservation	219.8
	No Conservation	1,489.8
	Project Conservation	115.0
3 Total		4,429.2
5	Baseline Conservation	21.0
	No Conservation	6.1
	Project Conservation	5.0
5 Total		32.1
6	Baseline Conservation	198.5
	No Conservation	1.6
6 Total		200.1
7	Baseline Conservation	58.6
	No Conservation	52.1
7 Total		110.7
8	Baseline Conservation	19.8
	No Conservation	11.3
8 Total		31.1
Grand Total		6,276.0

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Legend

Vernal Pool HCP Modeled Potential Habitat Areas

* No Modeled Potential Habitat in area 4

APPENDIX D

**VERNAL POOL MANAGEMENT AND
MONITORING PLAN**

(Under Separate Cover)

APPENDIX E

COST ANALYSIS

APPENDIX E

CITY OF SAN DIEGO VPHCP COST ANALYSIS

COST ANALYSIS OVERVIEW

The VPMMP is the management framework for the VPHCP. The VPMMP identifies three levels of monitoring and management, with the level of effort (and therefore cost) required to conserve and protect populations of the seven focal species under the VPHCP increasing from Level 1 (Stewardship) to Level 3 (Restoration). General annual costs are estimated for the required monitoring and management actions at each VPMMP level. Those general costs for each level are then used to determine various categories of VPMMP implementation costs under the VPHCP. Other costs for VPMMP implementation (including as initial baseline hydrological surveys, data tracking/reporting, and costs for changed circumstances) and an annual contingency are also estimated. The various VPMMP implementation costs for are then compared to the costs for management under the Baseline.

Other potential “as-needed” costs associated with implementation of certain activities identified in the VPMMP, which may not be necessary for all complexes, are also provided for consideration by the City.

The following tables are included at the end of the cost evaluation:

- Table E-1: Level 1 Monitoring and Management Costs
- Table E-2: Level 2 Monitoring and Management Costs
- Table E-3: Level 3 Monitoring and Management Costs
- Table E-4: Other One-Time (Mandatory) and Potential As-Needed (Optional) Costs for VPHCP Monitoring and Management
- Table E-5: City of San Diego VPHCP Monitoring and Management Comprehensive Cost Estimate by Complex
- Table E-6: Summary of One-Time Costs for VPHCP Monitoring and Management by Complex (2014 Dollars)
- Table E-7: Summary of Annual Ongoing Costs for VPHCP Monitoring and Management by Complex (2014 Dollars)
- Table E-7: Summary of Total Costs for VPHCP Monitoring and Management by Complex (2014 Dollars)
- Table E-9: Weed Control Cost Estimate Detail

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- Table E-10: City and Consultant Staff 2014 Rates
 - Table E-11: Cost Estimate for Changed Circumstances
 - Table E-12: Fence and Sign Installation Cost Assumptions
 - Table E-13: Baseline Monitoring and Management Comprehensive Cost Estimate by Complex

The cost analysis is directly linked to the monitoring and management activities detailed in Chapter 7 of the VPHCP, as well as the complex-specific management framework in the VPMMP. If any changes are made to the monitoring and/or management methods outlined in the VPHCP and/or VPMMP, then the costs analysis may need to be revised accordingly.

While implementation costs have been generated for each vernal pool complex managed under the VPHCP, the costs have been generated based on broad, program-level assumptions. For example, some estimated costs were developed using Preserve-wide assumptions based on average complex size, average occurrence of vernal pool focal species, average number of vernal pools within a complex, etc. These assumptions are summarized in the following sections and described in further detail in the attached tables. The purpose of this cost analysis is to identify a program-level cost for implementation of the overall VPHCP management and monitoring program so that the City can target appropriate funding sources. At a site-specific level, some sites may require more funding and some may require less. Site-specific costs should be reevaluated if and when management and monitoring is implemented at a specific site. Costs can and should be tailored to reflect specific management and monitoring needs identified for a complex beyond what is assumed in this program-level cost analysis.

COST ASSUMPTIONS BY MANAGEMENT LEVEL

Tables E-1 through E-3 provides a cost estimate for the required activities associated with each monitoring and management level, as defined in the VPMMP (Table E-1 for Level 1, Table E-2 for Level 2, and Table E-3 for Level 3). Detailed assumptions for each activity associated with a level are provided in Tables E-1 through E-3. Overall assumptions for developing costs for each level are provided below:

- Estimated costs are in 2014 dollars. Escalation is not factored into the cost estimate, but will be factored in by the City when determining funding needs and sources for the VPHCP program.
- Cost estimates are generalized based on AECOM's previous experience and agency input (City, SANDAG Service Bureau, the U.S. Fish and Wildlife Service [USFWS], and the

California Department of Fish and Wildlife [CDFW]) on overseeing and implementing monitoring and management of vernal pools in the San Diego region over the past 15 years.

- Adequate access protection (e.g., fencing, signage) is in place or will be installed at each complex prior to implementation of other management activities. One-time costs for fence and sign installation (where needed, based on City input), as well as repair and replacement costs (assumed under each management level), are included. Site patrol/enforcement is assumed under Level 1 as part of annual ongoing Stewardship costs.
- Management and monitoring activities will be performed by either City staff or Consultants depending on the level and type of activity. In general, Level 1 activities will be performed by City staff. Note that Level 1 management activities (trash removal, access control maintenance, edge effect repair) are also performed under Levels 2 and 3 by City staff. It is assumed that Level 2 monitoring activities will be performed by City staff, while Level 2 management will be performed by Consultant staff. It is assumed that Level 3 monitoring and maintenance activities will be performed by Consultant staff.
- Level 1 (Stewardship) requires the least amount of management and monitoring (compared to Levels 2 and 3) and, therefore, is the least costly. Level 3 (Restoration) requires the most intensive management and monitoring effort (generally including all Level 1 activities, plus additional restoration activities) and, thus, is the most costly.
- City and Consultant biologists performing monitoring and management activities will have the appropriate permits to work with the focal species and have a minimum of 3 years of local field experience with vernal pool vegetation, fauna, hydrology, and soils.
- Weed control costs for focal species vernal pools were extrapolated based on the average size of vernal pools with focal species within the MHPA (0.018 acre). The area of weed control per pool was derived using a basin-to-watershed ratio of approximately 1:5 for Level 2 Weed Control (20-foot buffer treated around each pool) and approximately 1:10 for Level 3 Weed Control (35-foot buffer treated around each pool). Weed control costs for focal species vernal pool include labor plus other direct costs such as field vehicle rental, fuel, herbicide, and equipment. A separate line item is included in each management level for general weed control of the upland watershed and non-focal-species vernal pools. Table E-6 provides more detail on weed control cost estimates.
- For cost estimating purposes, Consultant rates are based on typical contracted audited rates for SANDAG Service Bureau Consultant staff. City staff costs are based on 2014

rates provided by the City. Other direct costs (fringe, overhead) and travel (vehicle use and fuel) are assumed in the fully loaded staff rates. Details on City and Consultant rates are provided in Table E-7.

OTHER ONE-TIME AND POTENTIAL AS-NEEDED COSTS

Table E-4 includes other on-time costs that are mandatory for VPMMP implementation, as well as potential as-needed costs that are optional.

One-time mandatory costs involve a baseline hydrological survey to measure maximum basin depth and watershed connectivity (based on assessment methods identified under the Hydrogeomorphic [HGM] Approach [Bauder et al. 2009]) for every vernal pool within the MHPA that will be managed under the VPHCP (regardless of management and monitoring level), including lands under City control and lands under other ownership. The baseline hydrological data will be used during VPMMP Level 2 and 3 monitoring to evaluate changes in vernal pool water storage and hydrological connectivity. All complexes need baseline hydrological data collected, in the event that a Level 1 complex declines to Level 2 or 3, at which point comparisons to baseline hydrological data would be required. The cost for this one-time survey is detailed in Table E-4 (broken down between City-controlled and other lands), and is incorporated into the cost of VPMMP implementation (Tables A-5 through A-7). It is assumed that the baseline hydrological survey will be completed within the first 5 years of VPMMP implementation.

Optional costs for Levels 1, 2, and 3, such as site-specific restoration plans and topographic restoration, are not included as part of the total implementation cost for the VPMMP levels because not all complexes, if any, will require the as-needed activities. These costs are provided in Table E-4 for reference if and when VPMMP monitoring indicates the need for these activities (as determined by the City). If a complex changes management level, the City can choose to add these activities, as needed. It is assumed that funding for as-needed activities would come from the annual contingency fund, at the discretion of the City and in coordination with USFWS.

