VISTA DEL MAR ELEMENTARY VERNAL POOL MITIGATION SITE

Annual Report Year 1

Prepared for
RBF Consulting

February 2013

ESA

Draft

VISTA DEL MAR ELEMENTARY VERNAL POOL MITIGATION SITE

Annual Report Year 1

Prepared for
RBF Consulting

February 2013

9191 Towne Centre Drive
Suite 340
San Diego, CA 92121
858.638.0900
www.esassoc.com

Los Angeles

Oakland

Orlando

Palm Springs

Petaluma

Portland

Sacramento

San Francisco

Santa Cruz

Seattle

Tampa

Woodland Hills

211685

TABLE OF CONTENTS

Vista Del Mar Annual Report Year 1

Page

Page

Figures

Tables

SECTION 1
Introduction

The construction of the Vista Del Mar Elementary School and associated extension of Del Sol Boulevard on a 20-acre project site in Otay Mesa, California; resulted in impacts to 0.02 acre of vernal pool basin and associated federally listed species. To mitigate these impacts, offsite restoration/enhancement[1] and creation[2] (collectively referred to as "restoration" in this report) of vernal pool habitat was implemented according to a Vernal Pool Restoration Plan (Helix 2011, as amended by TAIC 2011; Appendix A), which was approved by the U.S. Fish and Wildlife Service (USFWS) and U.S. Army Corps of Engineers (USACE) on February 2, 2011.

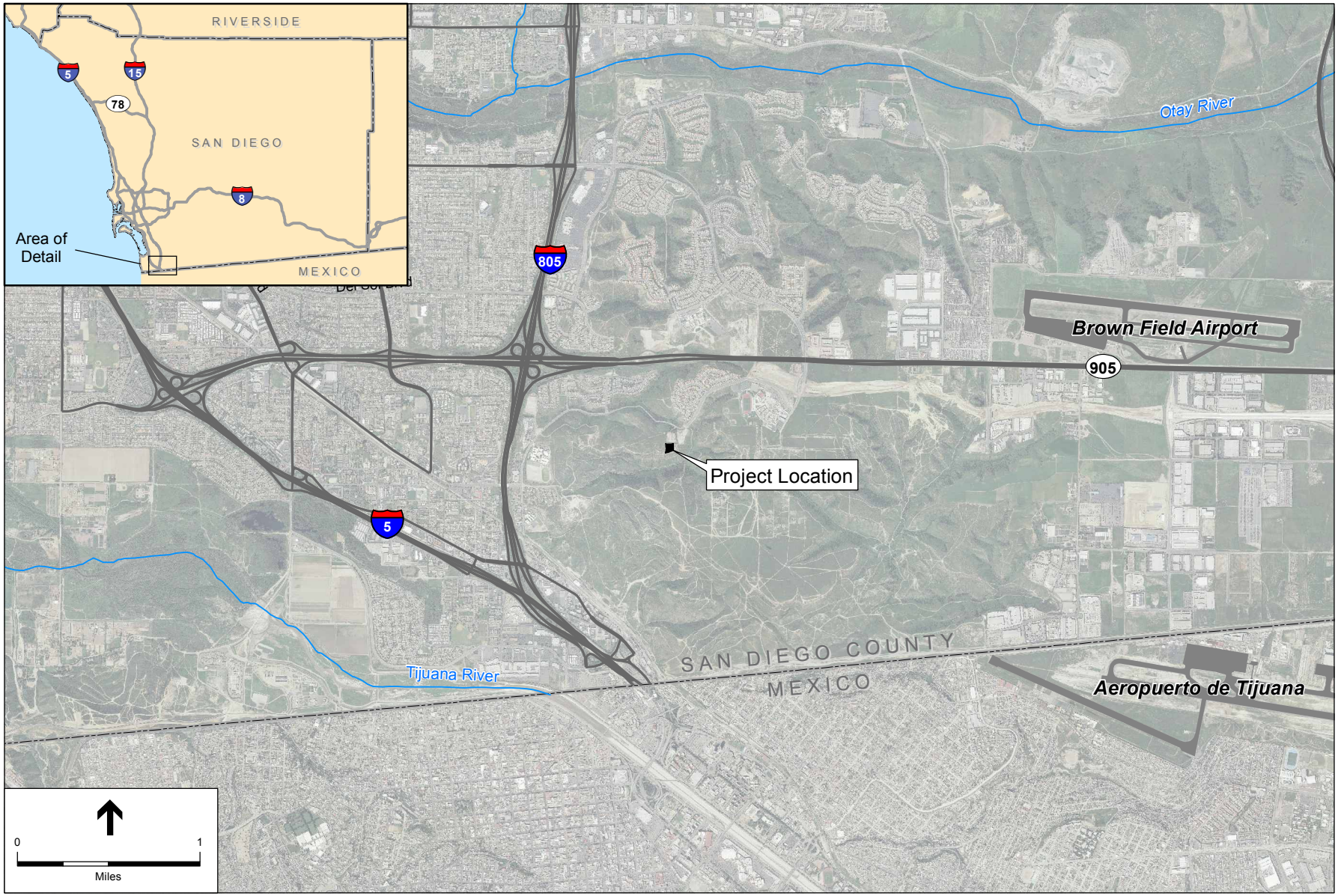
The vernal pool restoration site ("restoration site") is located within a 1.05-acre parcel, under the ownership of the City of San Diego (City), that makes up a portion of the City's Otay Mesa West Preserve—Parcel B in Otay, California (Figure 1), on the east side of Assessor's Parcel Number 645-061-01-00. It occupies a portion of Section 31 in Township 18 South, Range 1 West of the U.S. Geological Survey 7.5-minute Imperial Beach Quadrangle (Figure 2). The restoration site occurs approximately 2,700 feet south of the Vista Del Mar Elementary School construction (impact) site on a mesa and is situated between Moody Canyon to the south and the San Diego Gas and Electric substation on Otay Mesa Road to the north.

The restoration site historically supported low quality vernal pools that were disturbed by off-road vehicle activity. This area was previously managed by The Environmental Trust (TET), and then deeded to the City after TET declared bankruptcy. The Conservation Easement (CE) is currently being reviewed and approved by the USACE, and will also include the California Department of Fish and Wildlife (CDFW) as third party beneficiary.

The total impact to vernal pools from the construction of Vista Del Mar Elementary included the removal of 10 existing vernal pool basins, three of which supported the federally-endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*). The USFWS, which regulates impacts to federally listed species, issued a Biological Opinion (BO) in response to impacts to the San Diego fairy shrimp (USFWS 2011; Appendix B). The BO gave specific guidance regarding the allowable impacts and required mitigation for those impacts.

[1] Restoration is defined in the Water Quality Certification No. 09C-017 (WDID 9-000001990) as re-establishment and rehabilitation. Re-establishment is the return of natural/historic functions to a site where vegetated or unvegetated waters of the U.S./State previously existed. Rehabilitation is the improvement of the general suite of functions of degraded vegetated or unvegetated waters of the U.S/State. "Enhancement" is defined in the Water Quality Certification as the improvement to one or two functions of existing vegetated or unvegetated waters of the U.S/State.

[2] Also defined as "establishment" in the Water Quality Certification No. 09C-017 (WDID 9-000001990).

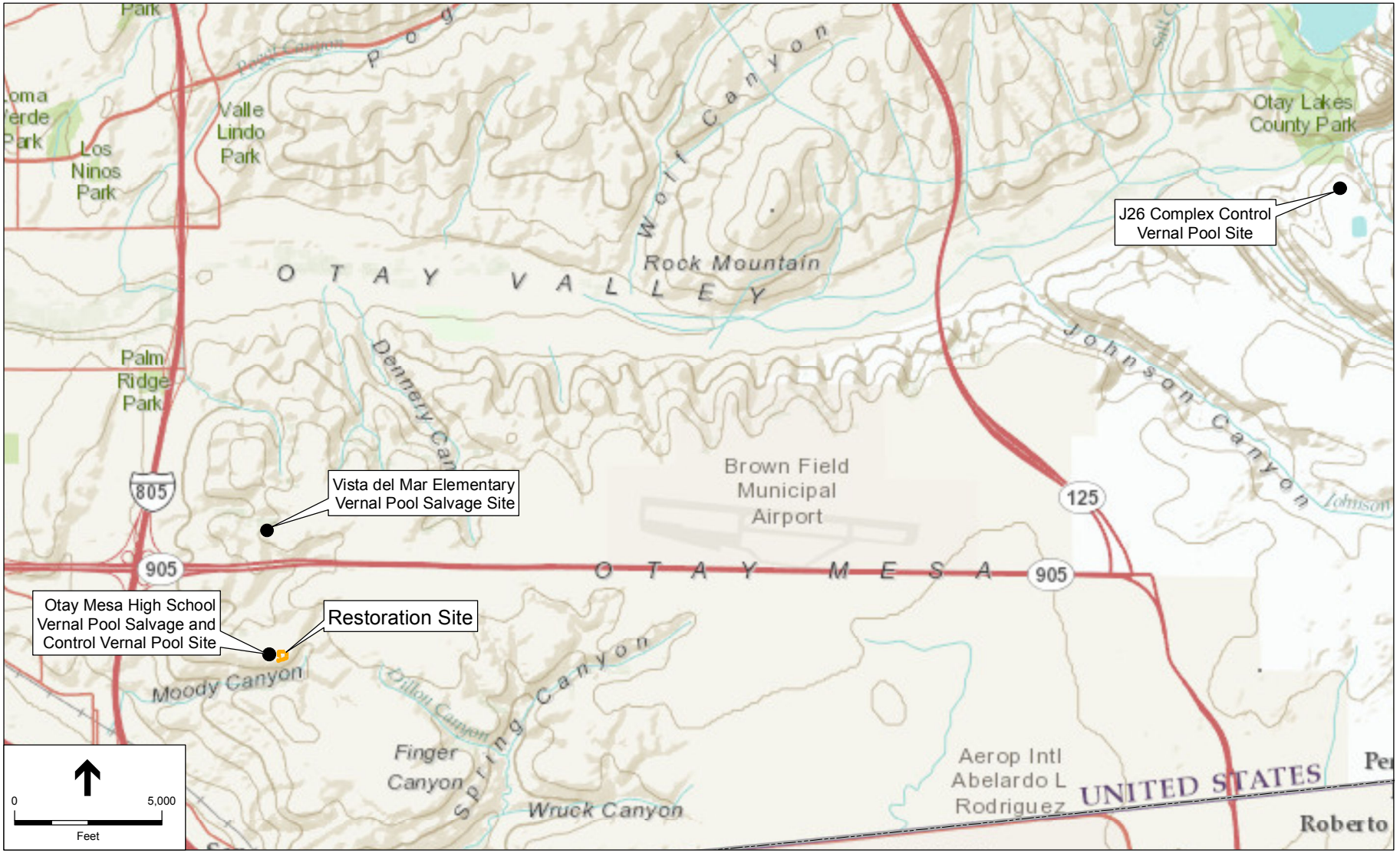


SOURCE: ESA, 2012.

Vista Del Mar Elementary School . 211685

Figure 1

Regional Location



SOURCE: USGS; RBF, 2012; ESA, 2012.

Vista Del Mar Elementary School . 211685

Figure 2
Site Map

A USACE Section 404 permit (Appendix B) allowing the fill of these vernal pools mirrored the mitigation requirements outlined in the BO, which requires restoration of vernal pools at a 5:1 ratio with at least 18 of 32 restored pools supporting San Diego fairy shrimp. The Regional Water Quality Control Board (RWQCB) issued a Section 401 Water Quality Certification that is consistent with the USACE's mitigation requirements.

The mitigation effort included the restoration of a vernal pool system which consisted of restoring 14 existing degraded pools and creating 18 pools within the single 1-acre restoration site. Restoration included inoculum and plant material collection, grading, invasive species control, inoculation with salvaged materials, the installation of salvaged plants and seeds, and the installation of four artificial burrowing owl burrows, herpetological cover-boards, and bee blocks. Vernal pool inoculum, seeds and plant materials were salvaged from the impact and restoration sites, and also collected from a road rut pool adjacent to the east side of the restoration site and the Otay Mesa High School vernal pool site (adjacent to the west side of the restoration site and within the Otay Mesa West Preserve).

1.1 Purpose

The purpose of this annual report is to document the post-restoration success of restoration activities to date and to monitor and report on progress towards mitigation goals, as identified in the Vernal Pool Restoration Plan (Helix 2011, as amended by TAIC 2011), and specific permit requirements. Annual reports are a requirement of all permits for impacts to vernal pools and vernal pool species.

The vernal pool restoration project is being implemented in compliance with the following regulatory agency authorizations: Department of the Army Permit No. SPL-2009-00028-LLC, the Biological Opinion (FWS-SDG-09BO258-11F0076), and the Water Quality Certification No. 09C-017 (WDID 9-000001990). In accordance with these authorizations, an approximate one-acre vernal pool restoration site has been installed within the City's West Otay Mesa Parcel B Vernal Pool Preserve. Installation was completed on March 23, 2012.

1.2 Goals

Per the restoration plan, the overall goal of this mitigation effort is to increase the functions and services of existing vernal pool habitat and create additional high quality vernal pools to an extent that would, at a minimum, replace the functions and services lost by construction of Vista Del Mar Elementary School. A further goal is the restoration of San Diego fairy shrimp habitat at the site. At the conclusion of this five year restoration effort, it is expected that functions and services (water filtration, sensitive wildlife and plant habitat) that are currently being performed by the existing pools would be improved. The condition of the restored vernal pools would be documented by monitoring the following (1) fairy shrimp, by wet season sampling, (2) hydrology, (3) surrounding upland vegetation, (4) vernal pool flora, and (5) condition of vernal pool wetlands, by conducting a California Rapid Assessment Method (CRAM) assessment. Specific permit requirements are detailed in Project Background, below.

1.3 Project Background

1.3.1 Permit Requirements

The permitting agencies (USACE, USFWS, RWQCB) have included specific criteria which must be met in order for mitigation to be deemed successful. The general mitigation requirements are included in Table 1. Mitigation requirements identified in the Section 404 and 401 permits and the BO, including specific success criteria and required methods, were incorporated into the Vernal Pool Restoration Plan (Helix 2011, as amended by TAIC 2011). These permit documents are appended (Appendix B).

TABLE 1
AGENCY PERMIT REQUIREMENTS

Agency	Permit No.	Impact	Mitigation
USACE	SPL-2009-00028-LLC	Fill of 0.02 acre of vernal pool wetlands (10 vernal pools total).	Preserve, protect, and maintain in perpetuity the 1.05-acre off-site preservation area. A minimum of 16 restored pools, totaling a minimum of 0.10 acre AND a minimum of 4,455 square feet, of the 18 restored pools proposed within the mitigation site shall support San Diego fairy shrimp.
USFWS	FWS-SDG-09B0258-11F0076	Removal of 0.02 acre of San Diego fairy shrimp (*Branchinecta sandiegonensis*) habitat (10 vernal pools).	Restore and enhance 32 vernal pools with a basin area of 0.218 acre on the 1.05 acre West Otay Mesa B parcel; 0.10 acre of restored and enhanced vernal pool basin must support San Diego fairy shrimp.
RWQCB	Water Quality Certification No. 09C-017	Impact to 0.02 acre of vernal pool.	Mitigate at a 5:1 ratio with at least 0.02 acre of vernal pool restoration (re-establishment) and 0.08 acre of vernal pool restoration and/or enhancement at the West Otay Mesa Parcel B Preserve and as described in *Vista Del Mar Elementary School, Vernal Pool Preserve Restoration Plan,* February 2, 2011, Helix Environmental Planning, Inc.

1.3.2 Monitoring Requirements

The restoration of the 32 vernal pools on the mitigation site extended from November 2011 through March 2012. The long-term monitoring period began in February 2012 (concurrent with final seeding in order to capture some of the 2011/2012 wet season for the purpose of branchiopod sampling), and is in progress. The first year post-restoration monitoring season extended from February 1, 2012 through September 30, 2012.

As identified in the Vernal Pool Restoration Plan (Helix 2011, as amended by TAIC 2011), qualitative monitoring and maintenance visits are required monthly during Year 1, every other month during Year 2, and every three months for the remainder of the monitoring period. Fairy shrimp surveys are required to occur during the wet season for the duration of the monitoring period to determine the presence or absence of San Diego fairy shrimp in the restored pools, as

well as population estimates. Additionally, hydrological monitoring is required every other week during the rainy season to measure depth, extent, and duration of inundation of all mitigation and control pools. Annual monitoring of the upland enhancement, including species cover, richness, and weed cover, is required by qualitative assessment in Years 1 and 2, and by qualitative and quantitative assessment for the remainder of the monitoring period. Table 2 details the restoration activities and qualitative and quantitative site visits to date.

TABLE 2
SUMMARY OF RESTORATION AND MONITORING ACTIVITIES TO DATE

Date	Type	Personnel	Notes
02/23/12	Quantitative	Erik La Coste, ESA Joseph Henry, ESA	USFWS protocol level fairy shrimp surveys of the road rut pool next to the restoration site. Survey was to confirm presence of fairy shrimp and to identify the species.
03/27/12	Qualitative	Christina Schaefer, ESA	Monitoring for invasive species, trash, vandalism, erosion, and other site condition issues.
04/04/12	Hydrological	Joseph Henry, ESA Kelcey Stricker, ESA	Measurements of deepest point in each of 32 pools onsite.
04/19/12	Quantitative	Erik La Coste, ESA Joseph Henry, ESA	USFWS protocol level fairy shrimp surveys of each of 32 pools onsite. Documentation of occupancy and species present.
05/03/12	Qualitative	Christina Schaefer, ESA	Monitoring of restored pools. General site monitoring for invasive species, trash, vandalism, erosion, and other site issues.
05/17/12	Quantitative	Kelcey Stricker, ESA Rosanne Humphrey, ESA	Baseline CRAM of the restored pools at the restoration site.
05/18/12	Qualitative	Christina Schaefer, ESA	Site visit with USACE and CDFG to verify use of J26 complex pools and Otay Mesa High School pools as restoration progress reference sites.
06/06/12	Qualitative	Joseph Henry, ESA Kelcey Stricker, ESA	Post installation site visit to confirm all components of restoration site have been installed including: upland vegetation, burrowing owl artificial burrows, vernal pools, bee blocks, and herpetofauna cover boards.
07/02/12	Quantitative	Christina Schaefer, ESA Rosanne Humphrey, ESA	Vegetation transect surveys of restoration site and Otay Mesa High School control pools.
07/06/12	Maintenance visit	Doug McKinney, D&D Habitats	Watering of plants and seedlings, removal of weeds. Qualitative site photos taken.
07/10/12	Quantitative	Joseph Henry, ESA Rosanne Humphrey, ESA	Vegetation monitoring of J26 complex control vernal pools per ESA protocols
07/17/12	Maintenance visit	Doug McKinney, D&D Habitats	Watering of plants and seedlings and removal of weeds.
07/23/12	Maintenance visit	Doug McKinney, D&D Habitats	Watering of plants and seedlings and removal of weeds. Qualitative site photos taken.
07/30/12	Maintenance visit	Doug McKinney, D&D Habitats	Watering of plants and seedlings, removal of weeds. Qualitative photos. Commencement of prickly pear cactus installation, installation of herbivore fencing, and spraying of herbivore repellent.
08/02/12	Maintenance visit	Doug McKinney, D&D Habitats	Watering of plants and seedlings, removal of weeds. Qualitative photos. Continuing prickly pear cactus installation, installation of herbivore fencing, and spraying of herbivore repellent.
08/03/12	Maintenance visit	Doug McKinney, D&D Habitats	Watering of plants and seedlings, removal of weeds. Qualitative photos. Completion of prickly pear cactus installation, completion of herbivore fencing, and spraying of herbivore repellent.
08/13/12	Maintenance visit	Doug McKinney, D&D Habitats	Watering of plants and seedlings, addition of 1.5

Date	Type	Personnel	Notes
			cubic yards of native mulch to seedling areas. Qualitative photos.
08/22/12	Maintenance visit	Doug McKinney, D&D Habitats	Watering of plants and seedlings, addition of 1.5 cubic yards of native mulch to seedling areas. Qualitative photos.
08/31/12	Maintenance visit	Doug McKinney, D&D Habitats	Watering of plants and seedlings. Qualitative photos.
09/13/12	Quantitative	Joseph Henry, ESA Rosanne Humphrey, ESA	Resurveying of permanent J26 vegetation survey transect points for vegetation monitoring.

SECTION 2
Methods

2.1 Qualitative Monitoring

Qualitative monitoring efforts were conducted on the restoration site and were focused on broad spectrum restoration progress outside of the scope of quantitative monitoring efforts. Qualitative monitoring efforts were conducted during all monitoring visits on the restoration site, including during quantitative monitoring surveys (Table 2).

2.1.1 Upland Restoration

Qualitative monitoring of upland restoration areas was conducted during each monitoring visit throughout the year (Table 2). The overall health and vigor of the restored upland habitat areas was noted during each of these visits. Indicators of overall health and vigor within the restored upland habitat areas surrounding the vernal pools, including presence of trash, signs of trespass or vandalism, presence or sign of wildlife, survivorship of container stock plantings, emergence of vegetation within seeded areas, presence of targeted native or non-native species (plants and animals), erosion problems, and signs of herbivory, were noted during each site visit. Representative photographs of indicators of overall upland health are included in this report for reference (Appendix C).

2.1.2 Vernal Pool Restoration

Qualitative monitoring of vernal pool restoration areas was conducted during each monitoring visit throughout the year (Table 2), including during quantitative vegetation monitoring efforts. General indicators of health and vigor of restored vernal pool habitat were noted during each of these visits, including presence of non-native species, signs of wildlife, emergence of native vernal pool plant species, presence of vernal pool invertebrates including fairy shrimp, presence of trash within vernal pool basins, signs of erosion or other disturbances of the basins, and inundation of pools. Representative photographs of qualitative vernal pool monitoring are included in this report for reference (Appendix C).

2.2 Quantitative Monitoring

Quantitative monitoring efforts were conducted at the restoration site, at the adjacent Otay Mesa High School site, and at the J26 complex reference pool site (Table 2; Figures 3, 4, and 5), and were focused on measuring specific characteristics pertaining to achievement of success criteria, as outlined in the Vernal Pool Restoration Plan (Appendix A). A vernal pool monitoring protocol

protocol was developed to guide the programmatic monitoring process established for the efficient and biologically sound monitoring of the Vista del Mar Elementary Project in association with other vernal pool restoration projects in progress or planned on Otay Mesa (Appendix D). Vernal pool monitoring is generally necessitated by frequent access to vernal pool complexes for the purpose of data collection. Vernal pool ecosystems are sensitive to disturbance; therefore, limited access to monitoring and control pools is desirable. In accordance with the programmatic Biological Opinion developed for State Route 11, Otay Mesa East Port of Entry, Otay Crossing Commerce Park and Otay Business Park, the USFWS recommended that a common reference pool complex be chosen for many, if not all, vernal pool restoration projects on the Otay Mesa. The J-26 complex (Figures 2 and 5) was identified as one of the last remaining naturally functioning vernal pool complexes on the mesa that is reasonably accessible and would provide acceptable baseline vernal pool functions to be used as a reference for most restoration projects on the mesa. Monitoring data will be housed with the San Diego Management and Monitoring Program's (SDMMP) South Coast Multi Taxa database (www.mtx.sdmmp.com). The development of this database is in progress and data entry will be coordinated directly with SDMMP.

2.2.1 Restoration Pools

Due to a delay in permit approvals, restoration occurred during the winter of 2011/2012. Therefore, post-restoration vernal pool branchiopod and hydrological monitoring did not include a full wet season cycle (typically from November through March).

2.2.1.1 Vernal Pool Branchiopod Monitoring

Focused surveys for listed fairy shrimp species were performed at the restoration site (including the road rut pool adjacent to the restoration site) by ESA biologist Erik LaCoste under USFWS permit #TE-027736-5; ESA candidate branchiopod biologist Joseph Henry assisted. A 10-day notification letter was submitted on January 26, 2012, and a 90-day post-survey notification report was submitted on July 13, 2012 (Appendix E).

The surveys followed USFWS protocol for conducting wet season surveys (USFWS 1996). The protocol requires that depressions be examined for filling 24 hours after storms if depressions are determined to be inundated. Sampling is required to continue every two weeks until the depressions are no longer inundated, or until they experience 120 days of continuous inundation. Sampling may be suspended if one or more listed branchiopod is determined to be present. The 32 pools included in this restoration project, and a single road rut pool, were surveyed during the 2011/2012 wet season. The project site was visited at several points during the 2011/2012 wet season to conduct various other project related tasks; vernal pool inundation levels were noted during each site visit.

On February 23, 2012, after recent rain events, Mr. LaCoste and Mr. Henry visited the project site again to perform protocol-level surveys to determine the presence of federally listed fairy shrimp within the road rut pool immediately adjacent to the restoration site. On April 19, 2012, after a recent rain event, Mr. LaCoste and Mr. Henry visited the restoration site again to perform

protocol-level surveys to determine the presence of federally listed fairy shrimp within the mitigation site. All pools were sampled using a hand-held net, which was swept through the water. The net contents were then examined for invertebrates. The depth and water temperature were measured during the surveys. When appropriate, and per USFWS survey protocol, samples of individual fairy shrimp were taken and definitively identified in a laboratory setting with the aid of a dissecting microscope.

2.2.1.2 Hydrological Monitoring

Quantitative hydrological monitoring was conducted on the restoration site concurrently with vernal pool and fairy shrimp monitoring efforts (Table 2), and was focused on measuring specific aspects of vernal pool hydrology, as outlined in the Vernal Pool Restoration Plan (Appendix A). Depth and extent of inundation were measured during each site visit where pools were noted to be inundated, and duration of inundation was measured from the onset of inundation until all pools were dry. Representative photographs of vernal pool monitoring efforts were taken during each site visit, and are included in this report for reference (Appendix C).

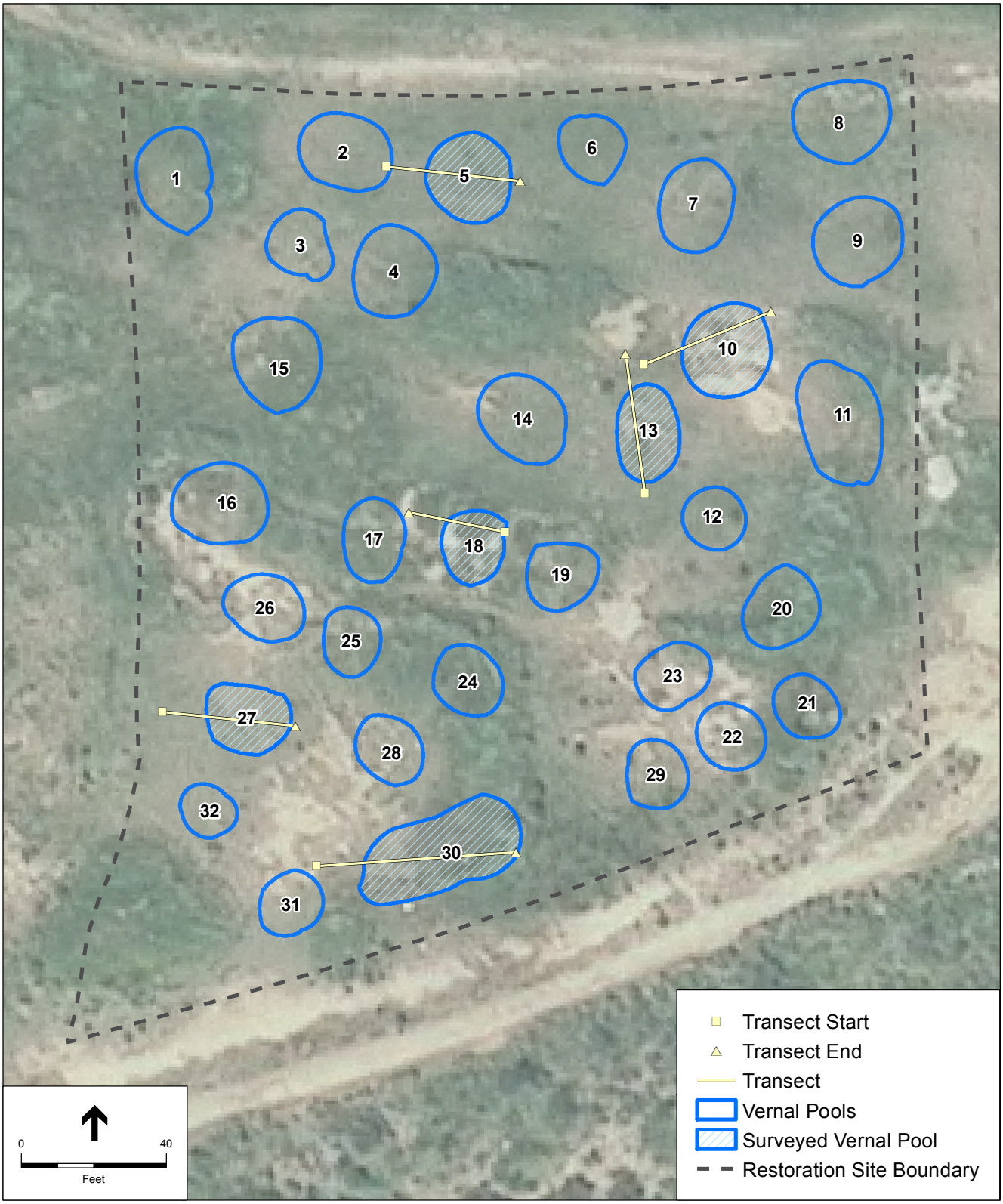
2.2.1.3 Vegetation Monitoring

Vegetation monitoring transects on the restoration site were established and monitored on July 2, 2012 by ESA biologists Rosanne Humphrey and Christina Schaefer (Table 2). A sample size of six pools was chosen on the restoration site for long-term monitoring (see also Appendix D). Sample size was chosen based on a statistically justifiable sample of 20 percent of the restoration site pools, rounded to the nearest integer. Sample pools were selected using stratified sampling technique to achieve a statistically accurate representation of all pools on the site. Of the six pools, four are sentinel (permanent) and two are rotating (changed every year). The sentinel pools were identified as Resto-S-5, Resto-S-13, Resto-S-18, and Resto-S-30. Rotating pools were identified as Resto-R-10 and Resto-R-27 (Figure 3).

Two survey methods were employed for each transect, as each method captures different components of the vegetation community. The quadrat method is best for capturing small plants, plants that are rare or that have low cover, and overall species richness (number of species); however, it is time-consuming and inferior when recording large plants (Deutschman and Strahm 2009). The point intercept method, which is less time consuming, works well for large and small plants, abundant species, and estimating cover.