VPMMP IMPLEMENTATION COSTS

Cost Analysis Methodology

The estimated cost for the three monitoring and management levels was used to determine a total cost of implementation of the VPMMP at each complex in the MHPA that will be managed under the VPHCP over the life of the Permit (31 years). Costs differ at each complex based on

the number of vernal pools with focal species, level of effort associated with assigned monitoring and management level (Levels 1, 2, and 3), and type of staff performing the monitoring and management (City or Consultant). Table E-5 provides various types (based on land ownership) and phases (one-time versus ongoing) of VPMMP implementation costs by complex, as follows:

- The total one-time cost to implement enhancement (Level 2) and restoration (Level 3 or Site-Specific Management Plan) for each complex within the MHPA that will be managed under the VPHCP, regardless of land ownership and management responsibility. The following assumptions were made about the time-frame for one-time monitoring and maintenance costs for these specific VPMMP levels:
 - Level 3 (Restoration) maintenance and monitoring would last 5 years. Each complex at Level 3 is assumed to be stabilized following the 5-year period and will be elevated to Level 1 (Stewardship) status.
 - Level 2 (Enhancement) maintenance and monitoring would last 3 years. Each complex at Level 2 is assumed to be stabilized following 3 years, and will then be elevated to Level 1 (Stewardship) status.
- The City's one-time cost to implement enhancement (Level 2) and restoration (Level 3 or Site-Specific Management Plan) for each complex within the MHPA that will be managed under the VPHCP.
- The total annual ongoing cost for Level 1 (Stewardship) monitoring and management at each complex within the MHPA that will be managed under the VPHCP, regardless of land ownership and management responsibility.
- The total annual ongoing cost for Level 1 (Stewardship) monitoring and management at each complex (or portion of a complex) on City-controlled land within the MHPA.
- The total cost for the VPMMP recommended (based on input from the City and resource agencies) monitoring and management level for each complex within the MHPA that will be managed under the VPHCP (ranges from Level 1 to Level 3, or may include Site-Specific Actions), regardless of land ownership and management responsibility. The recommended level is not required to be implemented under the VPHCP, but is provided for consideration should additional funding become available in the future. Not all complexes have a recommended monitoring and management level.
- The City's potential cost for the VPMMP recommended monitoring and management level at each complex (or portion of a complex) on City-controlled land within the MHPA, should additional funding become available.

-
- The total cost for VPMMP implementation over the 31-year life of the Project (in 2014 dollars, not adjusted for inflation), regardless of land ownership and management responsibility, including the one-time required costs, annual ongoing costs, reporting, changed circumstances, and contingency.
 - The City's total cost for VPMMP implementation for complexes on City-controlled land within the MHPA over the 31-year life of the Project, including the one-time required costs, annual ongoing costs, reporting, changed circumstances, and contingency.

Note that certain complexes do not have a required monitoring and management level in the VPMMP (noted as "None" in Table E-5). Some complexes do not have focal species and do not warrant monitoring and management, as agreed upon by the City, SANDAG Service Bureau, USFWS, and CDFW. Some complexes are privately held and may seek development entitlement in the future. During the development entitlement process, the City will ensure that the property owner implements the Recommended Management activities as appropriate for the level of mitigation outlined in the VPMMP. Other complexes that are not under City control have been developed pursuant to prior approval by the City of San Diego. No management was required at that time, nor is any management being required as part of the VPHCP. As funding becomes available, the City may work with the owner to implement the Additional Recommended Management activities.

Certain complexes may also have Site-Specific Management Plans (SSMP), instead of a required monitoring and management level. SSMPs are existing or future resource agency-approved plans that guide monitoring and management activities for the complex. For cost estimating purposes, it is assumed that costs for implementation of an SSMP are comparable to a Level 3 monitoring and management level. No additional requirements on the landowner will be added to complexes with an approved SSMP with adoption of the VPHCP if the land is retained by the landowner. In some cases, privately owned complexes with an SSMP have a recommended monitoring and management level in the event that the City gains control of the land. If lands are deeded to the City, appropriate funding will be provided to the City by the landowner and will be placed in a site-special special account. For resource agency-approved mitigation projects, it is assumed that, after 5 years of Level 3 maintenance and monitoring, the site will be elevated to Level 1 (at which point the monitoring and management costs would be reduced accordingly), and maintained at that level in perpetuity.

In addition to management and monitoring activities, it is assumed that City staff time will be required for data tracking, analysis, and reporting. City staff will also need to coordinate with private landowners and managers regarding VPMMP required activities, including obtaining

required data and reporting information for focal species vernal pools on private land. The cost estimate assumes an average time commitment of one day a week for a City biologist (Biologist III) for this effort, which is included as an individual line item in Table E-5. This task may also be performed by a Senior Planner which has a similar pay rate so the cost estimate would be the essentially the same.

The program-level cost calculation methodology allows the City the flexibility to adjust complex-specific costs as adaptive management and monitoring decisions are made in the future. If, through management and monitoring (as detailed in the VPMMP), it is determined that the management level for a complex must be elevated or lowered, the City can adjust the cost estimate for that particular complex using the management and monitoring level-specific costs in Tables A-1 through A-3. Costs can and should be tailored to reflect specific management and monitoring needs identified for a complex.

The cost analysis summarizes the one-time and annual ongoing Project costs, as well as the total costs for the 31-year life of the Project. After the initial 3-year period for Level 2 complexes and 5-year period for Level 3 or SSMP complexes, all complexes are assumed to be maintained at Level 1.

The total cost for VPMMP implementation was generated based on the total of the one-time costs for the VPMMP-required monitoring and management level (Level 2, Level 3, or SSMP complexes) plus annual ongoing Level 1 costs for all complexes.

Cost assumptions for contingency and changed circumstances are described below.

Annual Contingency Fund

Annual ongoing costs assume that all complexes will be maintained at Level 1 monitoring and maintenance (after initial Level 2 and 3 complexes are elevated to Level 1 status). However, over time it is realistic to anticipate that some complexes may decline to Level 2 or Level 3. In addition, it is possible that unanticipated costs may result from unexpected activities, such as illegal grading. Therefore, it is prudent for the City to include an annual contingency amount to account for potential additional monitoring and maintenance costs associated with a decline in a complex's management level (i.e., the difference between Level 1 and Level 2 or Level 3 costs).

To determine an appropriate annual contingency, it is assumed that, on average each year during the 31-year life of the VPHCP permit, either two average-sized complexes will be at Level 2 *or* one average-sized complex will be at Level 3. To estimate the contingency amount, the average

Level 2 and Level 3 costs were determined using the average number of vernal pools with focal plant species (13 pools) and shrimp species (three pools) for each complex within the MHPA that will be managed under the VPHCP. The average annual cost associated with managing these “contingency” complexes is approximately \$44,148. The average annual cost for these “contingency” complexes if they were at Level 1 is \$13,461. Therefore, the total annual contingency required is \$30,687 (\$44,148 minus \$13,461 for the already ongoing Level 1 costs). Therefore, an annual contingency of \$30,687 is appropriate to account for additional costs associated with complexes declining from Level 1 status. The City would be responsible for contingency costs up to a total of an estimated \$ 951,288 during the life of the Project (31 years).

Site conditions and monitoring and management requirements will vary among sites and between years depending on a variety of factors, such as rainfall patterns, changes to the surrounding environment, and success of management techniques. Estimated costs are averages and may fluctuate between years of Project implementation. Unexpended Project funds (including the contingency) would be available for use in future years. For example, unexpended funds could be used to address Planned Responses to Changed Circumstances (refer to VPHCP Chapter 9) that result in a change in management level, such as weed invasion or vandalism.

Changed Circumstances

Separate from the contingency, additional costs may be associated with Changed Circumstances that necessitate Planned Responses (i.e., additional mitigation, management, maintenance, and/or monitoring beyond what is identified in the VPMMP; see VPHCP Chapter 9). Based on guidance from USFWS, two specific categories of changed circumstances are included in this cost analysis: post-fire management and enhancement fairy shrimp management to address a decline in fairy shrimp density. Cost assumptions are summarized, including average annual cost and total cost for the 31-year life of the Project. More detail is provided in Table E-11. The City would be responsible for the costs of change circumstance up to a total of an estimated \$1,810,448 during the life of the Project (31 years). Costs associated with other Changed Circumstances, including weed invasion, vandalism, and climate change, are assumed to be covered by the annual contingency fund (discussed above) because the Planned Responses relate more specifically to a change in management level.

While the likelihood of occurrence and magnitude of subsequent effects of these circumstances are highly unknown, an estimated level of effort (and associated costs) is provided for consideration. Activities and assumptions associated with the changed circumstances categories are discussed below.

Post-Fire Management

For this cost analysis, it is assumed that a catastrophic fire will burn two average-size complexes (50 vernal pools) once every 10 years. Burned complexes will require limited Level 3 management and monitoring to recover (5 years). Management activities to restore burned complexes will involve general maintenance (trash removal, access control, etc.); weed control in vernal pools and the upland watershed; and seed collection, bulking, and dispersal. Monitoring will involve quantitative observations and Level 3 quantitative monitoring for focal plant species to monitor re-seeding success for all vernal pools in a complex and focal shrimp species pools (based on pre-fire conditions). It is assumed that, following 5 years of post-fire restoration, a burned complex will be elevated to Level 1 monitoring and management. Costs associated with post-fire management are the difference between Level 1 and Level 3 for the 5-year post-fire restoration period.

Enhanced Fairy Shrimp Management

Fairy shrimp (San Diego or Riverside) population decline is another unforeseen circumstance that may arise due to possible hybridization with versatile fairy shrimp or other yet-to-be determined causes. It is possible that, based on direction from USFWS, the City may be required to implement an enhanced level of effort for management of San Diego and/or Riverside fairy shrimp should a population decline occur. In a good-faith effort to address potential enhanced fairy shrimp management, a cost estimate was developed based on a possible fairy shrimp cyst bulking program. A cyst bank bulking inoculation program could potentially be implemented to address fairy shrimp population issues. Fairy shrimp cyst bank bulking is experimental in design and implementation, and should only be conducted upon approval by USFWS and under the direct supervision of a qualified biologist with permits for handling endangered fairy shrimp species. The guidelines discussed below should be considered.

To implement a cyst banking/inoculation program, cyst-rich soil could be collected from pools known to be occupied by San Diego or Riverside fairy shrimp (and ideally free of versatile fairy shrimp). Soil would be taken to a lab, placed in artificial basins (plastic pools or tubes), and inundated for at least 4 weeks to hatch the fairy shrimp and other crustacean species. A reverse osmosis system would be used to remove minerals and chemicals (chlorine) from the water.

Mature fairy shrimp and other crustacean species would be identified and placed in smaller containers for egg and cyst collection. It is difficult to identify the species of adult male fairy shrimp without the use of magnification, which usually requires the shrimp to be euthanized

before identification. However, females can be identified accurately without magnification. To ensure that San Diego and Riverside fairy shrimp are the only shrimp species being collected, only adult females that have bred and developed cyst sacs would be placed in the collection containers.

Fairy shrimp and other crustacean species would drop their eggs and cysts into a sterile medium in the collection containers. Once the adult crustacean species reproduce and completed their life cycle, the collection containers would be dried so that the sand rich with eggs and cysts can be collected and stored.

Soil rich with San Diego and/or Riverside fairy shrimp cysts could be used to inoculate pools and enhance or reestablish populations. Pools could also be saturated with San Diego and/or Riverside fairy shrimp cysts to possibly outcompete versatile fairy shrimp and prevent hybridization. These methods have not been tested, and would only be conducted under the direction and supervision of USFWS.

COST EVALUATION TABLES

- Table E-1: Level 1 Monitoring and Management Costs
- Table E-2: Level 2 Monitoring and Management Costs
- Table E-3: Level 3 Monitoring and Management Costs
- Table E-4: Other One-Time (Mandatory) and Potential As-Needed (Optional) Costs for VPHCP Monitoring and Management
- Table E-5: City of San Diego VPHCP Monitoring and Management Comprehensive Cost Estimate by Complex for the Project
- Table E-6: Summary of One-Time Costs for VPHCP Monitoring and Management by Complex for the Project (2014 Dollars)
- Table E-7: Summary of Annual Ongoing Costs for VPHCP Monitoring and Management by Complex for the Project (2014 Dollars)
- Table E-8: Summary of Total Costs for VPHCP Monitoring and Management by Complex for the 31-Year Life of the Project (2014 Dollars)
- Table E-9: Weed Control Cost Estimate Detail
- Table E-10: City and Consultant Staff 2014 Rates
- Table E-11: Cost Estimate for Changed Circumstances
- Table E-12: Fence and Sign Installation Cost Assumptions
- Table E-13: City of San Diego Baseline Vernal Pool Monitoring and Management Comprehensive Cost Estimate by Complex (2014 Dollars)

Table E-1: Level 1 Monitoring and Management Costs

Task	Assumptions	Staff	Title	Loaded Rate	Hours	Unit	Timing	Annual Cost per Unit
MONITORING LEVEL 1								
Qualitative Visits	2 hour per complex, including travel time	City	Bio III	\$88	2	Complex	Annual	\$176
Quantitative Floral Focal Species Surveys	0.5 hour per pool; survey 10% of pools with each focal species; if complex has <10 pools for each focal species, survey at least 1 pool for each focal species known to occur	City	Bio III	\$88	0.5	Pool (subsample)	Annual	\$44
Ponding Verification	4 hours per complex (includes 3 visits during wet season, one assumed to overlap with qualitative visit)	City	Bio I	\$61	4	Complex	Annual	\$246
MANAGEMENT LEVEL 1								
Patrol/Enforcement	Patrol and enforcement of site access throughout the year as part of stewardship (Average once per month, 4 hrs per visit including travel time. Note some complexes may not be visited every month and others may be visited bi-weekly or weekly)	City	Ranger	\$60	4	Complex	Ranges (Average Monthly)	\$2,873
Trash and Debris Removal	Performed in conjunction with other visits	City	GMM or Ranger ¹	\$67	16	Complex	Annual	\$1,074
Access Control Maintenance	Repair and maintenance of previously installed access control (e.g., fencing and signs). Material costs are included in the per unit cost (assume \$100 per complex).	City	GMM or Ranger+ Fence/Sign Cost	\$67	8	Complex	Annual	\$637
Edge Effect Repair	Irrigation control, erosion control, etc.	City	GMM or Ranger ¹	\$67	4	Complex	Annual	\$269
General Weed Control Level 1	Two visits per spring (2 staff) for general upland watershed area and non-focal species vernal pools	City	PA	\$56	32	Complex	Annual	\$1,789
Focal Vernal Pool Weed Control Level 1	Two visits per spring (1 staff) of targeted control of invasives in vernal pools with focal species	City	PA + Herbicide	\$67	16	Complex	Annual	\$1,066
Maintenance Oversight	Average of two 2 hour oversight visits/field coordination efforts per year	City	Snr Plnr	\$91	4	Complex	Annual	\$366

Notes: Level 1 activities apply to pools with focal species unless otherwise noted. Rates are rounded and detailed in Table E-10.

¹ For cost estimating purposes, the City GMM and Ranger rates are averaged

Summary Costs:	
Annual Cost for Complex-Wide Activities	\$8,495
Annual Cost for Each Floral Focal Species Pool in Subsample	\$44
Annual Cost for Each Shrimp Focal Species Pool in Subsample	\$0

Table E-2: Level 2 Monitoring and Management Costs

Task	Assumptions	Staff	Title	Loaded Rate	Hours	Unit	Timing	Annual Cost per Unit
MONITORING LEVEL 2								
Qualitative Visits	2 hour per complex, including travel time	City	Bio III	\$88	1.5	Complex	Annual	\$132
Quantitative Floral Focal Species Surveys	0.5 hour per pool. Survey all pools with focal species	City	Bio III	\$88	0.5	Pool	Annual	\$44
Quantitative Shrimp Focal Shrimp Species Surveys	Dry season shrimp cyst sampling for pools with shrimp, up to 10 pools or 10% of pools, whichever is greater; sampling once every 3 years; includes genetic lab time for analyzing shrimp	Consultant	n/a	\$860 per pool	n/a	Pool (subsample)	Once every 3 years	\$287
Ponding Verification	4 hours per complex (includes 3 visits during wet season, one assumed to overlap with qualitative visit)	City	Bio I	\$61	4	Complex	Annual	\$246
MANAGEMENT LEVEL 2								
Trash and Debris Removal	Performed in conjunction with other visits	City	GMM or Ranger ¹	\$67	16	Complex	Annual	\$1,074
Access Control Maintenance	Repair and maintenance of previously installed access control (e.g., fencing and signs). Material costs are included in the per unit cost (assume \$200 per complex).	City	GMM or Ranger + Fence/Sign	\$67	8	Complex	Annual	\$737
Edge Effect Repair	Irrigation control, erosion control, etc.	City	GMM or Ranger ¹	\$67	4	Complex	Annual	\$269
Maintenance Oversight	Assume average of 16 hours per complex annually (4 visits)	Consultant	Snr Bio	\$179	16	Complex	Annual	\$2,868
Dethatching	One time in pools with focal species and 20-foot buffer	Consultant	Crew	n/a	n/a	Pool	Annual	\$277
General Weed Control Level 2	Three visits per spring (2 staff) for general upland watershed area and non-focal species vernal pools	Consultant	Crew + Herbicide	\$71	48	Complex	Annual	\$3,399
Focal Vernal Pool Weed Control Level 2	Two visits per spring (4 staff) and 20-foot buffer around focal species pools only	Consultant	Crew	n/a	n/a	Pool	Annual	\$231
Seed Collection	Hand collection from pools with focal species	Consultant	Bio I	\$104	0.5	Pool	Annual	\$52
Seed Bulking	One greenhouse generation; 50 plants per pool with focal species	Consultant	n/a	\$7.50 per plant	n/a	Pool	Annual	\$375
Seed Dispersal	Hand broadcast in pools with focal species	Consultant	Crew	\$65	0.25	Pool	Annual	\$16
Shrimp Cyst Soil Collection	Performed by permitted biologist	Consultant	Bio I	\$104	0.5	Pool	Annual	\$52
Shrimp Cyst Soil Dispersal	Performed by permitted biologist	Consultant	Bio I	\$104	0.25	Pool	Annual	\$26
Topographic Repair	10 pools per day, including 8 hrs operator plus 8 hrs senior biologist, including maximum depth survey.	Consultant	Crew	\$65	8	Pool	Annual	\$102
			Snr Bio	\$179	8	Pool	Annual	\$143

Notes: Level 2 activities apply to pools with focal species unless otherwise noted. Rates are rounded and detailed in Table E-10.