Transects were established at the greatest width of each pool that crossed through the point of greatest depth as well. Each transect included the basin area as well as the band of transitional vegetation that grew around the basin; therefore, each transect was a different length, depending on the size of the pool. Quadrats were established and surveyed from the end point toward the origin to reduce trampling[3]; on the way back to the end point, the point intercept method was used.

[3] Surveying an area within a quadrat is more susceptible to vegetation disturbance than surveying point-intercept transects.



SOURCE: Landiscor, 2010; RBF, 2012; ESA, 2012.

Vista Del Mar Elementary School . 211685

Figure 3

Restoration Site Vegetation Monitoring Transects

SOURCE: Landiscor, 2010; RBF, 2012; ESA, 2012.

Vista Del Mar Elementary School . 211685

Figure 4

Otay Mesa High School Vernal Pool Salvage Site

SOURCE: Landiscor, 2010; RBF, 2012; ESA, 2012.

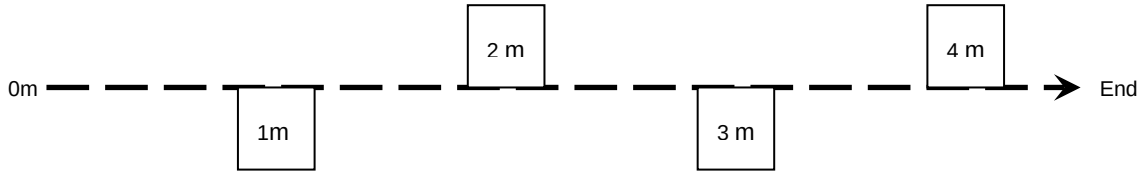
Vista Del Mar Elementary School . 211685

Figure 5

J26 Complex Control Vernal Pools

A 0.25-meter squared quadrat was used to conduct quadrat sampling along the previously established transect. Measurements were taken every meter on alternating sides along the extent of the transect (see diagram below). Starting on the right side of the transect line (facing the end point), the quadrat was placed on the ground at the 1-meter mark. One side of the quadrat was in line with the measuring tape. The final quadrat was placed at the end point and extended beyond the extent of the staked transect.

Quadrats along a transect



Two measurements were taken within each quadrat: (a) absolute percent cover (not to exceed 100 percent) of non-plant ground cover, and (b) relative cover of plant species, which could exceed 100 percent for overlapping plants. Ground cover types included litter (L), bare ground (B), and rock (R). Plant species were recorded using a six letter code, which consisted of the first three letters of the genus and first three letters of the species name (i.e., POGNUD was used for *Pogogyne nudiuscula*, Otay mesa mint). Unknown species were collected and labeled with the date, plot number, and a unique number. Collected specimens were later identified using the Jepson Manual (Hickman ed., 1993).

The point intercept method was used along the same transects that were set up for the quadrats. A ½ inch (diameter) wooden dowel, 1 meter long, was placed perpendicular to the ground at every 0.5 meter on the left side of the transect line (facing the end point) starting at 0.5 meter through the extent of the transect. Two measurements were taken at each 0.5 meter: (a) cover type, and (b) species touching the dowel. Species were recorded using the six-letter code described above. Only the name of the species touching the dowel was recorded. Abundance was not recorded.

2.2.2 Control Pools

Established and functioning vernal pools known to occur in the same microclimate as the restored vernal pools were chosen within the J26 complex and the Otay Mesa High School reference sites as “control pools” to monitor restoration success. The purpose of control pools is to measure San Diego fairy shrimp populations, vernal pool plant germination and abundance, and levels of inundation in a healthy natural vernal pool system, which can vary dramatically from year to year. Fluctuations in vernal pool conditions that are due to weather patterns or other abiotic conditions are visible in control pools and then used as a metric with which to measure the success of the restored vernal pools. Therefore, similar monitoring efforts were performed on the control pools chosen for this project including J26 and Otay Mesa High School pools.

2.2.2.1 Vegetation Monitoring

Vegetation monitoring transects on the J26 complex reference pool site were established and monitored on July 10, 2012 by ESA biologists Rosanne Humphrey and Joseph Henry (Table 2). Vegetation monitoring transects on the Otay Mesa High School salvage and reference pool site (adjacent to the restoration site) were established and monitored on July 2, 2012 by ESA biologists Christina Schaefer and Rosanne Humphrey. Methods used for these vegetation monitoring efforts are identical to those described in Section 2.2.1.3 above, with the exception that only two sentinel pools (RefA-S-11 and RefA-S-16), and no rotating pools were established and sampled on the Otay Mesa High School salvage and reference pool site; and only two sentinel pools (RefJ26-S-9 and RefJ26-S-18), and two rotating pools (RefJ26-R-15 and RefJ26-R-6) were established and sampled on the J26 complex reference pool site (Figures 4 and 5).

2.2.2.2 Hydrological and Branchiopod Monitoring

During the first post-construction monitoring wet season, neither the Otay Mesa High School control pools, nor the J26 control pools were inundated. Therefore, neither branchiopod sampling nor hydrological monitoring could be conducted at the control pools.

2.3 Vernal Pool CRAM Monitoring

A post-installation vernal pool CRAM assessment was conducted on the restoration site according to the *California Rapid Assessment Method for Wetlands and Riparian Areas: User's Manual v. 6* (O'Connor 2012) and the *Vernal Pool Systems Field Book* (2012). This module has been calibrated; however, minor refinements of the metrics and scoring may be made in the future as a result of validation efforts conducted by the California Wetlands Monitoring Workgroup (CWMW 2009). This effort will be used to track the ecological condition of the mitigation site during Years 3 and 5.

2.3.1 Restoration Pools

ESA biologists Rosanne Humphrey (CRAM practitioner) and Kelcey Stricker conducted a vernal pool CRAM on May 17, 2012. The purpose of this effort was to assess the post-installation condition of the restored vernal pools and compare them to pre-installation CRAM scores as detailed in the Vernal Pool Restoration Plan (note: the pre-restoration CRAM was conducted by Helix prior to the calibration of the vernal pool module; therefore, slight irregularities may occur when comparing pre-restoration and post-restoration CRAM scores). Six individual sample pools were chosen to capture the diversity of the site, including inoculum source, created vs. restored/enhanced pools, location within the restoration site (edge versus center), and size (small and large) (Figure 6). Sample size was chosen based on a statistically justifiable sample of 20 percent of the restoration site pools, rounded to the nearest integer. Sample pools were selected using stratified sampling technique to achieve a statistically accurate representation of all pools on the site. During the CRAM assessment, the following attributes were assessed: buffer and landscape context, hydrology, physical structure, and biotic structure. These attribute and final AA scores were then calculated and the stressor checklists were completed.

2.3.2 Control Pools

Vernal pool CRAM assessments for the Vista del Mar Elementary School Project were previously conducted on the impact site, on the mitigation site prior to the initiation of restoration efforts, and on the Robinhood Ridge vernal pool preserve site. The results of these CRAM assessments can be found in the Vernal Pool Restoration Plan, which is appended to this report (Appendix A). These scores were used to calculate target CRAM scores that will be used as one of the success criterion for the Project.

Pursuant to consultation with the USFWS, CDFG, and the City, the J26 complex reference vernal pools (Figures 2 and 5) will serve as the programmatic control pools for all future monitoring efforts (including monitoring for other projects), rather than the Robinhood Ridge vernal pool preserve site. However, because success criteria were already established for this Project, CRAM will not be conducted on reference sites during future monitoring efforts.

SOURCE: Landiscor, 2010; RBF, 2012.

Vista Del Mar Elementary School . 211685

Figure 6

Restoration Site Vernal Pool Assessment Area

SECTION 3
Results

The results of monitoring efforts are summarized below, pursuant to applicable permit conditions (Table 1) and related to target success criteria (Tables 5, 6, 7, and 8). Detailed results and analysis of individual survey efforts can be found in the appended 90-day post-survey notification report (Appendix E) and the Year 1 CRAM Report (Appendix F).

3.1 Qualitative Monitoring

3.1.1 Upland Restoration

Qualitative monitoring efforts within the upland restoration areas yielded the presence of several species of wildlife within the immediate vicinity of the upland restoration area, including red-tailed hawk (*Buteo jamaicensis*), common raven (*Corvus corax*), western meadowlark (*Sturnella neglecta*), desert cottontail (*Sylvilagus audubonii*), coyote (*Canis latrans*), woodrat (*Neotoma* sp.), and striped skunk (*Mephitis mephitis*). Minor herbivory of transplanted cholla was noted during several site visits, and can likely be attributed to woodrats. General health and vigor of the upland restoration area was observed to be satisfactory, with emergence of hydroseeded vegetation occurring across the upland restoration. Non-native plant species were noted within the upland restoration area, most commonly pineapple weed (*Matricaria discoidia*). Non-native species identified within the upland restoration area were actively removed by maintenance staff throughout the Year 1 monitoring period. Overall survivorship of container stock planting within the upland restoration area was satisfactory, although several container stock plantings showed signs of water or herbivore stress at various points throughout the Year 1 monitoring period and required additional efforts by maintenance staff to ensure survival, including supplemental watering and trimming. Signs of trespass and presence of trash on site were minimal throughout the Year 1 monitoring effort, despite the fact that the adjacent area is used as a pedestrian path by local residents.

3.1.2 Vernal Pool Restoration

Qualitative monitoring efforts within the vernal pool restoration areas yielded minimal wildlife observations; however sign of common raven and striped skunk were identified within the vernal pool basins. Sub-adult and adult fairy shrimp were observed within inundated pools on several occasions, as were other common vernal pool invertebrate species, including copepods (*Copepoda* sp.) and aquatic beetles. General health and vigor of the vernal pool restoration areas was observed to be satisfactory, with emergence of native inoculum vegetation occurring in each of the basins within the restoration area. Otay mesa mint was observed in two created pools. No

non-native plant species were noted within the vernal pool basins during the Year 1 monitoring period. The majority of pools were observed to hold measurable water for periods sufficient to support vernal pool branchiopod species. Several pools were not observed to hold measurable quantities of water following rain events, but did exhibit signs of recent pooling, including cracked soils and preserved wildlife tracks. Signs of trespass and presence of trash within the vernal pools basins was not noted during the Year 1 monitoring effort.

3.2 Quantitative Monitoring

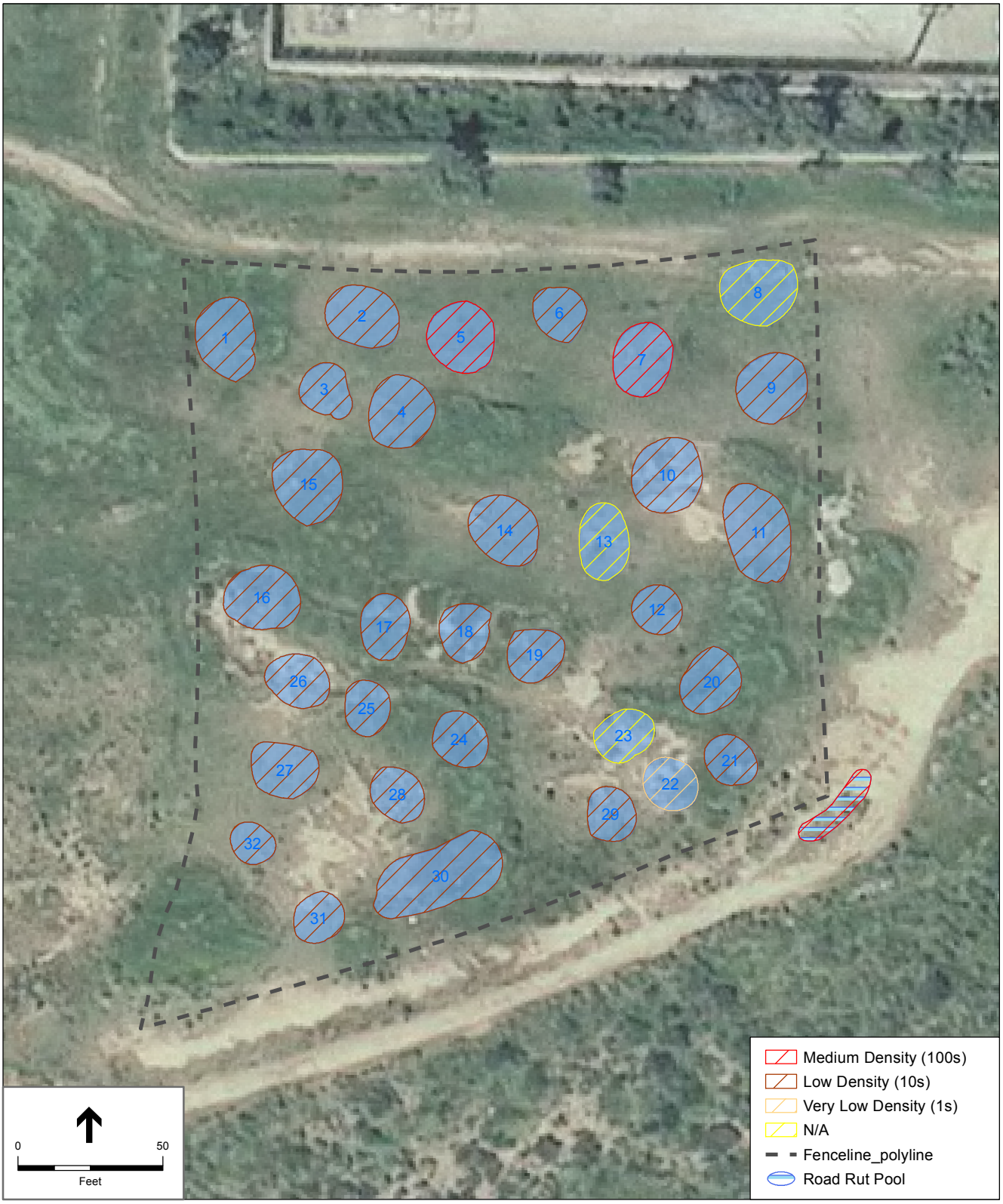
3.2.1 Restoration Pools

3.2.1.1 Vernal Pool Branchiopod Monitoring

During the February 23, 2012 survey (Table 2), the road rut pool was significantly inundated, and high densities of adult fairy shrimp were observed. The pool was sampled in accordance with USFWS protocol. A total of 10 male shrimp were collected during the survey, all of which were identified to be the federally-listed San Diego fairy shrimp (*Branchinecta sandiegonensis*). The survey results are included in Table 3.

During the April 19, 2012 survey, six pools (1, 3, 16, 22, 23, and 31) were dry or nearly dry, and were therefore not sampled (Figure 7). The remaining 26 pools were sampled with inundated pool maximum depth ranging from 1.3 to 10.8 centimeters. Water temperatures in the inundated pools ranged from 62.3 to 77.1 degrees Fahrenheit. Figure 7 illustrates the branchiopod survey results. The USFWS Vernal Pool Data Sheets for Wet Season Surveys (USFWS 1996) are appended to the 90-day post-survey notification report (Appendix E), and the physical data collected on these data sheets, as well as the results of the February 23, 2012 road rut pool sampling, are summarized in Table 3. Photographs of site conditions at the time of surveying can be found in Appendix E.

Sub-adult fairy shrimp, immature due to limited growth time, were observed in 21 pools (2, 4 through 12, 14, 15, 18, 19, 21, 25 through 28, 30, and 32). The immature fairy shrimp in these depressions were identified to be *Branchinecta*. Identification to the species level was not possible due to developmental stage of the shrimp; however, these pools were inoculated with San Diego fairy shrimp during restoration installation. Depending on temperature and water quality, fairy shrimp larvae typically mature in seven to 20 days, after a developmental period of between three and eight days. Concentrations of fairy shrimp varied, but were considered low or very low throughout, with population estimates ranging from ones in eight pools (8 through 12, 18, 19, and 32) to tens in 13 pools (2, 4 through 7, 14, 15, 21, 25 through 29, and 30). Photographs of pools and the general landscape of the site are included in the 90-day post-survey notification report (Appendix E: Photographs 1 through 5).



SOURCE: Landiscor, 2010; RBF, 2012; ESA, 2012.

Vista Del Mar Elementary School . 211685

Figure 7
Presence of Fairy Shrimp
with Restoration Pools

TABLE 3
FAIRY SHRIMP SURVEY RESULTS

Pool Number	Description	Size (ft^2)	Maximum Depth (cm)	Water Temperature (°F)	Presence of Fairy Shrimp
1	Enhanced	466.17	Dry	--	--
2	Newly Constructed	440.98	2.5	77.1	*Branchinecta* sp.
3	Enhanced	264.79	Dry	--	--
4	Enhanced	455.52	4.4	74.1	*Branchinecta* sp.
5	Newly Constructed	452.87	2.5	73.9	*Branchinecta* sp.
6	Newly Constructed	271.53	Dry	--	--
7	Newly Constructed	417.51	7.6	73.0	*Branchinecta* sp.
8	Newly Constructed	489.82	3.8	72.5	*Branchinecta* sp.
9	Newly Constructed	470.42	5.1	72.1	*Branchinecta* sp.
10	Newly Constructed	509.45	4.4	74.4	*Branchinecta* sp.
11	Enhanced	627.56	2.5	71.7	*Branchinecta* sp.
12	Newly Constructed	234.85	3.2	68.3	*Branchinecta* sp.
13	Newly Constructed	372.93	5.1	73.0	*Branchinecta* sp.
14	Newly Constructed	460.04	5.1	75.5	*Branchinecta* sp.
15	Newly Constructed	501.90	1.2	72.0	*Branchinecta* sp.
16	Enhanced	470.83	Dry	--	--
17	Enhanced	312.69	7.0	72.2	*Branchinecta* sp.
18	Enhanced	287.81	2.5	74.8	*Branchinecta* sp.
19	Enhanced	296.45	7.6	72.3	*Branchinecta* sp.
20	Enhanced	364.36	5.1	70.8	*Branchinecta* sp.
21	Enhanced	248.98	3.2	70.5	*Branchinecta* sp.
22	Newly Constructed	276.49	Dry	--	--
23	Newly Constructed	288.60	Dry	--	--
24	Enhanced	292.12	10.2	70.7	*Branchinecta* sp.
25	Enhanced	244.31	2.5	76.9	*Branchinecta* sp.
26	Enhanced	323.87	5.1	71.4	*Branchinecta* sp.
27	Newly Constructed	367.13	7.6	69.4	*Branchinecta* sp.
28	Newly Constructed	276.95	5.7	71.0	*Branchinecta* sp.
29	Newly Constructed	260.76	10.8	62.3	*B. sandiegonensis*
30	Enhanced	861.16	2.5	75.1	*Branchinecta* sp.
31	Newly Constructed	242.13	Dry	--	--
32	Newly Constructed	175.04	7.0	73.0	*Branchinecta* sp.
Road Rut	Existing/Off-site	217.80	Inundated	--	*B. sandiegonensis*

San Diego fairy shrimp were identified within pool 29 on April 19, 2012 with the aid of a microscope in a lab setting. The California Natural Diversity Database (CNDDB) California Native Species Field Survey Form is included in the 90-day post-survey notification report (Appendix E). The collected voucher specimens will be accessioned to the *Los Angeles Natural History Museum, Crustacea Section, Invertebrate Zoology, 900 Exposition Boulevard, Los Angeles, California 90007*.

Surveys were not conducted after April 19 as the site had not received sufficient rainfall to fill dry pools, or for inundated pools to remain full since that time. This branchiopod sampling event is considered the first annual post-restoration survey for fairy shrimp, and the low densities reported are not unexpected. The site will be surveyed each year through the fifth year of post-restoration monitoring.

At the time of the fairy shrimp sampling, the success criteria outlined in the Vernal Pool Restoration Plan (Helix 2011, as amended by TAIC 2011) for fairy shrimp occupancy had been met and exceeded: "Although all of the restored and enhanced vernal pools are intended to provide habitat for San Diego fairy shrimp, only 0.10 acre of the restored pools will be required to support San Diego fairy shrimp populations pursuant to the USFWS Biological Opinion."

3.2.1.2 Hydrological Monitoring

During hydrological monitoring efforts conducted throughout the Year 1 wet season, the majority of pools were observed holding measurable quantities of water on at least one occasion. Six of the pools (Pool numbers 1, 3, 6, 16, 23, and 31) were not observed holding measurable quantities of water during any of the hydrological monitoring site visits (Table 4). Continuous inundation during periods where rain events occurred was verified by the presence of sub-adult or adult fairy shrimp within the pools. Pools were not observed to be inundated for periods longer than 28 continuous days. The results of hydrological monitoring are included in Table 4, below.

TABLE 4
HYDROLOGICAL MONITORING RESULTS

Pool Number	Description	Size (ft^2)	Average Depth (cm)	Ponding Duration (days)
1	Enhanced	466.17	--	0-7
2	Newly Constructed	440.98	2.5	7-14
3	Enhanced	264.79	--	0-7
4	Enhanced	455.52	2.5	21-28
5	Newly Constructed	452.87	2.5	7-14
6	Newly Constructed	271.53	--	0-7
7	Newly Constructed	417.51	6.7	21-28
8	Newly Constructed	489.82	2.2	21-28
9	Newly Constructed	470.42	3.5	21-28
10	Newly Constructed	509.45	2.8	21-28
11	Enhanced	627.56	2.5	14-21
12	Newly Constructed	234.85	2.2	14-21
13	Newly Constructed	372.93	3.8	14-21
14	Newly Constructed	460.04	2.6	21-28
15	Newly Constructed	501.90	1.2	14-21
16	Enhanced	470.83	--	0-7
17	Enhanced	312.69	5.1	21-28
18	Enhanced	287.81	2.5	14-21
19	Enhanced	296.45	5.7	21-28
20	Enhanced	364.36	4.1	21-28
21	Enhanced	248.98	4.5	21-28
22	Newly Constructed	276.49	6.4	21-28
23	Newly Constructed	288.60	--	0-7

Pool Number	Description	Size (ft^2)	Average Depth (cm)	Ponding Duration (days)
24	Enhanced	292.12	7.0	21-28
25	Enhanced	244.31	1.9	28-35
26	Enhanced	323.87	4.5	14-21
27	Newly Constructed	367.13	7.3	14-21
28	Newly Constructed	276.95	5.7	21-28
29	Newly Constructed	260.76	9.8	21-28
30	Enhanced	861.16	1.6	21-28
31	Newly Constructed	242.13	--	0-7
32	Newly Constructed	175.04	4.8	21-28
Road Rut	Existing/Off-site	217.80	Inundated*	21-28

*Depth of road rut pool not measured during hydrological monitoring

To be considered successful, "The pools must pond for sufficient time (estimated to be 30 days) to support San Diego fairy shrimp during 2 winters in a 5-year monitoring period or 3 winters in a 10-year monitoring period." Because hydrological monitoring did not incorporate the entire wet season (usually between November and March), initial comparison to success criteria is not possible.

3.2.1.3 Vegetation Monitoring

Vegetation monitoring on the restoration site included the sampling of four sentinel pools (Pool numbers 5, 13, 18, and 30) and two rotating pools (Pool numbers 10 and 27). Vegetation monitoring on the adjacent Otay Mesa High School site included the sampling of two sentinel pools (Pool numbers 11 and 16). No rotating pools were established and sampled on the Otay Mesa High School site due to the small amount of pools at this site and the fact that none of the pools held water during the monitoring period. Vegetation monitoring on the J26 complex reference pool site included the sampling of two sentinel pools (Pool numbers 9 and 18) and two rotating pools (Pool numbers 15 and 6). Results of the vegetation monitoring efforts on the restoration site and reference sites are included in Tables 5, 6, and 7 below.

Only one indicator species was observed on one transect within the restoration site. This is likely due to the fact that permitting issues delayed the completion of installation until January 2012. This also explains the low species richness (number of vernal pool indicator species) and low cover of indicator species (0 to 9.1 percent cover) observed on the site (Tables 5 and 6).

Three indicator species (two within Pool 11, and one within Pool 16) were observed within transects conducted at the adjacent Otay Mesa High School reference site. Five indicator species (three within Pool 9, one within Pool 18, and one within Pool 15) were observed within transects conducted at the J26 complex reference pool site. Vegetation transects within Pool number 16 at the J26 complex reference pool site did not yield any indicator species.

TABLE 5
RESULTS: SPECIES RICHNESS (NUMBER OF INDICATOR SPECIES)*

Control-Adjacent		Control-J26		Restored Pools		
Number of Indicator Species		Number of Indicator Species		Yr 1 Success Criteria[1]	Number of Indicator Species	
RefA-S-11	2	RefJ26-S-9	3	35%	Resto-S-5	0
RefA-S-16	1	RefJ26-S-18	1		Resto-S-13	0
		RefJ26-R-15	1		Resto-S-18	1
		RefJ26-R-16	0		Resto-S-30	0
					Resto-R-10	0
					Resto-R-27	0
Average	1.5	Average	1.3	0.5	Average	0.2

*Based on quadrat data
[1] Number of indicator species relative to control pools

TABLE 6
RESULTS: COVER OF INDICATOR SPECIES

Control-Adjacent		Control-J26		Restored Pools		
Percent Cover (PI/Q) *		Percent Cover (PI/Q) *		Yr 1 Success Criteria[1]	Number of Indicator Species (PI/Q) *	
RefA-S-11	25.0/38.5	RefJ26-S-9	38.3/12.8	25%	Resto-S-5	0/1.7
RefA-S-16	5.3/4.3	RefJ26-S-18	20.0/13.5		Resto-S-13	0/2.0
		RefJ26-R-15	27.0/13.7		Resto-S-18	9.1/2.0
		RefJ26-R-16	0/0		Resto-S-30	0/0.6
					Resto-R-10	0/3.3
					Resto-R-27	0/0.8
Average	15.2/21.4	Average	21.3/10.0	3.8-5.3/2.5-5.4	Average	1.5/1.7

* PI = point intercept data; Q = quadrat data
[1] Percent cover relative to control pools (PI/Q)

TABLE 7
RESULTS: COVER OF NON-NATIVE SPECIES IN VERNAL POOLS

	Yr 1 Success Criteria	Control-Adjacent	Control-J26	Restored Pools
Type of Non-native Species	Cover Limits	Percent Cover (B/T)[1,2]	Percent Cover (B/T)[1,2]	Percent Cover (B/T)[1,2]
Cal-IPC moderate/high spp.	<1%	0/0	0	0/0
Other non-native spp.	<5%	0/33.3	6.7/15.9	0/0
Absolute cover for all non-native spp.	<5%	0/33.3	6.7/15.9	0/0

[1] Based on point intercept data within the basin (B) and surrounding transitional vegetation (T)
[2] A number of species could not be identified because they were senescent; these were not included in the cover calculation

Note that the percent cover for each transect was calculated using both point intercept and quadrat data; point intercept data tends to be more accurate for widespread species, while quadrat data tends to be more accurate for rare species (Deutschman and Strahm, 2009).

The Year 1 success criterion for cover requires 25 percent cover of vernal pool indicator species relative to control pools, which calculates to 3.8 to 5.3 percent cover based on Year 1 point-intercept data, or 2.5 to 5.4 percent cover based on quadrat data. The restoration site had an average cover of 1.5 percent based on Year 1 point-intercept data, or 1.7 percent based on quadrat data. The success criteria for non-native species require that the site support less than one percent cover of invasive species (ranked by Cal-IPC as moderate to high risk), and less than five percent for all other non-native species. The restoration site had zero percent cover of all non-native species, as compared to up to 33 percent on the reference sites.

3.3 CRAM Monitoring

To fulfill the mitigation requirements for no net loss of wetland functions and services, the net gain in CRAM scores at the mitigation site must be equal to or greater than the loss at the impact site. Pre-construction CRAM assessments were conducted by Helix Environmental at the impact site (in 2003 and 2004), and the restoration site (in 2010). The latter assessment will be compared to future CRAM assessments of the restoration site to measure the change in the system during the restoration period. In addition, Helix Environmental conducted a CRAM assessment in 2010 at a reference site (Robinson Ridge in Otay Mesa) so that the final condition of the restoration site could be compared to an existing, healthy natural vernal pool system.

The attribute scores for the vernal pools at the impact site suggest that the condition of the pools were of fairly low quality with respect to Physical structure (34), Biotic structure (37), and Buffer and Landscape Context (43). However, the pools scored high for Hydrology (100) (Table 8). The mean scores for the pre-restoration CRAM at the mitigation site varied from a low of 28 for the Physical Structure attribute, to a high of 90 for the Hydrology attribute. Low patch richness and topographic complexity within pools resulted in the low mean score for the Physical Structure attribute. The Biotic Structure attribute, which had a mean score of 36, was affected by low numbers of co-dominant species, and high ratios of non-natives to endemic species within the pools. The Buffer and Landscape Context attribute, which had a mean score of 48, had strong scores for Percent of AA with Buffer and Average Buffer Width submetrics, but scored low for the Buffer Condition submetric due to non-native grasses observed to be dominant within the buffer. The overall score for the pre-restoration CRAM at the mitigation site was 51 (Helix 2001, amended by TAIC 2011).

TABLE 8
RESULTS: CRAM SCORES

	Impact Site (Pre-Construction)	Pre-Restoration	Post-Installation	Reference Site[1]	Year 3 Success Criteria	Year 5 Success Criteria
Buffer and Landscape Context	43	48	75	53	50	54
Hydrology	100	90	100	100	94	100
Physical Structure	34	28	66.7	50	42	50
Biotic Structure	37	36	54.2	46	46	58
Overall Score	53	51	74	62	58	66

[1] Robinson Ridge, Otay Mesa

The overall CRAM score for the reference site was 62. Scores for Buffer and Landscape Context (50), Physical Structure (50) and Biotic Structure (46) were moderate. The control pools, although in better condition than the impact site and pre-restoration mitigation site, were affected by nearby development, simple physical structure and a relatively low number of indicator species. Hydrology scored high (100), which is similar to the condition of the impacted pools and pre-restoration pools.

Using the CRAM data described above, Helix Environmental calculated target CRAM scores (i.e., success criteria) for monitoring Years 3 and 5 (Table 8). The post-restoration CRAM scores calculated by ESA in 2012 for the post-restoration mitigation site have already exceeded the target for Year 5 (Table 8). The main reason for this is the location of the mitigation site and the methods used for restoration. For example, because the site is located on top of a mesa adjacent to mostly undeveloped land, it is not impacted by structures such as drainage ditches, roads, or irrigation that could negatively affect the hydrology. Additionally, restoration methods included the installation of clay soils and small cobbles, which increase the micro-topography of the pools. Further, the site is being actively maintained, which ensures zero percent cover of non-native plant species, and has been planted with vernal pool endemic plant species.