¹ For cost estimating purposes, the City GMM and Ranger rates are averaged

Summary Costs:	
Annual Cost for Complex-Wide Activities	\$8,724
Annual Cost for Each Floral Focal Species Pool in Subsample	\$995
Annual Cost for Each Shrimp Focal Species Pool in Subsample	\$365
Topographic Repair	\$245

Note: Annual costs for Level 2 are assumed over a 3 year period

Table E-3: Level 3 Monitoring and Management Costs

Task	Assumptions	Staff	Title	Loaded Rate	Hours	Unit	Timing	Annual Cost per Unit
MONITORING LEVEL 3								
Qualitative Visits	2 hour per complex, including travel time	Consultant	Bio I	\$104	1.5	Complex	Annual	\$156
Quantitative Floral Focal Species Surveys	0.5 hour per pool; survey all pools with focal species	Consultant	Bio I	\$104	0.5	Pool	Annual	\$52
Quantitative Shrimp Focal Shrimp Species Surveys	Dry season shrimp cyst sampling for pools with shrimp, up to 10 pools or 20% of pools, whichever is greater; sampling once every 3 years; includes genetic lab time for analyzing shrimp	Consultant	n/a	\$860 per pool	n/a	Pool (subsample)	Once every 5 years	\$172
Ponding Verification	4 hours per complex (includes 3 visits during wet season, one assumed to overlap with qualitative visit)	Consultant	Bio I	\$104	4	Complex	Annual	\$417
MANAGEMENT LEVEL 3								
Trash and Debris Removal	Performed in conjunction with other visits	City	GMM or Ranger ¹	\$67	16	Complex	Annual	\$1,074
Access Control Maintenance	Repair and maintenance of previously installed access control (e.g., fencing and signs). Material costs are included in the per unit cost (assume \$200 per complex).	City	GMM or Ranger + Fence/Sign Cost	\$67	8	Complex	Annual	\$737
Edge Effect Repair	Irrigation control, erosion control, etc.	City	GMM or Ranger ¹	\$67	4	Complex	Annual	\$269
Maintenance Oversight	Assume 32 hours per complex annually (8 visits)	Consultant	Snr Bio	\$179	32	Complex	Annual	\$5,736
Dethatching	One time in pools with focal species and 35-foot buffer	Consultant	Crew	\$65	n/a	Pool	Annual	\$558
General Weed Control	Four visits per spring (2 staff) in general upland watershed and non-focal species vernal pools	Consultant	Crew + Herbicide	\$71	64	Complex	Annual	\$4,532
Focal Vernal Pool Weed Control Level 3	Four visits per spring (4 staff) and 35-foot buffer around pools with focal species only	Consultant	Crew	\$65	n/a	Pool	Annual	\$744
Seed Collection	Hand collection from pools with focal species	Consultant	Bio I	\$104	1	Pool	Annual	\$104
Seed Bulking	One greenhouse generation; 50 plants per pool with focal species	Consultant	n/a	\$7.50 per plant	n/a	Pool	Annual	\$375
Seed Dispersal	Hand broadcast in pools with focal species	Consultant	Crew	\$65	0.5	Pool	Annual	\$32
Container Plant Installation	Plants are directly planted into the site	Consultant	Crew	\$65	4	Pool	Annual	\$258
Container Plant Care	Includes 3 visits for watering (0.5 hour each), does not include water cost	Consultant	Crew	\$65	1.5	Pool	Annual	\$97
Shrimp Cyst Soil Collection	Performed by permitted biologist	Consultant	Bio I	\$104	1	Pool	Annual	\$104
Shrimp Cyst Soil Dispersal	Performed by permitted biologist	Consultant	Bio I	\$104	0.5	Pool	Annual	\$52
Topographic Repair	8 pools per day, including 8 hrs operator plus 8 hrs senior biologist, including maximum depth survey	Consultant	Crew	\$65	8	Pool	Annual	\$127
			Snr Bio	\$179	8	Pool	Annual	\$179

Notes: Level 3 activities apply to pools with focal species unless otherwise noted. Rates are rounded and detailed in Table E-1C

¹ For cost estimating purposes, the City GMM and Ranger rates are average

Summary Costs:	
Annual Cost for Complex-Wide Activities	\$12,921
Annual Cost for Each Floral Focal Species Pool in Subsample	\$2,221
Annual Cost for Each Shrimp Focal Species Pool in Subsample	\$328
Topographic Repair	\$306

Note: Annual costs for Level 3 are assumed over a 5 year period

Table E-4: Other One-Time (Mandatory) and Potential As-Needed (Optional) Costs for VPHCP Monitoring and Management Plan

Task	Assumptions	Staff	Title	Loaded Rate	Hrs	Unit	Timing	Estimated Cost or Range of Costs
ONE-TIME MANDATORY COSTS (INCLUDED IN TABLE E-5)								
HGM Baseline Survey (City Lands)	Assume all pools in the VPHCP Preserve on City controlled lands (1,486 pools) will be surveyed within a 5 year timeframe. Data collection for Level 2 and 3 pools will be funded via the VPHCP, Level 1 pools will be funded via outside funding (e.g., a grant).	Consultant	Bio I	\$104	0.5	Per Pool	One-Time	\$77,482
HGM Baseline Survey (Other Ownership)	Assume all pools in the VPHCP Preserve on privately owned/controlled lands (1,375 pools) will be surveyed within a 5 year timeframe	Consultant	Bio I	\$104	0.5	Per Pool	One-Time	\$71,694
Installing Fencing/Signage	Fencing and signage will be installed at certain complexes that do not have existing access control and require fencing/signs based on City direction (as detailed in Table E-12). Costs include materials plus City staff labor for installation.	City	GMM	\$74	N/A	Average Fence/Sign Installation Cost plus Labor per Linear Foot	One-Time	\$10.29
POTENTIAL AS-NEEDED OPTIONAL COSTS TO CONSIDER (NOT INCLUDED IN TABLE A-5)								
Management Level 1								
Topographic Repair Level 1	Minor as-needed repairs with hand tools	City	GMM	\$74	16	Complex	Annual	\$1,191
Management Level 2								
Detailed Restoration Plan	For internal use by City and Consultant staff to guide specific restoration activities; prepared at the discretion of the City	Consultant	Various	N/A	N/A	Per Plan	One-time	\$15,000 (1-20 pools)/ \$20,000 (21-50 pools)/ \$25,000 (51-100 pools)
Detailed Topographic Plan	Includes a detailed micro-topographic map to direct vernal pool restoration; prepared at the discretion of the City	Consultant	Various	N/A	N/A	Per Plan	One-time	\$3,500 (1-20 pools)/ \$7,500 (21-50 pools)/ \$10,000 (50+ pools)
Management Level 3								
Detailed Restoration Plan	For internal use by City and Consultant staff to guide specific restoration activities; prepared at the discretion of the City	Consultant	Various	N/A	N/A	Per Plan	One-time	\$5000 (1-20 pools)/ \$7500 (21-50 pools)/ \$10,000 (51-100 pools)
Detailed Topographic Plan	For internal use by City and Consultant staff, includes a detailed micro-topographic map to direct vernal pool restoration; prepared at the discretion of the City	Consultant	Various	N/A	N/A	Per Plan	One-time	\$3,500 (1-20 pools)/ \$7,500 (21-50 pools)/ \$10,000 (50+ pools)

Notes: Rates are detailed in Table E-10.

Table E-6: Summary of One-Time Costs for VPHCP Monitoring and Management by Complex (2014 Dollars)

Complex ID	Name	Planning Unit	Inside or Outside VPHCP Plan Area	Management Funding Responsibility	Total Pools with Plant Focal Species	Plant Focal Species Pools Subsample (Level 1)	Pools with Plant Focal Species (Level 2)	Pools with Plant Focal Species (Level 3)	Total Pools with Shrimp Focal Species	Shrimp Focal Species Pool Subsample (Level 1)	Shrimp Focal Species Pool Subsample (Level 2)	Shrimp Focal Species Pool Subsample (Level 3)	Total One-Time Fence/Sign Installation Cost	City One-Time Fence/Sign Installation Cost	Required VPMMP Mngmt & Monitoring Level	Total One-Time* Cost for Required VPMMP Mngmt & Monitoring Level 2 or 3 or SSMP (\$)	City One-Time* Cost for Required VPMMP Mngmt & Monitoring Level 2 or 3 or SSMP (\$)
J 28 E	La Media Swale North	South	Inside	Private	0	0	0	0	0	0	0	0	13,935	0	Level 3 ₁	64,604	0
J 31	Hidden Trails	South	Inside	City	0	0	0	0	1	1	1	1	0	0	Level 1	0	0
J 32	West Otay A (Private)	South	Outside	State	2	2	2	2	0	0	0	0	0	0	Level 1 ₂	0	0
	West Otay B	South	Inside	City	0	0	0	0	0	0	0	0	11,777	11,777	Level 1	0	0
	West Otay C	South	Inside	City	1	1	1	1	0	0	0	0	9,917	9,917	Level 1	0	0
J 34	Bachman	South	Inside	Private	0	0	0	0	0	0	0	0	21,601	0	Level 3	61,876	0
	Candlelight	South	Inside	Private	0	0	0	0	1	1	1	1	45,134	0	Level 1	0	0
J 35	Brown Field	South	Inside	City Enterprise	0	0	0	0	0	0	0	0	0	0	None ₄	0	0
J 36	Southview	South	Inside	Private	0	0	0	0	11	10	10	10	29,144	0	Level 3 ₁	61,876	0
J 4	Robinhood Ridge	South	Inside	City	50	8	50	50	41	10	10	10	0	0	Level 2	193,774	193,774
	California Crossing	South	Inside	Private	0	0	0	0	5	5	5	5	13,596	0	Level 1	0	0
K 5	Otay Lakes	Central	Inside	City Enterprise	46	6	46	46	6	6	6	6	0	0	Level 1	0	0
KK 2	Pasatiempo	Central	Inside	City	0	0	0	0	0	0	0	0	14,212	14,212	Level 1	0	0
MM 1	Marron Valley	South	Inside	City Enterprise	0	0	0	0	5	5	5	5	0	0	Level 1	0	0
N 1-4	Teledyne Ryan	Central	Inside	Private	1	1	1	1	11	10	10	10	0	0	Level 2 ₁	47,455	0
N 5-6	Montgomery Field	Central	Inside	City Enterprise	151	15	151	151	24	10	10	10	0	0	Level 1 ₄	0	0
N 7	Serra Mesa Library	Central	Inside	City	0	0	0	0	0	0	0	0	0	0	Level 1	0	0
N 8	General Dynamics **	Central	Inside	City	20	3	20	20	6	6	6	6	0	0	Level 1	0	0
NC	Li Collins	North	Inside	Private	0	0	0	0	0	0	0	0	0	0	None	0	0
	Kelton	South	Inside	City	0	0	0	0	0	0	0	0	0	0	None	0	0
OO	Salk Institute	North	Inside	Private	0	0	0	0	0	0	0	0	0	0	Level 1	0	0
Q 2	Mission Trails Regional Park	Central	Inside	City	0	0	0	0	6	6	6	6	3,083	3,083	Level 1 ₁	0	0
Q 3	Castlerock	North	Inside	Private	0	0	0	0	0	0	0	0	0	0	Level 1	0	0
QQ	Tecolote Canyon	Central	Inside	City	0	0	0	0	0	0	0	0	17,861	17,861	None	0	0
R 1	Proctor Valley	South	Inside	City Enterprise	0	0	0	0	3	3	3	3	0	0	Level 1	0	0
U15	SANDER	Central	Inside	City Enterprise	1	1	1	1	2	2	2	2	0	0	Level 2 ₁	31,347	31,347
U 19	Cubic	Central	Inside	Private	3	2	3	3	6	6	6	6	38,979	0	Level 1 ₁	0	0
X 5	Nobel Drive	North	Inside	City	1	1	1	1	6	6	6	6	0	0	Level 1	0	0
X 7	Nobel Research **	North	Inside	City	0	0	0	0	1	1	1	1	0	0	Level 1	0	0
Subtotal VPMMP Monitoring and Management Cost													-	-		1,415,881	327,635
One-Time Cost for Vernal Pool HGM Baseline Survey (see Table A-4 for detail)													-	-		149,176	77,482
TOTAL COST													631,573	180,681		2,196,630	585,798

Table E-7 Summary of Annual Ongoing Costs for VPHCP Monitoring and Management by Complex (2014 Dollars)

Complex ID	Name	Planning Unit	Inside or Outside VPHCP Plan Area	Management Funding Responsibility	Total Pools with Plant Focal Species	Plant Focal Species Pools Subsample (Level 1)	Pools with Plant Focal Species (Level 2)	Pools with Plant Focal Species (Level 3)	Total Pools with Shrimp Focal Species	Shrimp Focal Species Pool Subsample (Level 1)	Shrimp Focal Species Pool Subsample (Level 2)	Shrimp Focal Species Pool Subsample (Level 3)	Total Annual Ongoing Cost for Level 1 Mngmt & Monitoring (\$)	City Annual Ongoing Cost for Level 1 Mngmt & Monitoring (\$)	Required VPMMP Mngmt & Monitoring Level
J 32	West Otay A (Private)	South	Outside	State	2	2	2	2	0	0	0	0	8,583	0	Level 1 ₂
	West Otay B	South	Inside	City	0	0	0	0	0	0	0	0	8,495	8,495	Level 1
	West Otay C	South	Inside	City	1	1	1	1	0	0	0	0	8,539	8,539	Level 1
J 34	Bachman	South	Inside	Private	0	0	0	0	0	0	0	0	8,495	0	Level 3
	Candlelight	South	Inside	Private	0	0	0	0	1	1	1	1	8,495	0	Level 1
J 35	Brown Field	South	Inside	City Enterprise	0	0	0	0	0	0	0	0	0	0	None ₄
J 36	Southview	South	Inside	Private	0	0	0	0	11	10	10	10	8,495	0	Level 3 ₁
J 4	Robinhood Ridge	South	Inside	City	50	8	50	50	41	10	10	10	8,846	8,846	Level 2
	California Crossing	South	Inside	Private	0	0	0	0	5	5	5	5	8,495	0	Level 1
K 5	Otay Lakes	Central	Inside	City Enterprise	46	6	46	46	6	6	6	6	8,758	8,758	Level 1
KK 2	Pasatiempo	Central	Inside	City	0	0	0	0	0	0	0	0	8,495	8,495	Level 1
MM 1	Marron Valley	South	Inside	City Enterprise	0	0	0	0	5	5	5	5	8,495	8,495	Level 1
N 1-4	Teledyne Ryan	Central	Inside	Private	1	1	1	1	11	10	10	10	8,539	0	Level 2 ₁
N 5-6	Montgomery Field	Central	Inside	City Enterprise	151	15	151	151	24	10	10	10	9,153	9,153	Level 1 ₄
N 7	Serra Mesa Library	Central	Inside	City	0	0	0	0	0	0	0	0	8,495	8,495	Level 1
N 8	General Dynamics **	Central	Inside	City	20	3	20	20	6	6	6	6	8,626	8,626	Level 1
NC	Li Collins	North	Inside	Private	0	0	0	0	0	0	0	0	8,495	0	None
	Kelton	South	Inside	City	0	0	0	0	0	0	0	0	8,495	8,495	None
OO	Salk Institute	North	Inside	Private	0	0	0	0	0	0	0	0	8,495	0	Level 1
Q 2	Mission Trails Regional Park	Central	Inside	City	0	0	0	0	6	6	6	6	8,495	8,495	Level 1 ₁
Q 3	Castlerock	North	Inside	Private	0	0	0	0	0	0	0	0	8,495	0	Level 1
QQ	Tecolote Canyon	Central	Inside	City	0	0	0	0	0	0	0	0	8,495	8,495	None
R 1	Proctor Valley	South	Inside	City Enterprise	0	0	0	0	3	3	3	3	8,495	8,495	Level 1
U15	SANDER	Central	Inside	City Enterprise	1	1	1	1	2	2	2	2	8,539	8,539	Level 2 ₁
U 19	Cubic	Central	Inside	Private	3	2	3	3	6	6	6	6	8,583	0	Level 1 ₁
X 5	Nobel Drive	North	Inside	City	1	1	1	1	6	6	6	6	8,539	8,539	Level 1
X 7	Nobel Research **	North	Inside	City	0	0	0	0	1	1	1	1	8,495	8,495	Level 1
Subtotal VPMMP Monitoring and Management Cost													602,757	278,199	
Data Tracking and Reporting (Bio III 1 day per week annually, City responsibility for all sites)													35,360	35,360	
Changed Circumstances (refer to Table A-11 for detail, assumes City is responsible for all costs)													58,402	58,402	
Contingency													30,687	30,687	
TOTAL COST													727,205	402,647	

Table E-8 Summary of Total Cost for VPHCP Monitoring and Management by Complex for the 36-Year Life of the Project (2014 Dollars)

Complex ID	Name	Geographic Area	Management Responsibility	City Cost for Required VPMMMP Implementation (31 Years)	Non-City Cost for Required VPMMMP Implementation (31 Years)	Total Cost for VPMMMP Implementation (31 Years)
B 11	Mesa Norte**	North	City/Private	0	266,060	266,060
B 5	Tierra Alta	North	Private	0	263,338	263,338
B 6	Lopez Ridge (CDFW)	North	State	0	264,699	264,699
B 7-8	Crescent Heights	North	City	264,699	0	264,699
	Lopez Ridge (City)	North	City Enterprise	266,060	0	266,060
C 17-18	Fieldstone	North	Private	0	0	0
C 27	Mira Mesa Market Center	North	Private	0	0	0
D 5-8	Parkdale Carroll Canyon	North	City	263,338	0	263,338
	Carroll Canyon	North	City	278,310	0	278,310
F 16-17	Menlo KM Parcel	Central	Private	0	263,338	263,338
H 1-10, 13-15, 18-23, 24-26	Del Mar Mesa (State/Federal)	North	State/Federal	0	287,837	287,837
	Del Mar Mesa (Private)	North	Private	0	264,699	264,699
	Del Mar Mesa (City)	North	City	270,143	0	270,143
	Rhodes	North	Private	0	266,060	266,060
H 17	Shaw Lorenz	North	Private	0	263,338	263,338
H 33	East Ocean Air Drive	North	Private	0	264,699	264,699
H 38	Carmel Mountain	North	City	263,338	0	263,338
H 39	Greystone Torrey Highlands	North	City	266,060	0	266,060
I 1	Arjons	North	Private	0	0	0
I12	Pueblo Lands South	North	City Enterprise	263,338	0	263,338
I 6 B	Ford Leasing (Bob Baker)	North	Private	0	0	0
I 6 C	Facilities Development (Eastgate)	North	Private	0	0	0
J 11 E	Slump Block Pools	South	Private	0	306,499	306,499
J 11 W	J 11 West	South	Private	0	288,642	288,642
J 12	J 12	South	Private	0	285,469	285,469
J 13 E	South Otay J 13 East	South	Private	0	285,469	285,469
	South Otay 1 acre (City)	South	City	326,803	0	326,803
J 13 S	South Otay J 13 South	South	Private	0	0	0
	Bachman	South	Private	0	285,469	285,469
J 14	Anderprises (City)	South	City	263,338	0	263,338
	Cal Terraces (South)	South	City	282,393	0	282,393
	Brown Field Basins	South	City Enterprise	0	0	0
	Handler	South	Private	0	285,469	285,469
	Bachman	South	Private	0	285,469	285,469
J 16-18	Goat Mesa (Private)	South	Private	263,338	0	263,338
	Goat Mesa (City)	South	City Enterprise	264,699	0	264,699
	Wruck Canyon	South	City	263,338	0	263,338
J 2	Cal Terraces (North), Otay Mesa Road Parcels	South	City	358,612	0	358,612
	Clayton Parcel	South	City	264,699	0	264,699
	St. Jerome's	South	Private	0	285,469	285,469
J 20-21	La Media ITS	South	Private	0	304,510	304,510
J 21	La Media Swale South	South	Private	0	285,469	285,469
J 27	Empire Center	South	Private	0	400,340	400,340
J 28 E	La Media Swale North	South	Private	0	285,469	285,469
J 31	Hidden Trails	South	City	263,338	0	263,338
J 32	West Otay A (Private)	South	State	0	266,060	266,060
	West Otay B	South	City	263,338	0	263,338
	West Otay C	South	City	264,699	0	264,699
J 34	Bachman	South	Private	0	282,740	282,740
	Candlelight	South	Private	0	263,338	263,338
J 35	Brown Field	South	City Enterprise	0	0	0
J 36	Southview	South	Private	0	282,740	282,740
J 4	Robinhood Ridge	South	City	441,463	0	441,463
	California Crossing	South	Private	0	263,338	263,338
K 5	Otay Lakes	Central	City Enterprise	271,505	0	271,505
KK 2	Pasatiempo	Central	City	263,338	0	263,338
MM 1	Marron Valley	South	City Enterprise	263,338	0	263,338
N 1-4	Teledyne Ryan	Central	Private	0	329,232	329,232
N 5-6	Montgomery Field	Central	City Enterprise	283,754	0	283,754
N 7	Serra Mesa Library	Central	City	263,338	0	263,338
N 8	General Dynamics **	Central	City	267,421	0	267,421
NC	Li Collins	North	Private	0	0	0
	Kelton	South	City	0	0	0