SECTION 4
Discussion

Fairy shrimp surveys were conducted at appropriate times when the pools were inundated and when fairy shrimp were present toward the end of the wet season (following construction completion). However, only one individual was mature enough to keep as a voucher specimen and identify to species. The remaining fairy shrimp observed on the restoration site were immature due to the late date in the season and the fact that the pools dried out prior to the shrimp reaching maturity. Future surveys will be timed and repeated such that mature fairy shrimp are present and additional voucher specimens can be collected to allow for identification to species for all collected samples.

The hydrological regime onsite is on target and expected to meet or exceed restoration criteria in the coming years. Even with a late start that excluded a significant number of rainy days from the season, the pools were found to be inundated for a maximum of 28 days. This does not meet the target of 30 days of continuous inundation, however, fairy shrimp were found to be present and the coming rainy season is expected to be a much better representation of hydrological conditions.

Due to permitting delays, the restoration on the mitigation site was not initiated until November, well into the start of the 2011/2012 winter rainy season. Additional, smaller delays took place periodically throughout the winter when rain events required that work be temporarily paused. For example, when rain events caused grading to be temporarily suspended, the soil onsite had to dry up to three inches in depth before grading was continued. Despite the late start, the vegetation monitoring was conducted as originally scheduled in July 2012, which resulted in lower than anticipated species richness and cover.

The CRAM scores for the restoration site have already exceeded the target scores (success criteria) for Year 5 (Table 8). This is likely due to the location of the site, which is characterized by high-scoring attributes such as buffer, landscape context, and hydrology, as well as restoration methods, which contributed to high-scoring physical and biotic structure.

The restoration site has been successfully installed and is meeting most of the interim success criteria. Despite delays to the restoration implementation schedule, it is anticipated that the restoration site will meet future success criteria pursuant to applicable permit conditions on schedule.

The restoration site is progressing towards success as expected given the abbreviated first post-restoration monitoring period. No remedial actions are needed at this time. Regularly scheduled monitoring will continue, and remedial actions taken as needed. Due to the proximity of the site

to disturbed lands, aggressive weed control should continue. Trash and trespass should be monitored for regularly and corrected as necessary, specifically relative to the location of the site along access routes for the Otay Mesa High School and the frequency of Border Patrol actions on and near the restoration site.

SECTION 5
References

California Wetlands Monitoring Workgroup (CWMW). 2009. Using CRAM (California Rapid Assessment Method) to Assess Wetland Projects as an Element of Regulatory and Management Programs.

Deutschman, D., and Strahm, S. 2009. *Improving Statistical Sampling and Vegetation Monitoring for the San Diego MSCP, 2008 Final Report*, Contract 5001033. Prepared for The San Diego Association of Governments. San Diego, California.

Eriksen, C.H. and D. Belk. 1999. Fairy Shrimps of California's Puddles, Pools, and Playas. Mad River Press

Helix Environmental Planning, Inc. 2001 (Amended by TAIC in 2011). Vista del Mar Elementary School Vernal Pool Restoration Plan. Prepared for the San Ysidro School District.

Hickman, James C. ed. 1993. *The Jepson Manual*. University of California Press, Berkeley and Los Angeles, California.

O'Connor, K. ed. 2012. *California Rapid Assessment Method (CRAM) for Wetlands and Riparian Areas, User's Manual, Version 6, a product of the Level 2 Committee of the California Wetlands Monitoring Workgroup.*

The Planning Center. 2009. *Vista Del Mar Elementary School Subsequent Environmental Impact Report*, July 2009, Screencheck No. 2004111054. Los Angeles, California.

U.S. Fish and Wildlife Service (USFWS). 1996. 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.

U.S. Fish and Wildlife Service (USFWS). 2011. Formal Section 7 Consultation on the San Ysidro School District's Vista Del Mar Elementary School Project (Biological Opinion).

APPENDIX A

Vernal Pool Restoration Plan (2011)

Vista Del Mar Elementary School

Vernal Pool Restoration Plan
for the Off-Site Preserve

February 2, 2011
Amended July 28, 2011

Prepared for:
San Ysidro School District
4350 Otay Mesa Road
San Ysidro, CA 92173

Prepared by:
Helix Environmental Planning, Inc.
7578 El Cajon Boulevard, Suite 200
La Mesa, CA 91942

Revised by:
Technology Associates (TAIC)
5473 Kearny Villa Rd, Suite 200
San Diego, CA 92123

VERNAL POOL PRESERVE RESTORATION PLAN FOR VISTA DEL MAR ELEMENTARY SCHOOL

TABLE OF CONTENTS

TABLE OF CONTENTS (cont.)

TABLE OF CONTENTS (cont.)

LIST OF TABLES

TABLE OF CONTENTS (cont.)

LIST OF FIGURES

APPENDICES

1.0 INTRODUCTION

This plan provides measures to mitigate for vernal pool and San Diego fairy shrimp (*Branchinecta sandiegonensis*) associated with the Vista Del Mar Elementary School Project (proposed project). The mitigation measures identified herein are based on those contained in the Vista Del Mar Draft Subsequent Environmental Impact Report (The Planning Center [TPC] 2009). The proposed mitigation is intended to meet the requirements of the proposed project's expected U.S. Fish and Wildlife Service (USFWS) Biological Opinion (pending), U.S. Army Corps of Engineers (Corps) Section 404 Individual Permit, and Regional Water Quality Control Board (RWQCB) Section 401 Water Quality Certification. All restoration associated with this plan will occur at the West Otay Mesa Parcel B Preserve (Assessor's Parcel Number 64506102).

2.0 PROJECT DESCRIPTION

2.1 DEVELOPMENT PROJECT LOCATION

The approximately 20-acre project site is located at the western terminus of Del Sol Boulevard in the Otay Mesa community of the City of San Diego (City). The site is located in Section 30, Township 18 South, Range 1 West as shown on the U.S. Geological Survey 7.5-minute Imperial Beach quadrangle (Figures 1 and 2).

2.2 DEVELOPMENT PROJECT SUMMARY

The project consists of two components: 1) the construction and operation of Vista Del Mar Elementary School on the southernmost 10.08 acres of the project site and 2) the extension of Del Sol Boulevard from its current terminus near Surf Crest Drive to the western property line of the project site.

2.3 PROJECT IMPACTS

The proposed project would cause direct and indirect impacts to sensitive vegetation communities, jurisdictional areas, and sensitive plant and animal species. The Planning Center prepared a Draft Subsequent Environmental Impact Report that details all of the biological impacts and required mitigation for the Vista Del Mar Elementary School project (TPC 2009). This current plan details project-related impacts to vernal pool habitat and associated sensitive plants and animals.

2.3.1 Vernal Pools

Implementation of the proposed project would impact a total of 10 vernal pools with a combined surface area of 0.02 acre (891 ft^2; Figure 4). These pools occur within non-native grassland, disturbed habitat, and disturbed Diegan coastal sage scrub habitats. Most of the vernal pools are associated with dirt roads. Throughout the site, three vernal pool plant indicator species (Corps 1997) were observed: wooly marbles (*Psilocarphus brevissimus*), dwarf plantain (*Plantago*

elongata), and adobe popcorn flower (*Plagiobothrys acanthocarpa*). Each pool had at least one of the three indicator species present. No federally, state, or CNPS listed (CNPS 2010) plant species were observed in any of the pools.

2.3.2 San Diego Fairy Shrimp

Vernal pools A and E support the federally and state listed endangered San Diego fairy shrimp and would be impacted by the proposed project. Fairy shrimp surveys in the remaining pools were negative.

2.3.3 Sensitive Plants

No federally or state listed endangered or threatened vernal pool plants would be impacted by the proposed project.

2.3.4 Functions and Services

The existing functions and services of the impacted vernal pools were assessed using the Individual Vernal Pool Fieldbook of the California Rapid Assessment Method (CRAM) for Wetlands v. 5.0.3 (March 2009). The purpose of the CRAM assessment is to provide a rapid, standardized, and scientifically defensible assessment of the status of a wetland. To conduct this assessment, 2 CRAM practitioners conducted a CRAM assessment according to the User's Manual: California Rapid Assessment Method for Wetlands v. 5.0.2 (Collins et. al., 2008) and other training materials located on the CRAM web site (www.cramwetlands.org). As part of this assessment, a variety of landscape context, hydrology, and structure attributes and metrics were assessed. The CRAM for individual vernal pools has not been fully calibrated; however, it represents a view into the condition of the pools that would otherwise not be represented in the monitoring efforts. Therefore, the CRAM scores will be used primarily for informational purposes and to potentially further the calibration effort on-going in central California. Results of the pre-project and pre-restoration CRAM assessments will be used for later comparison with post-restoration CRAM scores to determine how functions and services were replaced by the rehabilitation effort. Additional monitoring data will also be collected in order to evaluate success off the rehabilitation effort (see Section 8.0).

All of the 10 pools proposed to be impacted by project development were assessed on August 24, 2010 by HELIX biologists Sally Trnka and Dale Ritenour. CRAM scores varied between 49 and 57 at the assessed pools, with a mean score of 53 (Appendix A). The Buffer and Landscape Context attribute score was between 42 and 46 for all of the pools as a result of little surrounding wetland habitat but good-sized buffer habitat, dominated by non-native grassland and disturbed habitat, particularly to the north and west. The Hydrology attribute score was high (100) for all of the pools, since they all receive water as precipitation, follow the natural patterns of filling and drying, and do not indicate that dry season conditions are substantially controlled by artificial water sources (e.g., urban runoff). The Physical Structure attribute score was low for all of the pools (between 25 and 37.5) since they are simple depressions with one main slope and without many structural patch types, as defined by the CRAM fieldbook. All of the pools, except Pool B, also had very low scores for the Biotic Structure attribute (between 25 and 37.5) as a result of few

native species and fewer vernal pool indicator species. As described above, a total three vernal pool indicator plant species were observed throughout the study area. Most pools only contained one vernal pool indicator species. Pool G was the only pool to contain a second indicator plant species. Although higher, Pool B still scored low on the Biotic Structure attribute (50), but higher than the other pools because it contained 2 co-dominant native species and only one co-dominant invasive species.

3.0 MITIGATION REQUIREMENTS

Pursuant to discussions with the resource agencies, the restoration proposed in this plan is intended to meet the RWQCB required 5:1 mitigation ratio for impacts to vernal pools. Therefore, impacts to 0.02 acre of vernal pool habitat would require 0.10 acre of mitigation, with at least 0.02 acre of pool restoration and 0.08 acre as vernal pool enhancement or restoration (Table 1).

Table 1
MITIGATION FOR IMPACTS TO VERNAL POOL HABITAT

TOTAL IMPACTS (acre)	MITIGATION	
	Ratio	Acreage
0.02	5:1	0.10

To ensure no-net-loss of jurisdictional areas, as well as associated functions and services, the Corps requires compensatory mitigation for jurisdictional impacts. Jurisdictional impacts and mitigation are assessed by using a function-based assessment tool such as CRAM coupled with more typical data such as richness of vernal pool flora, presence of target fauna, extent and duration of ponding, and percent cover of native and non-native flora. The Corps encourages the use of this type of function-based assessment for evaluating impacts to aquatic resources as well as for aiding in establishing appropriate mitigation ratios and determining success criteria.

4.0 MITIGATION SITE DESCRIPTION

The vernal pool mitigation would occur off site at the City of San Diego's Otay Mesa West Preserve. This restoration plan deals only with the off-site restoration and enhancement.

4.1 MITIGATION LOCATION

The vernal pool mitigation would occur within an approximately 1.05-acre area within the Otay Mesa West Preserve. This mitigation site is located approximately 2,700 feet of the south of the Vista Del Mar school impact site on a mesa top owned by the City (Figures 2 and 3). The Preserve is adjacent to Moody Canyon to the south and the San Diego Gas and Electric

substation on Old Otay Mesa Road to the north. The preserve is located on the east side of Assessor's Parcel Number 645-061-01-00, and occupies portion of Sections 31 in Township 18 South, Range 1 West of the U.S. Geological Survey 7.5-minute Imperial Beach quadrangle.

Vernal pool restoration would occur in an approximately one acre area within Parcel B of the Otay Mesa West Preserve (Figures 4 and 5) in an area that currently supports low quality vernal pools. Vernal pool watershed enhancement would occur throughout the entirety of the uplands within the designated restoration area.

4.2 OWNERSHIP STATUS

The section of the Otay Mesa West Preserve where mitigation is proposed to occur was previously owned and managed by The Environmental Trust; however, the proposed restoration area was never used as mitigation for any project. The area is now owned by the City of San Diego and managed by their Park and Recreation Department as permanent open space. While being managed by the Environmental Trust, the site was protected under a conservation easement. When the City took possession of the site, it was placed under a new conservation easement, along with the surrounding mesa top. The City would allow the San Ysidro School District to conduct its vernal pool mitigation in this area.

4.3 ENVIRONMENTAL SETTING

The proposed vernal pool mitigation area is located within the City's Multi-habitat Planning Area (MHPA) and currently supports non-native grassland and disturbed habitat over the mesa top, with high-quality maritime succulent scrub and Diegan coastal sage scrub in the adjacent canyons. A total of 18 highly disturbed vernal pools with a combined area of approximately 0.048 acre have been mapped in the restoration area (Figure 6), two of which are known to support the San Diego fairy shrimp. Vernal pool indicator plant species occurring in these pools include wooly marbles, dwarf plantain, and popcorn flower, all at low densities (Table 2). In addition, little mousetail (*Myosurus minimus* ssp. *apus*), a CNPS Lit 3.1 species, was detected in 2003 in some of the pools (City of San Diego, written comm.). No other sensitive or listed plant species occur within the pools. Overflow from the pools would drain into an unnamed ephemeral drainage in Moody Canyon. This drainage ultimately empties into the Tijuana River.

TABLE 2
SUMMARY OF EXISTING VERNAL POOL CONDITIONS AT RESTORATION SITE

Pool	Pool Area (sq. ft.)	Vernal Pool Cover*	Fairy Shrimp Observed†
1	272	< 1 %	SDFS
3	202	< 1 %	--
4	245	0	--
11	468	5 %	--

TABLE 2 (cont.) SUMMARY OF EXISTING VERNAL POOL CONDITIONS AT RESTORATION SITE			
Pool	**Pool Area (sq. ft.)**	**Vernal Pool Cover***	**Fairy Shrimp Observed†**
16	245	0	--
17	471	10 %	--
18	299	< 1 %	--
19	481	< 1 %	--
20	374	< 5 %	--
21	128	< 5 %	--
24	251	< 1 %	--
25	68	< 1 %	--
26	214	0	SDFS
30	752	5 %	--

* = total cover of vernal pool indicator plant species (Corps 1997)
**= number of vernal pool indicator plant species
†= SDFS- San Diego fairy shrimp

The vernal pools in this area are the result of the construction of a BMX track more than 12 years ago. The vernal pools are situated within and adjacent to the created jumps, berms, mounds, and turnouts. These pools exhibit a low diversity of vernal pool plant indicator species and are characterized as having steep slope edges and tire ruts. The dirt used to create the BMX features has been slowly eroding back into the pools, such that over time many of the pools will fill in and cease to function.

4.4 EXISTING FUNCTIONS AND SERVICES OF MITIGATION AREA

This section provides a brief overview of the functions and services currently provided by the proposed mitigation area based on a review of site maps, numerous site visits, and an initial CRAM assessment. The latter assessment will be used for comparison with post-rehabilitation CRAM assessments to measure the change in the system as a result of habitat restoration.