Table E-8 Summary of Total Cost for VPHCP Monitoring and Management by Complex for the 36-Year Life of the Project (2014 Dollars)

Complex ID	Name	Geographic Area	Management Responsibility	City Cost for Required VPMMP Implementation (31 Years)	Non-City Cost for Required VPMMP Implementation (31 Years)	Total Cost for VPMMP Implementation (31 Years)
OO	Salk Institute	North	Private	0	263,338	263,338
Q2	Mission Trails Regional Park	Central	City	263,338	0	263,338
Q3	Castlerock	North	Private	0	263,338	263,338
QQ	Tecolote Canyon	Central	City	0	0	0
R1	Proctor Valley	South	City Enterprise	263,338	0	263,338
U15	SANDER	Central	City Enterprise	313,123	0	313,123
U19	Cubic	Central	Private	0	266,060	266,060
X5	Nobel Drive	North	City	264,699	0	264,699
X7	Nobel Research **	North	City	263,338	0	263,338
Subtotal VPMMP Monitoring and Management Cost				8,635,879	8,467,995	17,103,874
Data Tracking and Reporting (Bio III 1 day per week annually, City responsibility for all sites)				1,096,160	0	1,096,160
Changed Circumstances (refer to Table A-11 for detail, assumes City is responsible for all costs)				1,810,448	0	1,810,448
Contingency				951,288	0	951,288
Total One-Time Fence/Sign Installation Cost (only certain complexes, as detailed in Table A-12)				180,681	450,892	631,573
One-Time Vernal Pool HGM Baseline Survey (see Table A-4 for detail)				77,482	71,694	149,176
TOTAL COST FOR VPMMP IMPLEMENTATION				12,751,938	8,990,581	21,742,518

See Table E-5 for footnotes

Table E-9: Focal Vernal Pool Weed Control Cost Estimate Detail

Weed Control Task	Description of Activity	Cost/Acre	Cost/Pool
Level 2 Focal Vernal Pool Weed Control			
Dethatching 2	One-time visit (4 person crew) in pools with focal species and 20-foot buffer	\$3,000	\$277
Weed Control Level 2	Two visits (4 person crew) per spring and 20-foot foot buffer	\$2,500	\$231
TOTAL		\$5,500	\$508
Level 3 Focal Vernal Pool Weed Control			
Dethatching 3	One-time visit (4 person crew) in pools with focal species and 35-foot buffer	\$3,000	\$558
Weed Control Level 3	Four visits (4 person crew) per spring and 35-foot buffer	\$4,000	\$744
TOTAL		\$7,000	\$1,302

Level 2 Watershed Area

Avg pool size (acres)	0.018
Avg pool size (sq ft)	784.08
Avg pool radius	15.80
Radius + 20-ft buffer	35.80
Area of watershed (sq ft)	4024.83
Area of watershed (acres)	0.092
Watershed/pool ratio	5.13

Level 3 Watershed Area

Avg pool size (acres)	0.018
Avg pool size (sq ft)	784.08
Avg pool radius	15.80
Radius + 35-ft buffer	50.80
Area of watershed (sq ft)	8103.89
Area of watershed (acres)	0.186
Watershed/pool ratio	10.34

Note: Costs include labor and other direct costs such as field vehicle rental, fuel, herbicide, and equipment

Table E-10: City and Consultant Staff 2014 Rates

City Staff	Fully Loaded Rate	Rate with Travel
Senior Planner/Natural Resource Manager	\$88.61	\$91.42
Biologist I	\$58.58	\$61.39
Biologist III	\$85.00	\$87.81
Pesticide Applicator (PA)	\$53.10	\$55.91
Pesticide Applicator (PA) plus Herbicide	\$59.35	\$66.63
Grounds Maintenance Manager (GMM)	\$71.62	\$74.43
Ranger	\$57.04	\$59.85
Senior Ranger	\$73.33	\$76.14

Consultant Staff	Fully Loaded Rate	Rate with Travel
Senior Restoration Ecologist/Biologist	\$163.62	\$179.25
Biologist I	\$88.65	\$104.28
Maintenance/Restoration Crew	\$48.93	\$64.56
Maintenance/Restoration Crew plus Herbicide	\$55.18	\$70.81

Notes:

Fringe and overhead are included in the fully loaded rates
Rates with travel include \$2.81 per hour for City staff (City fleet car) and \$15.63 per hour (\$125/8hr day) for Consultant staff (rental vehicle plus fuel)

Herbicide Cost Assumptions:

Herbicide \$ per acre = 50
Hours for 1 acre herbicide spraying = 8
Herbicide \$/hr = 6.25

Table E-11: Cost Estimate for Changed Circumstances

Task	Assumptions	Staff	Title	Loaded Rate	Avg. Hours	Unit	Timing	Cost per Unit	Avg. Pools/ Complexes Requiring Enhanced Management*	Total Cost
Enhanced Fairy Shrimp Management										
Shrimp Cyst Collection	Performed by permitted biologist	Consultant	Bio I	\$104	0.5	Pool	Annual	\$52	24	\$1,228
Shrimp Cyst Bulking	Performed by permitted biologist	Consultant	Bio I	\$104	120	Complex	Annual	\$12,514	3	\$33,162
Shrimp Cyst Dispersal	Performed by permitted biologist	Consultant	Bio I	\$104	0.25	Pool	Annual	\$26	24	\$614
* Assumes 5% of focal species pools/complexes within the VPHCP Preserve will require enhanced fairy shrimp management once every 5 years									Total (Avg)	\$35,004
									Total (6 times over 31 Years)	\$210,022
Post-Fire Management										
Perform Post-Fire Management	Assume 2 average size complex (50 vernal pools each) burns once every 10 years. Burned complexes will require certain Level 3 management activities (general maintenance, weed control, and seeding) to recover. Level 3 qualitative and quantitative (focal plants and shrimp pools) monitoring would also be necessary. Following the 5-year period, the site would be elevated to Level 1 status.	Consultant	Varied (see Table A-3 for specific Level 3 staff)	Varied (see Table A-3 for rates for Level 3 staff)	Varied (see Table A-3 for Level 3 hours for various tasks)	All pools and overall complex for limited Level 3 management and monitoring	Two complexes once per 10 years	Level 3 costs for specified management and monitoring activities	Total of 6 complexes (50 pools each) burn during life of the HCP Permit (31 years)	
									Total for 31 Years at Level 3	\$3,202,072
									Avg. Annual Post-Fire Cost (6 complexes)	\$103,293
									Avg. Level 1 Ongoing Cost (6 complexes)	\$51,666
									Total Annual Avg Post-Fire Cost (Level 3 less Level 1)	\$51,627
									Total Post-Fire Costs for 31 Years	\$1,600,426
									Total Changed Circumstances over 31 Years	\$1,810,448
									Total Avg. Annual Cost for Changed Circumstances	\$58,402