The pre-restoration CRAM assessment was conducted on August 24, 2010 by Ms. Trnka and Mr. Ritenour on 5 of the 32 pools that will be restored or enhanced. The sampled pools were specifically selected as a representative sampling of the varied size and quality of pools currently located at the site. The CRAM scores of these individual pools varied between 45 and 54, with a mean CRAM score of 50 (actually 49.5) being used for comparisons between the impact site and the post-restoration mitigation site scores (Appendix A). As a result of low structural patch richness and topographic complexity, the pools had low scores for the Physical Structure attribute (25 to 37.5). Biotic Structure scores were low to moderate (25 to 50) because the pools had few co-dominant species and fewer vernal pool endemics combined with the presence of non-native grasses and filaree (*Erodium* spp). The Buffer and Landscape Context attribute was

also moderate (48 for all pools), largely as a result of low scores for Landscape Connectivity (i.e., few wetlands within 500m of the pools) and Buffer Condition (because of the abundance of non-native vegetation). The Hydrology attribute scores were high (83 or 100) for all pools because the water source for the pools is mainly from rainfall coming directly into the basins, which fill and drain in natural cycles, and flow from the pools is largely unrestricted (with the exception of areas where a dirt berm is located along the edge of a pool). Data forms for the assessment areas (AAs) are included in Appendix A.

The existing pools currently provide low to moderate habitat functions and services because of their heavily disturbed state. Due to their proximity to adjacent, higher quality pools, there is some potential for long-term dispersal of sensitive plants and animals into these degraded pools; however, as noted above, many of the pools are filling in over time as the adjacent BMX features erode. The long term survival of these pools, without restoration/enhancement is in question.

4.5 MITIGATION SITE SUITABILITY

The proposed mitigation area is considered suitable for vernal pool restoration due to the presence of appropriate soils and topography on site, and the presence of existing, successfully restored vernal pools immediately adjacent to the site. The site is flat to gently sloping, with less than a 2 percent grade. Soils within the site are mapped as Huerohuero loam (Bowman 1973), a type with a clay subsoil, which is one of the 5 primarily soil types associated with vernal pools in San Diego County (Bauder 1998). The adjacent restoration site contains nine vernal pools; has sensitive animals, including San Diego fairy shrimp, Riverside fairy shrimp (*Streptocephalus wootoni*), and spadefoot toad (*Spea hammondii*); and rare vernal pool plants, including Otay mesa mint (*Pogogyne nudiuscula*), San Diego button-celery (*Eryngium aristulatum*), spreading navarretia (*Navarretia fossalis*), and little mousetails (*Myosurus minimus* ssp. *apus*) (HELIX 2004). A total of 13 vernal pool plant indicator species have been observed within the adjacent preserve.

5.0 MITIGATION DESIGN CONCEPT

To meet Corps, USFWS, and RWQCB (hereafter referred to as "resource agencies") mitigation requirements, as appropriate, this plan recommends measures to restore vernal pool habitat by expanding and enhancing existing degraded pools and enhancing the adjacent upland watershed habitat. It is anticipated that the functions and services of wetland habitat within the target area would be increased with the proposed mitigation measures.

5.1 MITIGATION DESIGN

5.1.1 Vernal Pool Restoration and Watershed Enhancement

Mitigation for impacts to 0.02 acre of vernal pools and San Diego fairy shrimp would occur through vernal pool preservation, enhancement, and restoration (re-establishment) on the Otay Mesa West Preserve. All of the preserved pools (0.048 acre) on site will be enhanced to improve

their quality and function. All but 2 of the preserved pools on site also will be expanded to provide additional surface area. The preserved and enhanced vernal pool surface area is intended to provide the City with additional, higher quality vernal pool habitat within the MHPA. It is not being used to directly meet the project's vernal pool habitat mitigation requirements. An additional 18 pools with a combined surface area of approximately 0.111 acre will be restored to satisfy the project's mitigation requirements. Upon completion of the restoration effort there will be a total of approximately 0.218 acre of restored/enhanced vernal pools on site. Of this area, only 0.125 acre would be counted toward mitigation for the Vista Del Mar elementary school project. This includes the required 0.10 acre plus a 25 percent contingency in excess of mitigation requirements.

The restored vernal pools would support vernal pool plant indicator species (Corps 1997) and function as viable, self-sustaining vernal pool basins. In addition to pool restoration and enhancement, approximately one acre of watershed would also be enhanced in upland habitat surrounding the restored pools. Watershed enhancement would consist of the control of invasive non-natives, and seeding and planting of native upland species.

5.1.2 San Diego and Riverside Fairy Shrimp Mitigation

The project applicant proposes to mitigate impacts to San Diego fairy shrimp at a 5:1 ratio in conjunction with the vernal and road pool mitigation identified above. This mitigation would include the salvage of soil containing fairy shrimp cysts in the impacted pools and the use of this inoculum within a minimum of 0.10 acre of enhanced/restored pools.

5.1.3 Rare Plant Enhancement

While not a resource agency requirement, the project applicant proposes to mitigate impacts to uncommon and rare plants through the following measures:

- Seed collection from impacted populations and placement at the vernal pool restoration area for: San Diego bur-sage, south coast saltbush, seaside calandrinia, Orcutt's bird's beak, Palmer's grapplinghook, Robinson's peppergrass, and golden-rayed pentachea

- Inclusion of San Diego barrel cactus, south coast saltbush, and San Diego bur-sage in the vernal pool uplands planting plan. These plant species may be acquired through collection from the impact area of the Vista del Mar Elementary School project, or by purchasing container plants at a qualified native plant nursery.

5.2 TARGET FUNCTIONS AND SERVICES

The overall goal of this mitigation effort is to increase the functions and services of existing vernal pool habitat and create additional high quality vernal pools to an amount that would, at a minimum, replace the functions and services lost by project implementation. With the completed restoration, it is expected that functions and services (water filtration, sensitive wildlife and plant habitat, etc.) that are currently being performed by the existing pools would be improved by the end of the 5-year mitigation effort. This increase would be documented by

conducting CRAM assessments prior to impacts, post-rehabilitation, and at the end of Years 3 and 5 of the mitigation effort.

5.3 RATIONALE FOR EXPECTING IMPLEMENTATION SUCCESS

The mitigation site is adjacent to an existing, successful pool restoration/enhancement mitigation area. The mitigation site currently supports non-native grassland habitat with vernal pools. This plan would enhance the watersheds of existing pools, restore vernal pools, salvage and transfer rare plant seed, and implement habitat enhancements for other wildlife species.

A watershed analysis of several mound and basin vernal pool complex maps from Kearny Mesa and Otay Mesa found watershed to pool surface area ratios as low as 4:1, and commonly 6:1 or 7:1 (RECON 1997). Studies have shown that direct precipitation plays a more important role in pool filling than watershed contributions in more porous soils (Hanes and Stromberg 1998), while subsurface flow may have an effect on the duration of ponding.

A hydrological analysis of the proposed vernal pools and surrounding watershed area was conducted to determine the appropriateness of the proposed restoration. This analysis included a delineation of the specific watershed areas (micro-basins) for each proposed pool complex and models inter-pool surface flows. The micro-basins delineation and modeled surface flows were obtained with a Geographic Information System (GIS) using the hydrological modeling capabilities of ArcView 9.2, and the Spatial Analyst and Arc Hydro GIS tools. A digital elevation model (DEM) was derived from the linear hypsography (6-inch contours) resulting in a raster surface model with 1-foot resolution. This DEM acts as the surface upon which all subsequent hydrological modeling was performed. The micro-basin delineation was the result of employing flow direction, flow accumulation, stream channel modeling, and basin modeling in Arc Hydro, the Environmental Systems Research Institute GIS tool for hydrological and water resource analysis. The delineated micro-basins represent a generalization of the output of the GIS analysis, with a number of the modeled lines removed for clarity. The resulting micro-basin delineations (Figure 7) represent "break-lines" that would not likely be crossed by surface flows, thus illustrating the spatial limits (watershed) of potential contributing surface flows for an area. Also derived through hydrological modeling techniques are the flow lines included in the analysis. These lines were derived using the tools in Arc Hydro. The flow lines are not meant to show the location of channelized flow, as might be expected from stream channel modeling in GIS; rather, these lines show the path or direction that water would take from a specific point on a surface. While the flow lines are specific paths that overland flow would follow from a single one foot by one foot location in the study area, they provide a good indication of the general direction and path that flows would follow from a potentially much larger area, until of course they infiltrate into the soil, enter a vernal pool, or channelize, ultimately becoming part of a stream network. Channelization is not anticipated to occur on site because of the small size and general flat character of the site.

The overall watershed to pool ratio of 6:1 is similar to other successful pool complexes and would be sufficient to support the restored vernal pools. Additionally, the project team is comprised of a number of individuals who have been involved in the successful implementation of several vernal pool restoration efforts in San Diego and Riverside counties.

6.0 IMPLEMENTATION PLAN

Vernal pool mitigation at the Otay Mesa West preserve will consist of several components, including:

- The restoration of 0.17 acre of vernal pools in an approximately one-acre vernal pool restoration area;
- The enhancement of 0.048 acre of existing pools;
- The avoidance or mitigation of impacts to on-site little mousetail plants
- The addition of Diegan coastal sage scrub plantings and seeding adjacent to the restored/enhanced pools;
- Translocation of rare plant seed to the vernal pool restoration area; and
- Enhancement of wildlife habitat.

The site preparation, installation, and maintenance of these areas are described in detail in sections 5.4 and 5.5.

6.1 RESPONSIBLE PARTIES

6.1.1 Project Proponent

San Ysidro School District would be responsible for financing the installation, maintenance, monitoring, and long-term management of the restoration effort. The City of San Diego Park and Recreation Department or an approved alternative management entity would be responsible for long-term management upon completion of the 5-year maintenance and monitoring period with Wildlife Agency signoff verifying the successful completion, and acceptance of the non-wasting endowment received by the San Ysidro School District.

6.1.2 Restoration Specialist

Overall supervision of the installation, maintenance, and monitoring of this mitigation project would be the responsibility of a restoration specialist with vernal pool restoration experience. The restoration specialist would educate all participants with regard to mitigation goals and requirements and directly oversee grading, excavation, and placement of salvaged topsoil for vernal pool restoration, installation of vernal pool watershed enhancement, rare plant translocation, and maintenance during the minimum 5-year restoration effort. In addition, the specialist would conduct all CRAM assessments, other monitoring data collection, and annual assessments, and prepare all required reports. If necessary, the restoration specialist would provide the permittee and contractor with a brief report, including a written list of items in need of attention following each monitoring visit. The contractor would be responsible for carrying out all required measures in a timely manner. The restoration specialist would notify the contractor and responsible party if any requested remediation is not addressed.

6.1.3 Installation/Maintenance Contractor

The installation and maintenance contractor(s) will: have wetland habitat restoration experience; be under direction of the restoration specialist; be responsible for completion of grading, pre-planting weed control, translocation, planting, seeding, and maintenance of the restored and enhanced vernal pools and watersheds. The restoration specialist would educate the contractor(s) on the installation and maintenance of vernal pools and native plant species.

After the installation contract is completed, the project proponent(s) would hire a maintenance contractor for the duration of the minimum 5-year monitoring period. The maintenance contractor and the installation contractor may be the same entity. The project proponent may change contractors at its discretion. The maintenance contractor will be educated as to the maintenance of native plant habitat and the difference between native plants and weeds. The maintenance contractor would service the entire restoration area at least once per month. Service would include, but not be limited to weed control, trash removal, watering, fence repair, dead plant replacement, and re-seeding. If large scale trespassing occurs and the mitigation areas are destroyed by digging or otherwise reconfiguring the pools, mounds, or watersheds for the purposes of off-roading, dirt biking, or other unauthorized use, the affected area will be fully restored. All activities conducted would be seasonally appropriate and approved by the restoration specialist. The maintenance contractor would meet the restoration specialist at the site when requested and would perform all checklist items in a timely manner, as directed by the project proponent.

6.2 RESTORATION IMPLEMENTATION SCHEDULE

6.2.1 Vernal Pool Restoration and Enhancement Implementation Schedule

The schedule for implementation of the mitigation program has not yet been set. Implementation would only occur if weather and soil conditions are dry enough to conduct the vernal pool restoration without causing irreparable damage to the surrounding habitat. No activities would be conducted within the vernal pools unless approved by the Corps, USFWS, and City. In order to obtain this approval, the following conditions must be met:

1. Grading will occur only when the soil is dry to the touch both at the surface and one inch below, and a visual check for color differences (i.e., darker soil indicating moisture) in the soil between the surface and one inch below indicates that the soil is dry.

2. After a rain of greater than 0.2 inch, grading will 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.

3. Grading would commence only when no rain is forecast during the anticipated grading period.

4. To prevent erosion and siltation from stormwater runoff due to unexpected rains, Best Management Practices (i.e., silt fences and fiber rolls) would be implemented as needed during grading.

5. If rain occurs during grading, work would stop and only resume after soils are dry, as described above.

Initial vernal pool restoration and enhancement activities would include demarcating all restoration areas, little mousetail plants, impacted pool inoculum salvage, weed and trash removal, and vernal pool grading. Grading of the restored vernal pools would start once the site has been weeded. Grading would avoid little mousetail plants as feasible. If avoidance is not possible, little mousetail plants will be salvaged and transplanted on-site, or added to the seed mix during restoration. Seeding and planting of the vernal pool enhancement areas would begin when vernal pool grading is complete. The entire restoration is anticipated to be complete within 4 weeks of starting. Pool grading cannot be conducted while the pool soils are wet or damp, so it is expected that pool grading could not be conducted before June or July of a given year. Monitoring of the restoration effort would begin immediately following installation. The monitoring program would continue for a minimum 5-year period and until the success criteria are met and the resource agencies agree with the success of the site. Field surveys would be completed every other week during the rainy season and monthly during the dry season each year, with an annual report being prepared and distributed by October 1. The results of the annual reports would be used to determine the success of the restoration effort and to determine any remedial actions necessary. When success criteria are achieved, a site visit will be offered to the resource agencies and a final report would be produced for agency review and approval. A general checklist showing the phases and responsible parties is included in Table 3.

6.2.2 Rare Plant Seed Translocation Schedule

Rare plant seed would be collected before any project site grading occurs, and would be placed at the restoration site concurrent with restoration site seeding.

6.2.3 Upland Planting and Seeding

Installation of container stock will not occur until after vernal pool site grading is completed. Container stock will be installed in the fall, as generally cooler, shorter days will help reduce plant mortality. Seeding will not be conducted until after container stock are installed, to avoid trampling of seeds and seedlings. To take advantage of the rainy season and minimize seed predation, seeding will occur between November 15 and January 15.

6.3 RESTORATION SITE PREPARATION

Site preparation would be accomplished by: weeding the non-native grasslands in the mitigation site; salvaging topsoil from vernal pools in the project site and the enhancement area; salvaging rare plants and seed in the proposed project site; grading restored vernal pools; and protecting the restoration area from intrusion.

6.3.1 Initial Restoration Site Weeding

All non-native grassland areas within the mitigation site would be weeded before any other restoration activities occur, and the plant material would be raked up by hand and disposed of in a legal manner.

6.3.2 Vernal Pool Inoculum Salvage

Restoration of the native vernal pool habitat on site requires the reintroduction of plants and animals in addition to the physical construction described above. Partly because vernal pools recur reliably in the same location year after year, many vernal pool species are adapted for a strategy of non-dispersal (Zedler 1990). As a result, the restoration of vernal pool habitat can be greatly accelerated by the active transport of propagules from donor sites into the restored pools (Scheidlinger et al. 1985).

Table 3
VERNAL POOL RESTORATION PLAN CHECKLIST

Construction Phase	Restoration Task	Applicable Parties				
		Project Proponent[1]	Grading Contractor	Installation Contractor	Maintenance Contractor	Restoration Specialist
Pre-construction	Order seed[1]			X		
	Attend pre-construction meeting	X	X	X		X
	Document pre-impact conditions, including a CRAM assessment					X
	Document pre-installation site conditions, including CRAM					X
	Salvage vernal pool topsoil			X		X[2]
	Salvage rare plant seed					X
Installation	Delineate mitigation boundaries			X		X[2]
	Remove non-native vegetation			X		X[2]
	Restore vernal pool topography		X			X[2]
	Install container stock and seed and replace vernal pool topsoil			X		X[2]
	Conduct post-installation CRAM assessment					X
	Prepare/submit as-built report					X
Five-year Maintenance & Monitoring Period	Conduct maintenance monitoring and annual monitoring; Conduct Year 3 and Year 5 CRAM assessments					X
	Maintain site for remainder of 5 years - until signed off by resource agencies				X	X[2]

[1] Must provide all source locations and receive authorization of final seed and plant lists prior to ordering
[2] Inspecting or overseeing work related to this task

Prior to project site development, vernal pool topsoil would be collected, placed into boxes, and stored until the restoration site is ready. Hand tools (i.e., shovels and trowels) would be used to remove the first one to 2 inches of soil from the existing pools. Soil would be placed in boxes of sturdy, moving grade cardboard, with lids. Typically, the size of each box is 12 inches by 15 inches by 10 inches (depth). Butcher paper (or similar) should be placed in the bottom of the boxes to reduce leaks. Boxes should only be filled to 3/4 of capacity or approximately 3/4 cubic feet each, to allow for safe movement. The collected inoculum from each pool would be labeled and kept separate from inoculum collected from other pools. The amount of inoculum collected from a given pool depends upon its size, slopes, and quality. Each box must be labeled with the pool number, box number, and date of collection. Boxes would be moved to a secure, dry, enclosed storage facility. Boxes should be stored off the floor, on pallets or similar.

Prior to vernal pool enhancement within the restoration area, vernal pool topsoil would be collected, and stored until pool grading is complete, as per above. Topsoil would be returned to the pools that it was drawn from.

Off-site seed inoculum would be required to supplement the salvaged soils to achieve reasonable vernal pool cover because of the low cover and diversity of plants within the impacted pools. Potential sources of inoculum include other vernal pool restoration projects that have been conducted by HELIX on Otay Mesa, including Robinhood Ridge Vernal Pool Preserve, Otay Mesa West Preserve, and Arnie's Point Vernal Pool Preserve. These locations provide a large surface area of pools, with a variety of vernal pool indicator plant species. Care would be taken to minimize the introduction of weed seeds into the restored vernal pools. Prior to the use of off-site inoculum, the restoration specialist would contact the appropriate resource agency for approval.

The successfully completed Sweetwater Union High School District vernal pool habitat restoration is located west of the proposed mitigation site. Portions of the watershed for the proposed mitigation is in this off-site area, which supports native upland habitat and minimal cover by invasive, non-native species.

6.3.3 Rare Plant Seed Salvage

Seed collection will occur in June and would attempt to collect as much seed as possible. Seed collection would be conducted by the restoration specialist or a qualified seed collector. Seed would be stored in a cool, dry, dark, well ventilated location in paper bags until they can be placed in the receptor site. The seed collector would also gather seed of any chocolate lily observed and include these in the seed mix used for the restoration site.

6.3.4 Vernal Pool Grading

The restored and enhanced pools (Figure 5) would be formed to replicate hydrologic conditions of existing vernal pool habitat in Otay Mesa. The post-construction hydrologic analysis depicts the vernal pool restoration area and its topography and watershed following project implementation and vernal pool restoration (Figure 6). Pools would be graded to have maximum depths of 4 to 6 inches, with the goal of having appropriate hydrology for San Diego fairy

shrimp (i.e. ponding for 30 days in an average rainfall year). Pools are planned to have slopes of 12:1 to 15:1 to provide smooth, micro-topographic variance for vernal pool plants. Material removed during pool excavation would be used to enhance and restore adjacent mima mounds.

Vernal pool grading would be carried out under the supervision of the restoration specialist. The restoration specialist would mark all areas to be graded. Existing sensitive habitats and plants would be marked as avoidance areas. Access routes would be identified and marked. An on-site meeting would be held with the restoration specialist and all installation personnel to identify sensitive areas and devise a strategy for avoidance prior to initiation of restoration activities. A staging area would be established outside of the on-site vernal pool restoration area. Grading shall be implemented using rubber-tired loaders with ripping tines and slope boards. Skid-steer loaders would not be used because of their high impact on soil. All vehicles and construction equipment would be restricted to the staging areas when not required for restoration activities.

All of the existing vernal pools will be enhanced by implementing the activities listed in Table 4. Existing ponding area has been delineated and mapped as the normal high water mark for the pools, and is often discernable by changes in vegetation composition, the presence of a dried algal mat, or micro-topographical changes. All restored pools would be created and inoculated with appropriate vernal pool flora and fauna (Table 4).

Table 4
SPECIFIC ENHANCEMENT/RESTORATION ACTIVITIES BY POOL

Vernal Pool Enhancement			
Pool	**Existing Pool Area†**	**Planned Size After Grading†**	**Activity**
1	67	272	Deepen basin and smooth edges
3	30	202	Deepen basin and smooth edges
4	91	248	Deepen basin and smooth edges
11	386	468	Remove wetland weeds and berm, and smooth edges
16	105	245	Remove berm, deepen basin, and smooth edges
17	196	471	Remove mounds, merge ruts, and smooth edges
18	117	299	Remove mounds, merge ruts, and smooth edges
19	190	481	Remove mounds, merge ruts, and smooth edges
20	137	374	Remove wetland weeds and berm, and smooth edges

Table 4 (cont.) **SPECIFIC ENHANCEMENT/RESTORATION ACTIVITIES BY POOL**			
Vernal Pool Enhancement (cont.)			
Pool	**Existing Pool Area†**	**Planned Size After Grading†**	**Activity**
21	116	128	Remove wetland weeds and berm, and smooth edges
24	90	251	Deepen basin and smooth edges
25	62	68	Deepen basin and smooth edges
26	59	214	Deepen basin and smooth edges
30	455	752	Remove wetland weeds and berm, and smooth edges
Subtotal	**2,101**	**4,473**	**--**
Vernal Pool Restoration			
Pool	**Existing Pool Area†**	**Planned Size After Grading†**	**Activity**
2	0	397	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
5	0	368	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
6	0	118	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
7	0	369	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
8	0	207	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
9	0	374	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
10	0	296	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
12	0	249	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
13	0	373	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
14	0	288	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
15	0	398	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
22	0	123	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species

Table 4 (cont.) **SPECIFIC ENHANCEMENT/RESTORATION ACTIVITIES BY POOL**			
Vernal Pool Restoration (cont.)			
Pool	**Existing Pool Area†**	**Planned Size After Grading†**	**Activity**
23	0	156	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
27	0	317	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
28	0	231	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
29	0	201	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
31	0	241	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
32	0	117	Restore new basin and inoculate with SDFS‡ and vernal pool indicator species
Subtotal	**0**	**4,823**	**--**
TOTAL	**2,101**	**9,296**	**--**

†Area presented in square feet.
‡San Diego fairy shrimp

6.3.5 Fencing and Signage

A non-barbed, 3-wire fence would be constructed around boundary of the vernal pool restoration area, tying into the existing fence along the adjacent preserve. A vehicle-access gate would be included in the fence to allow maintenance personnel to access the site.

Aluminum signs would be posted adjacent to the dirt road on the north and south boundary of the site, providing notice in both English and Spanish that the area is an ecological preserve and that trespassing is prohibited.

6.4 VERNAL POOL RESTORATION AREA PLANTING PLAN/ INSTALLATION

6.4.1 Vernal Pool Inoculation

After the pools are successfully graded, each of the restored pools would receive a share of the total collected pool material proportionate to its surface area. The collected soils would be spread out and raked into the bottoms of the restored pools.

6.4.2 Vernal Pool Restoration Area Planting Plan

Restoration of upland habitat is critical to the overall success of this vernal pool restoration plan. Without native vegetative cover to prevent erosion, the pools may fill with materials washed in from the adjacent upland areas or become overrun by annual grass weeds. Adjacent areas are managed by the City, which has recently assumed responsibility for all of Otay Mesa Parcels A and B. The City and SANDAG are developing management approaches for vernal pool areas within the MHPA, and are seeking various sources of funding for future restoration efforts. This restoration plan represents a step toward overall improvement and management of the entire mesa top.

Disturbed upland areas within the one-acre restoration site will be enhanced. Upland restoration will involve a number of techniques including installing: (1) salvaged rare plant seed, (2) container stock plantings, and (3) commercially obtained seed mix. No seeding or planting will occur within restored pools (besides salvaged inoculum).

The planting palette for the vernal pool uplands will include a mix of Diegan coastal sage scrub and maritime succulent scrub plant species (Table 5). The amount of container stock for each species is dependent upon availability from local nurseries. The seed palette includes a mix of shrub, forb, and native bunchgrass species (Table 6). All of the species in the planting and seeding palettes have been observed on south facing slopes in the immediate vicinity. All plantings would be one-gallon pots, except purple needlegrass (*Nassela pulchra*) which would be plugs. Root bound container stock would not be accepted from the nursery. Container stock placement would be overseen by the restoration specialist, and plants would be positioned prior to planting. Planting holes should be excavated to 1.5 times the planting depth, to loosen the soil. Prior to installing container stock, the planting hole would be filled with water and allowed to drain, to build soil moisture. Container stock should be planted so that after soil settling, the crown of the root ball is one-inch above finish grade. The deep watering pipe would be installed at the same time that the container stock is planted. The holes should be backfilled around the container stock and pipe with native soil, and the holes will be watered immediately after planting, to settle the soil. Any voids or settlement should be filled with additional native soil, and the watering repeated.

Table 5
UPLAND ENHANCEMENT CONTAINER STOCK PLANT PALETTE*

Scientific Name	Common Name	Spacing on Center (ft)	Grouping Size	Number Per Acre	Number to be Ordered†
Euphorbia misera	cliff spurge	4	8	10	10
Isomeris arborea	bladderpod	5	3	10	10
Malosma laurina	laurel sumac	6	4	5	5
Opuntia littoralis	coastal prickly pear	4	4	10	10
Opuntia prolifera	cholla	4	4	10	10
Rhus integrifolia	lemonadeberry	6	4	5	5
Simmondsia chinensis	jojoba	6	4	20	20
Yucca schidigera	Mojave yucca	5	3	5	5
Artemisia californica	California sage brush	5	3	20	20
Eriogonum fasciculatum var. *fasciculatum*	California buckwheat	5	3	20	20
			TOTAL	**115**	**115**

*All container stock would be 1 gallon
†Based on 1 acre

Table 6
UPLAND ENHANCEMENT SEED MIX

Scientific Name	Common Name	Pound/Acre†	Amount to be Ordered*
Ambrosia chenopodifolia	San Diego bur-sage	3	3
Artemisia californica	California sage brush	2	2
Deinandra fasciculata	fascicled tarweed	5	5
Encelia californica	California encelia	3	3
Eriogonum fasciculatum var. *fasciculatum*	California buckwheat	2	2
Eriophyllum confertiflorum	golden yarrow	2	2
Isomeris arborea	bladderpod	1	1
Lasthenia californica	goldfields	1	1
Lotus scoparius	deerweed	3	3
Nassella pulchra	purple needlegrass	3	3
Salvia columbariae	chia	1	1
Salvia mellifera	black sage	2	2
Simmondsia chinensis	jojoba	4	4
Viguiera laciniata	San Diego sunflower	3	3
	TOTAL	**35**	**35**

†Seeding rates are dependent on availability of seed material
*Based on 1 acre

6.5 IRRIGATION PLAN

No broadcast irrigation is planned or considered appropriate for this project. Runoff from any spray irrigation could alter the hydrology or water chemistry of the surrounding vernal pools. Irrigation runoff entering pools could cause vernal pool plant seed germination or fairy shrimp cysts to leave diapause at a time of year not appropriate, and therefore cause the death of these individuals.

Deep pipe irrigation would be utilized for establishment of the container stock. In this method, a perforated pipe is placed in the soil next to each planting and watered by hand (Soil Ecology Restoration Group 2001). Specifically, a 3-inch diameter PVC plastic pipe will be placed vertically in the soil approximately 12-inches deep, immediately adjacent to each container stock planting. Each pipe should be approximately 16-inches long, and be either commercially available French drain pipe, or PVC pipe with a quarter inch diameter holes drilled every 3 to 4 inches. A screen cap of 1/8 inch hardware cloth would be glued onto the top of each pipe with silicone caulk to prevent animal entry.

Container stock and grass plugs will be watered at the time of planting, and then periodically during the installation and maintenance period. A water truck will be brought to the site and water will be moved to the container stock by hose or watering can. The water truck will remain on designated roads and will not enter the restoration site. Each planting will be individually watered by hand, in a way such that runoff from the planting does not occur. If hoses are used, care will be taken to avoid damaging establishing seedlings or container stock. During installation, the entire planting hole will be watered, but afterwards, only the deep pipe will be watered. During each watering visit, each deep pipe will be filled, allowed to naturally drain, and then filled again.

6.6 WILDLIFE HABITAT ENHANCEMENT

In addition to seeding and planting, the restoration effort will include additional measures intended to increase the potential for wildlife usage of the site, particularly in the early years prior to full establishment.

6.6.1 Small Animal Cover

In order to encourage wildlife establishment and use of the restoration area, and document small animal presence, shelter for small mammal and reptile species will be created on site. These shelters include placement of 10 half-inch thick plywood boards, measuring 2 by 4 feet, within the site. These boards will provide shade, cover, and nesting locations for species including mice, lizards, snakes, and numerous invertebrate species (insects, spiders, etc.). The boards also provide an opportunity to monitor the wildlife usage of the site. During regular monitoring visits, the project biologist will be able to lift each board and note the species present. The data collected during these monitoring visits will be summarized in the annual reports prepared during the 5-year restoration monitoring period.

Additionally, shrub vegetation will be salvaged and collected from the project site and used for brush piles within the restoration site. Shrubs will be collected by hand before site grading,

transferred to the restoration site, and stacked into low brush piles to provide additional cover for small animals.

6.6.2 Pollinator Support

Pollinator species are integral in a diverse, self sustaining habitat. Pollinators may include bats, birds, and a host of insects. The restoration seed mixes include a variety of forbs and other plants with overlapping flowering periods to support a wide-range of pollinators that will stimulate continued seed production and provide pollen and nectar sources for foraging wildlife. In addition, 10 bee blocks will be prepared and scattered throughout the restoration area to provide nesting locations for native wood and cavity-nesting bees. Bee species from the Apidae, Colletidae, Halictidae, and Megachilidae families are expected. The bee blocks will consist of an untreated 4 inch by 8 inch by 12 inch block of wood. Numerous holes ranging in size from 3/32 inch to 3/8 inch in diameter will be drilled approximately 3/4 inch on center on the 4-inch wide face of the block. The depths will be approximately 3 to 4 inches for holes less than 1/4 inch in diameter and 5 to 6 inches for holes greater than 1/4 inch in diameter. The varying hole sizes and depths should attract a variety of native solitary bee species. The bee blocks will be positioned such that they face the morning sun (east to southeast).