Table E-12: Fence and Sign Installation Cost Assumptions

Complex ID	Name	Geographic Area	Fencing Assumed (Y/N)	20' Buffer Perimeter Around Complex (LF)
B 11	Mesa Norte	North	N	
B 5	Tierra Alta	North	Y	186
B 6	Lopez Ridge (CDFG)	North	N	
B 7-8	Crescent Heights	North	N	
	Lopez Ridge (City)	North	N	
C 17-18	Fieldstone	North	N	
C 27	Mira Mesa Market Center	North	N	
D 5-8	Parkdale Carroll Canyon	North	N	
	Carroll Canyon	North	N	
H 1-10, 13-15, 18-23, 24-26	Del Mar Mesa (State/Federal)	North	N	
	Del Mar Mesa (Private)	North	Y	1,336
	Del Mar Mesa (City)	North	Y	3,049
	Rhodes	North	N	
H 17	Shaw Lorenz	North	Y	457
H 33	East Ocean Air Drive	North	N	
H 38	Carmel Mountain	North	N	
H 39	Greystone Torrey Highlands	North	N	
I 1	Arjons	North	Y	1,185
I12	Pueblo Lands	North	N	
I 6 B	Ford Leasing (Bob Baker)	North	N	
I 6 C	Facilities Development (Eastgate Miramar Associates)	South	Y	1,180
J 11 E	Slump Block Pools	South	Y	2,113
J 11 W	J 11 West	South	Y	1,416
J 12	J 12	South	Y	1,648
J 13 E	South Otay J 13 East	South	N	
J 13 N	South Otay 1 acre (City)	South	Y	2,514
J 13 S	South Otay J 13 South	South	Y	5,719
	Bachman	South	Y	203
J 14	Anderprises (City)	South	Y	226
	Cal Terraces (South)	South	N	
	Brown Field Basins	South	N	
	Handler	South	Y	2,249
	Bachman	South	N	
J 16-18	Goat Mesa (Private)	South	Y	220
	Goat Mesa (City)	South	N	
	Wruck Canyon	South	Y	983
J 2	Cal Terraces (North), Otay Mesa Road Parcels	South	N	
	Clayton Parcel	South	Y	5,278
	St. Jerome's	South	Y	1,366
J 20-21	La Media ITS	South	Y	6,354
J 21	La Media Swale South	South	Y	1,630
J 27	Empire Center	South	Y	812
J 28 E	La Media Swale North	South	Y	1,356
J 31	Hidden Trails	South	N	

Table E-12: Fence and Sign Installation Cost Assumptions

Complex ID	Name	Geographic Area	Fencing Assumed (Y/N)	20' Buffer Perimeter Around Complex (LF)
J 32	West Otay A	South	N	
	West Otay B	South	Y	1,146
	West Otay C	South	Y	965
J 34	Bachman	South	Y	2,102
	Candlelight	South	Y	4,392
J 35	Brown Field	South	N	
J 36	Southview	South	Y	2,836
J 4	Robinhood Ridge	South	N	
	California Crossing	Central	Y	1,323
K 5	Otay Lakes	Central	N	
KK 2	Pasatiempo	South	Y	1,383
MM 1	Marron Valley	Central	N	
N 1-4	Teledyne Ryan	Central	N	
N 5-6	Montgomery Field	Central	N	
N 7	Serra Mesa Library	Central	N	
N 8	General Dynamics	North	N	
NC	Li Collins	South	N	
	Kelton	North	N	
OO	Salk Institute	Central	N	
Q2	Mission Trails Regional Park School District	Central	Y	300
Q 3	Castlerock	Central	N	
QQ	Tecolote Canyon	South	Y	1,738
R 1	Proctor Valley	Central	N	
U15	SANDER	Central	Y	
U 19	Cubic	North	Y	3,793
X 5	Nobel Drive	North	N	
X 7	Nobel Research	North	N	
Total				61,458

Type	Cost per Linear Foot (LF)
Peeler Log	\$7.61
3-strand Wire	\$5.50
Average Cost	\$6.56
Installed LF/hr	20
Labor/hr per LF	\$3.72
Loaded Rate/hr per LF	\$10.28

Note: Costs include fence and sign materials plus installation by a GMM

Table E-13: City of San Diego Baseline Vernal Pool Monitoring and Management Comprehensive Cost Estimate by Complex (2014 Dollars)

Complex ID	Name	Planning Unit	Inside or Outside Baseline	Management Funding Responsibility	Total Pools with Plant Focal Species	Plant Focal Species Pools Subsample (Level 1)	Pools with Plant Focal Species (Level 2)	Pools with Plant Focal Species (Level 3)	Total Pools with Shrimp Focal Species	Shrimp Focal Species Pool Subsample (Level 1)	Shrimp Focal Species Pool Subsample (Level 2)	Shrimp Focal Species Pool Subsample (Level 3)	Total Annual Ongoing Cost for Level 1 Mngmt & Monitoring (\$)	City Annual Ongoing Cost for Level 1 Mngmt & Monitoring (\$)	Baseline Mngmt & Monitoring Level	Total One-Time* Cost for Required VPMMP Mngmt & Monitoring Level 2 or 3 or SSMP (\$)	City One-Time* Cost for Required VPMMP Mngmt & Monitoring Level 2 or 3 or SSMP (\$)	Cost for VPMMP Implementation (31 Years)	City Cost for Required VPMMP Implementation (31 Years)
B 11	Mesa Norte**	North	Inside	City/Private	16	2	16	16	24	10	10	10	8,583	0	Level 1	0	0	266,060	0
B 6	Lopez Ridge (CDFW)	North	Inside	State	1	1	1	1	0	0	0	0	8,539	0	Level 1	0	0	264,699	0
B 7-8	Lopez Ridge (City)	North	Inside	City Enterprise	10	2	10	10	2	2	2	2	8,583	8,583	Level 1	0	0	266,060	266,060
C 17-18	Fieldstone	North	Inside	Private	8	1	8	8	0	0	0	0	0	0	None	0	0	0	0
C 27	Mira Mesa Market Center	North	Inside	Private	1	1	1	1	1	1	1	1	0	0	None	0	0	0	0
D 5-8	Parkdale Carroll Canyon	North	Inside	City	0	0	0	0	0	0	0	0	8,495	8,495	Level 1	0	0	263,338	263,338
	Carroll Canyon	North	Inside	City	76	11	76	76	5	5	5	5	8,978	8,978	Level 1	0	0	278,310	278,310
H 1-10, 13, 15,18-23, 24-26	Del Mar Mesa (State/Federal)	North	Outside	State/Federal	154	18	154	154	10	10	10	10	8,495	0	Level 1	0	0	263,338	0
	Del Mar Mesa (Private)	North	Inside	Private	2	1	2	2	1	1	1	1	0	0	None	0	0	0	0
	Del Mar Mesa (City)	North	Inside	City	54	6	54	54	8	8	8	8	9,285	9,285	Level 1	0	0	287,837	287,837
	Rhodes	North	Inside	Private	12	2	12	12	4	4	4	4	8,539	0	SSRP ₃	219,750	0	441,755	0
H 17	Shaw Lorenz	North	Inside	Private	0	0	0	0	1	1	1	1	8,495	0	Level 1	0	0	263,338	0
H 33	East Ocean Air Drive	North	Inside	Private	2	1	2	2	0	0	0	0	0	None	0	0	0	0	
H 38	Carmel Mountain	North	Inside	City	0	0	0	0	2	2	2	2	8,495	8,495	SSRP	70,951	70,951	291,816	291,816
H 39	Greystone Torrey Highlands	North	Inside	City	6	2	6	6	0	0	0	0	8,583	8,583	Level 1	0	0	266,060	266,060
I 1	Arjons	North	Inside	Private	25	4	25	25	1	1	1	1	0	0	None	0	0	0	0
I 12	Pueblo Lands South	North	Inside	City Enterprise	0	0	0	0	2	2	2	2	8,495	8,495	Level 1	0	0	263,338	263,338
I 6 B	Ford Leasing (Bob Baker)	North	Inside	Private	1	1	1	1	3	3	3	3	0	0	None	0	0	0	0
I 6 C	Facilities Development (Eastgate Miramar Associates)	North	Inside	Private	11	2	11	11	6	6	6	6	0	0	None	0	0	0	0
J 11 E	Slump Block Pools	South	Inside	Private	0	0	0	0	0	0	0	0	0	0	None	0	0	0	0
J 11 W	J 11 West	South	Inside	Private	0	0	0	0	1	1	1	1	0	0	None	0	0	0	0
J 12	J 12	South	Inside	Private	0	0	0	0	0	0	0	0	0	0	None	0	0	0	0
J 13 N	South Otay 1 acre (City)	South	Inside	City	3	3	3	3	0	0	0	0	0	0	None	0	0	0	0
J 13 S	South Otay J 13 South	South	Inside	Private	0	0	0	0	0	0	0	0	0	0	None	0	0	0	0
	Bachman	South	Inside	Private	0	0	0	0	0	0	0	0	0	0	None	0	0	0	0
J 14	Anderprises (City)	South	Inside	City	0	0	0	0	0	0	0	0	8,495	8,495	Level 1	0	0	263,338	263,338
	Cal Terraces (South)	South	Inside	City	63	14	63	63	36	10	10	10	9,109	9,109	SSRP	780,650	780,650	1,017,496	1,017,496
	Brown Field Basins	South	Inside	City Enterprise	0	0	0	0	0	0	0	0	0	0	None	0	0	0	0
	Bachman	South	Inside	Private	0	0	0	0	0	0	0	0	0	0	None	0	0	0	0
J 16-18	Goat Mesa (Private)	South	Inside	Private	0	0	0	0	0	0	0	0	0	0	None	0	0	0	0
	Goat Mesa (City)	South	Inside	City Enterprise	4	1	4	4	0	0	0	0	8,539	8,539	Level 1	0	0	264,699	264,699
	Wruck Canyon	South	Inside	City	0	0	0	0	0	0	0	0	8,495	8,495	Level 1	0	0	263,338	263,338
J 2	Cal Terraces (North), Otay Mesa Road Parcels	South	Inside	City	219	70	219	219	216	11	22	43	11,568	11,568	Level 1	0	0	358,612	358,612
	Clayton Parcel	South	Inside	City	1	1	1	1	0	0	0	0	8,539	8,539	Level 1	0	0	264,699	264,699
J 27	Empire Center	South	Inside	Private	9	1	9	9	0	0	0	0	0	0	None	0	0	0	0
J 28 E	La Media Swale North	South	Inside	Private	0	0	0	0	0	0	0	0	0	0	None	0	0	0	0
J 3	J3	South	Outside	State	0	0	0	0	0	0	0	0	0	0	None	0	0	0	0
J 31	Hidden Trails	South	Inside	City	0	0	0	0	1	1	1	1	8,495	8,495	Level 1	0	0	263,338	263,338
J 32	West Otay A (Private)	South	Outside	State	2	2	2	2	0	0	0	0	0	0	None	0	0	0	0
	West Otay B	South	Inside	City	0	0	0	0	0	0	0	0	8,495	8,495	SSRP	64,604	64,604	285,469	285,469
	West Otay C	South	Inside	City	1	1	1	1	0	0	0	0	8,539	8,539	Level 1	0	0	264,699	264,699
J 34	Bachman	South	Inside	Private	0	0	0	0	0	0	0	0	0	0	None ₁	0	0	0	0
	Candlelight	South	Inside	Private	0	0	0	0	1	1	1	1	8,495	0	SSRP	66,246	0	287,111	0
J 35	Brown Field	South	Inside	City Enterprise	0	0	0	0	0	0	0	0	0	0	None	0	0	0	0
J 36	Southview	South	Inside	Private	0	0	0	0	5	10	10	10	0	0	None	0	0	0	0
J 4-5	Robinhood Ridge	South	Inside	City	50	8	50	50	41	10	10	10	8,846	8,846	Level 1	0	0	274,227	274,227
	California Crossing	South	Inside	Private	0	0	0	0	5	5	5	5	0	0	None (reporting)	0	0	0	0
K 5	Otay Lakes	Central	Inside	City Enterprise	46	6	46	46	6	6	6	6	8,758	8,758	Level 1	0	0	271,505	271,505

Table E-13: City of San Diego Baseline Vernal Pool Monitoring and Management Comprehensive Cost Estimate by Complex (2014 Dollars)

Complex ID	Name	Planning Unit	Inside or Outside Baseline	Management Funding Responsibility	Total Pools with Plant Focal Species	Plant Focal Species Pools Subsample (Level 1)	Pools with Plant Focal Species (Level 2)	Pools with Plant Focal Species (Level 3)	Total Pools with Shrimp Focal Species	Shrimp Focal Species Pool Subsample (Level 1)	Shrimp Focal Species Pool Subsample (Level 2)	Shrimp Focal Species Pool Subsample (Level 3)	Total Annual Ongoing Cost for Level 1 Mngmt & Monitoring (\$)	City Annual Ongoing Cost for Level 1 Mngmt & Monitoring (\$)	Baseline Mngmt & Monitoring Level	Total One-Time* Cost for Required VPMMP Mngmt & Monitoring Level 2 or 3 or SSMP (\$)	City One-Time* Cost for Required VPMMP Mngmt & Monitoring Level 2 or 3 or SSMP (\$)	Cost for VPMMP Implementation (31 Years)	City Cost for Required VPMMP Implementation (31 Years)
MM 1	Marron Valley	South	Inside	City Enterprise	0	0	0	0	5	5	5	5	8,495	8,495	SSRP	75,878	75,878	296,742	296,742
N 5-6	Montgomery Field	Central	Inside	City Enterprise	151	15	151	151	24	10	10	10	9,153	9,153	Level 1	0	0	283,754	283,754
N 7	Serra Mesa Library	Central	Inside	City	0	0	0	0	0	0	0	0	8,495	8,495	Level 1	0	0	263,338	263,338
N 8	General Dynamics **	Central	Inside	City	20	3	20	20	6	6	6	6	8,626	8,626	Level 1	0	0	267,421	267,421
NC N	Li Collins	North	Inside	Private	0	0	0	0	0	0	0	0	0	0	None	0	0	0	0
NC S	Kelton	South	Inside	City	0	0	0	0	0	0	0	0	0	0	None	0	0	0	0
Q 2	Mission Trails Regional Park	Central	Inside	City	0	0	0	0	6	6	6	6	8,495	8,495	Level 1	0	0	263,338	263,338
QQ	Tecolote Canyon	Central	Inside	City	0	0	0	0	0	0	0	0	0	8,495	None	0	0	0	0
R 1	Proctor Valley	South	Inside	City Enterprise	0	0	0	0	3	3	3	3	8,495	8,495	Level 1	0	0	263,338	263,338
X 5	Nobel Drive	North	Inside	City	1	1	1	1	6	6	6	6	8,539	8,539	Level 1	0	0	264,699	264,699
X 7	Nobel Research **	North	Inside	City	0	0	0	0	1	1	1	1	8,495	8,495	Level 1	0	0	263,338	263,338
Subtotal Monitoring and Management Cost													278,726	236,077		1,278,079	992,084	9,660,451	7,874,149
Data Tracking and Reporting (Bio III 1 day per week annually, City responsibility for all sites)													35,360	35,360				1,096,160	1,096,160
Changed Circumstances													57,433	57,433				1,780,422	1,780,422
Contingency Annually													30,687	30,687				951,288	951,288
TOTAL COST													402,206	359,556		1,278,079	992,084	13,488,320	11,702,018

= Land not owned by City of San Diego.

Bold = Land not owned by City of San Diego or under the City of San Diego's land use authority.

SSRP = Site-specific Restoration Plan, not part of VPHCP. For cost-estimating purposes, Level 3 costs are assumed.

SSMP = Site-specific Management Plan, not part of VPMMP. Assumes SSMP will be updated to be consistent with the VPHCP. For cost-estimating purposes, Level 3 costs are assumed.

None₁ = These sites are privately held and may seek development entitlement in the future. During the development entitlement process the City will ensure the property owner implements the Recommended Management.

None₂ = These site have been developed pursuant to prior approval by City of San Diego. No management was required at that time, nor is any management being required as part of this VPHCP. As funding becomes available the City may work with the owner to implement the Additional Recommended Management.

* = One-time costs are assumed for a 3-year period for monitoring and management for VPMMP-required Level 2 and 5-years for Level 3. After the initial 3 or 5-years, all complexes are assumed at the annual ongoing Level 1 cost. Sites at Level 1 are NOT included in this column as they are part of the on-going annual costs.

** = Development projects were approved on these three sites after the adoption of the City of San Diego's Multiple Species Conservation Plan (MSCP) Subarea Plan (SAP). The City was granted a Conservation Easement as a condition of the discretionary land use entitlement. While the ownership is private, the City committed to ensure the biological management of these sites as a condition easement pursuant to the requirements of the MSCP SAP.

APPENDIX F

MODEL CERTIFICATE OF INCLUSION

Appendix F
Model Certificate of Inclusion

The United States Fish and Wildlife Service and the California Department of Fish and Wildlife have issued Permits pursuant to the Federal Endangered Species Act and the California Natural Community Conservation Planning Act (collectively, "Permits") authorizing "Take" of certain species in accordance with the terms and conditions of the Permits, the City San Diego's Vernal Pool Habitat Conservation Plan (VPHCP). Through execution of this Certificate of Inclusion, you, [insert entity name] agree to implement all applicable terms and conditions of the Permits, which include the VPHCP Agreement and to submit to the direct legal control of the City for purposes of the City's enforcement of all applicable terms and conditions of the Permits, against you with regard to the Take of certain species resulting from the [insert Covered Project or Covered Activity as applicable] identified below.

As the owner/operator of the property depicted on Exhibit "1", attached hereto and incorporated herein by this reference, you are extended the protection of the Permits for the proposed activities as set forth in Exhibit "2", with respect to any Take of species covered by the VPHCP. In the event that you use the property depicted on Exhibit "1" for other purposes without the express consent of the Permittee, or fail to follow the applicable requirements of the Permits, Take Authorization under the Permits will automatically cease. Such Authorization is provided as described in the Permits and the VPHCP. By signing this Certificate of Inclusion, you signify your election to receive Take Authorization under the Permits in accordance with the terms and conditions thereof. Further, by signing this Certificate of Inclusion you agree to provide reasonable access to the property depicted on Exhibit 1 to the City, the United States Fish and Wildlife Service pursuant to 50 C.F.R. 13.21(e)(2) and the California Department of Fish and Wildlife as necessary to monitor your compliance with the applicable terms of the Permits and the VPHCP.

Coverage under the Permits will become effective upon receipt of the executed Certificate of Inclusion by City of San Diego. In the event that the subject property is sold or leased, the buyer or lessee must be informed of these provisions and execute a new Certificate of Inclusion.

Name

Signature

Address

Phone

City of San Diego Representative

Date