The restoration effort also will include support for ground-nesting bees in the form of small, shallow sand pits (Sarver 2007). A total of 4 sand pits will be installed within the restoration area. Each pit will be approximately one foot deep and 4 feet in diameter. The pits will be filled with a mix of sand, native soil, and organic material (plant chippings). In addition to ground nesting bees, several other insect species may use these pits as foraging and nesting areas. Birds also may use the pits for taking dust baths for feather maintenance, parasite control, and temperature regulation.

7.0 MAINTENANCE PLAN

7.1 HABITAT MAINTENANCE ACTIVITIES

A 5-year maintenance program is proposed to ensure the successful establishment and persistence of the restored habitat. The maintenance program would involve removal of trash, weed control, fence repair, and any remedial measures deemed necessary for restoration program success (e.g., re-seeding and re-contouring).

7.1.1 Trash Removal

The maintenance contractor would remove any trash encountered within the restoration area and dispose of it in a legally acceptable fashion.

7.1.2 Weed Control

Particular emphasis in the vernal pool restoration area will be placed on pro-active weed control. All weed species observed within the vernal pool restoration area during restoration activities would be considered invasive and targeted for removal. All workers conducting weed removal activities would be educated to distinguish between native and non-native species, with special attention paid to rare and endangered plant species. All weeding within the restored/enhanced pools would be performed by hand and with hand tools. Care would be taken within pools to avoid removing vernal pool plant species and to reduce soil disturbance. Weeds would be removed from the restoration limits and disposed of in a legal manner. All weeds would be removed prior to reaching 12 inches in height or before reaching seed. Leaf and branch drop of native species should be left in place and not removed from the site.

Weeds in the uplands of the vernal pool restoration area will be removed by hand tools whenever possible; however,focused herbicide application is recommended if manual removal does not fully control invasive species. Pesticides would only be applied by workers licensed to use those chemicals. Additionally, no herbicide will be used within 5 feet of any vernal pools. Herbicides will not be used during wet or windy conditions. Care will be taken not to saturate the soils with herbicide, and any herbicide used will not be allowed to be blown into pools.

Mechanical removal of weed species with a line trimmer or other such device in the upland areas may also be necessary. However, no mechanical weed removal devices will be used in any pool. Weeding will not occur in the pools while the pools are wet. Pools may be recontoured if necessary to increase the hydrologic ponding period, which helps exclude upland weed species.

As the Southern California region is already impacted by nitrogen deposition, no fertilizers will be used in the restoration site.

7.1.3 Container Stock Irrigation

Container stock, native grass plugs, and transplanted sensitive plants will be hand watered at least twice a month, if necessary, during the first 2 years of maintenance and monitoring. Hand watering may not be necessary during the rainy months. Water will be applied to the deep pipe adjacent to each container stock planting, and will be watered in such a way that run off does not occur.

Dead container stock will be replaced by the maintenance contractor at the request of the vernal pool restoration specialist, if container stock is not meeting survival goals.

Deep pipes will remain in the soil until the vernal pool restoration specialist decides that hand watering is no longer necessary. Deep pipes will then be removed and backfilled with native soil.

7.1.4 Fence Repair

The 3-strand wire fence will be maintained in good order by the maintenance contractor. Wiring and fence posts will be repaired within one month of the initial observation if damaged. If

unauthorized access threatens the restoration site, fencing will be repaired within one week of the initial observation.

7.2 HABITAT MAINTENANCE SCHEDULE

Regular maintenance, trash removal, and weed control of the vernal pool restoration area would be conducted during the first 5 years following implementation of the mitigation program or until the mitigation program is deemed successful. Maintenance personnel would visit the site at least monthly for the entire duration of the 5-year restoration effort. Additional visits would be conducted as directed by the restoration specialist during the rainy season (generally December through May) each year to keep non-native species under control.

8.0 SUCCESS CRITERIA

As discussed in Section 3.0, mitigation for impacts to 0.02 acre of vernal pools with and without fairy shrimp would be at a 5:1 ratio, and would consist of at least 0.10 acre of vernal pool restoration and enhancement.

The following sections provide performance standards to determine the successful completion of the 5-year mitigation and monitoring program. Attainment of these standards indicates the mitigation area is progressing toward the habitat functions and services specified for this plan. Methods used to measure these success criteria are described in the following text. If the restored areas fail to meet the Year 5 standards after the full monitoring term, a specific set of remedial measures would be implemented, and the monitoring and maintenance period would be extended until all Year 5 standards are met or as otherwise provided in this document. Only areas failing to meet the success standards would require additional work (i.e., not all of the areas originally restored), and only when the entire mitigation site is meeting the Year 5 standards will the entire site be signed off.

8.1 CONTROL POOLS

In order to measure the success of the restored vernal pools, 10 off-site pools in Otay Mesa would serve as control pools. Five pools are located in the adjacent West Otay Mesa vernal pool preserve (Figures 2 and 3). Three control pools are located at the San Ysidro High School on-site preserve, immediately adjacent to the high school and approximately 0.2 mile east of the San Ysidro School #8 mitigation area. The remaining 2 control pools are located on the Robinhood Ridge vernal pool preserve, west of Heritage road in north central Otay Mesa (Figure 2). The Robinhood Ridge control pools are preserved pools that have not been restored or enhanced, but are protected from trespass and have been weeded at times over the last 10 years, and are associated with nearby vernal pool restoration. The West Otay Mesa preserve and San Ysidro High School on-site preserve are both restoration sites that were associated with the high school. All of the control pools at these sites have average or better ponding, high cover and diversity of vernal pool indicator plant species, and the presence of some vernal pool fauna, including endangered fairy shrimp.

The control pools are of high quality and are of similar depth and vegetative makeup as those proposed for the mitigation site. A total of 14 vernal pool plant indicator species and 2 native vernal pool associated species have been observed in the control pools (Table 7). During the hydrological year of 2003 to 2004, the control pools had species richness values (the number of species in a given area) ranging from 3 to 11 species with an average of 6.9. In 2004, vernal pool plant cover varied from one to 60 percent, with an average of 13.5 percent. The 2004/2005 hydrological year was the final year of restoration monitoring for the West Otay Mesa and San Ysidro pools, and was the third wettest year on record. Pools had excellent hydrology during this year and exhibited high amounts of cover. In 2005, the vernal pool plant richness varied from 4 to 15 species per pool with a mean of 8.5. The vernal pool plant cover in the control pools ranged from 29 to 100 percent with an average of 60 percent.

Table 7
CONTROL VERNAL POOL PLANT SPECIES

SCIENTIFIC NAME	COMMON NAME
Vernal Pool Indicators*	
Callitriche marginata	long-stalk water-starwort
Centunculus minimus	chaffweed
Crassula aquatica	water pygmyweed
Deschampsia danthonoides	annual hairgrass
Elatine brachysperma	smooth waterwort
Eryngium aristulatum var. *parishii*	San Diego button-celery
Lilaea scilloides	flowering quillwort
Myosurus minimus	little mousetail
Navarretia fossalis	spreading navarretia
Pilularia americana	American pillwort
Plagiobothrys acanthocarpus	adobe popcornflower
Plantago elongata	dwarf plantain
Pogogyne nudiuscula	Otay mesa mint
Psilocarphus brevissimus	woolly marbles
Other Native Vernal Pool Associated Species	
Eleocharis macrostachya	pale spike-sedge
Juncus bufonius	common toad-rush

*Based on Corps Vernal Pool Plant Indicator List (Corps 1997)

Success of the restored vernal pools would be determined by comparing species richness and vegetative cover with the control pools. A transect/quadrat sampling method would be used to monitor the restored pools (described in Section 8.1). Permanent transects and decimeter quadrats have been established within the off-site control pools and would be established in the onsite control pools and the restored pools. Each year, species richness and vegetative cover

within the quadrats would be measured and recorded. This data would be used to determine if the restored pools have met the success criteria described below.

8.1.1 Vernal Pool Indicator Species Richness

Only native vernal pool indicator species (Corps 1997) and selected native vernal pool associates (Table 7) would be included in species richness (the number of species in a given area) in the monitored vernal pool quadrats. Annual performance goals expressed as a percent of vernal pool indicator species in control pools are addressed in Table 8. Acceptable species richness within each restored pool at the end of the 5-year monitoring period is 100 percent of the average control pool vernal pool species richness. Meeting the 100 percent criterion by Year 5 would show that pools are functioning and that they would be expected to continue functioning. If the species richness criterion for a given year is not met, corrective measures (e.g., reseeding, excavation of a portion of a basin, introducing new inoculum, berming of a pool edge, etc.) may be taken to ensure eventual achievement of long-term goals.

Table 8
VERNAL POOL SPECIES RICHNESS
SUCCESS CRITERIA

Year	Number of Indicator Species Relative to Control Pools (percent)	Minimum Number of Indicator Species Present in each pool
1	35	1
2	50	1
3	65	2
4	80	3
5	100	3

8.1.2 Vegetative Cover of Vernal Pool Indicator Species

In addition to species richness, cover of native vernal pool and associated wetland plants within the pools would be used to determine project success. At the end of the 5-year monitoring period, the total cover of vernal pool plant species in each restored vernal pool should be 100 percent of the average total cover value for the control pools. Yearly performance goals have been set to track the progress of the mitigation effort (Table 9). After the first year, the relative cover in each of the restored vernal pools should be at least 25 percent of the average relative cover measured in the control pools for the same year. This percentage is expected to increase annually relative to the control pools. For Years 2 through 5, the percentage should be 35, 50, 70, and 90 percent, respectively. If the annual goals for relative cover are not being met, additional measures would be taken as necessary to ensure final success including the addition of supplemental inoculum.

Table 9 VERNAL POOL PLANT COVER SUCCESS CRITERIA	
Year	**Cover of Indicator Species Relative to Control Pools (percent)**
1	25
2	35
3	50
4	70
5	90

8.1.3 Non-native Cover in Restored Vernal Pools

Non-native weed species anticipated to encroach upon the vernal pools include Italian ryegrass (*Lolium multiflorum*), Pacific bent grass (*Agrostis avenaceae*), grass poly (*Lythrum hyssopifolia*), African brass buttons (*Cotula coronipifolia*), rabbitsfoot grass (*Polypogon monspeliensis*), Boccone's sand spurry (*Spergularia bocconi*), and nit grass (*Gastridium ventricosum*). Of these weed species, Italian ryegrass is considered to be the most significant competitor to native vernal pool species. Elimination of this species would be the main focus of the vernal pool weed control effort. Relative cover of Italian ryegrass shall not exceed one percent during the 5-year monitoring period. Control of weed species categorized as High or Moderate in the California Invasive Plant Council (Cal-IPC) 2006 Invasive Plant Inventory shall be conducted such that at the end of the 5-year monitoring period the total cover of such weed species in each restored vernal pool is less than one percent and total cover of any other weed species does not exceed 5 percent (Table 10). If weed cover criteria are not being met, additional maintenance effort would be required. Table 11 includes Cal-IPC listed species likely to occur within the mitigation area.

Table 10 COVER LIMITS FOR NON-NATIVE SPECIES IN VERNAL POOLS	
Cal-IPC Moderate or High species	<1%
Other non-native species	<5%
Absolute cover for all non-native species (Cal-IPC and others combined)	<5%

Table 11
CALIFORNIA INVASIVE PLANT COUNCIL
MODERATELY TO HIGHLY INVASIVE PLANT SPECIES*

SCIENTIFIC NAME	COMMON NAME
Avena spp.	wild oats
Brassica nigra	black mustard
Bromus diandrus	ripgut brome
Bromus madritensis ssp. rubens	red brome
Centaurea melitensis	tocalote
Chrysanthemum coronarium	garland daisy
Foeniculum vulgare	fennel
Hirschfeldia incana	shortpod mustard
Lolium multiflorum	Italian ryegrass
Lythrum hyssopifolia	grass poly
Vulpia myuros	rattail fescue

*California Invasive Plant Council (Cal-IPC) 2006 Invasive Plant Inventory

8.2 CRAM REFERENCE SITE/TARGET VALUES

A CRAM reference site was selected in order to compare the final restoration effort goals to existing, healthy vernal pools. The reference site assessment was conducted by Ms. Trnka and Mr. Ritenour on August 27, 2010. The site, located at Robinhood Ridge in Otay Mesa, contains a number of previously enhanced/restored pools of moderate to high quality vernal pool habitat. Three of these pools (19, 28, and 79) were selected to represent the variety of pool size and quality present at the site.

The final CRAM scores for the reference site pools was 58, 63, and 66, mean of 62 (Appendix A). For all 3 pools, the Buffer and Landscape Context attribute score was moderate (50-54) because of the site's location in an area containing little wetland habitat other than the on-site pools and the presence of development to the north and southeast. The Hydrology attribute score for all 3 pools was very high (100) which is a result of the pools undergoing regular annual cycles of filling and drying, unaffected by urban runoff or other artificial water sources. The Physical Structure attribute score was low (50) for all 3 pools because they have simple structural patch richness and topography; however, these pools contain features that are common to healthy vernal pool systems on Otay Mesa, where pools tend to be smaller, relatively simple, and uniform in structure. Although the assessed pools were of good quality and included vernal pool indicator species as well as some sensitive and/or endemic species, the overall number of co-dominant and endemic species was low, which resulted in low scores for these parameters, and negatively affected the overall Biotic Structure attribute score. Overall, these pools are healthy stable systems containing several sensitive native plant species that are endemic to vernal pool habitat. The scores attained at these pools are reasonable to expect from a restoration effort located at a site with similar buffer and landscape context features (which cannot be altered during the restoration process).

Typically, to fulfill the minimum requirement for no net loss of wetland functions and services, the net gain in CRAM scores at a mitigation site must be equal to or greater than the loss at the impact site. The mean CRAM score for the selected reference site is 62, 11 points higher than the mean CRAM score for pre-restoration mitigation site and 9 points higher than the CRAM score for the impact site (Table 12). Based on the reference site and pre-restoration mitigation site data, the maximum possible CRAM score for the mitigation site was estimated to be 66, a minimum score of 62 within each pool is required (based on the mean for the control pools) and a mean of 64 across all mitigation pools (Table 12). This assumes an increase in the quality of the buffer condition as a result of upland enhancement, improvement in hydrologic connectivity as a result of berm removal, an increase in the patch richness and topography of some of the pools as well as the number of native and endemic pool species, and a decrease in non-native species within the pools. Achieving a functional lift at the mitigation site of 14 points (from 50 to 64) would require that the mitigation ratio be 3.8:1 (mean of 53 at the impact site divided by 14-point increase at the mitigation site equals approximately 3.8). It should be noted that using the CRAM scores in this very simplified way and as the only factor in determining the mitigation ratio is not typical for the Corps. The Corps currently utilizes 6 factors to establish mitigation ratios including mitigation site location, type, type conversion, uncertainty, and temporal loss. Several of these factors may weigh heavily in determining the Corps mitigation ratio for a project affecting vernal pools because they are a difficult aquatic resource to replace. However, for the purposes of this project only, the Corps is deferring to the 5:1 ratio, as requested by the RWQCB.

Table 12
CRAM DATA SUMMARY

CRAM Attributes	METRICS	BASELINE SCORES[1]				TARGET SCORES	
		Impact Site	Pre-Restoration	Post-Restoration[2]	Reference Site	Year 3	Year 5
Buffer and Landscape Context	Landscape Connectivity	3	3		3	3	3
	Buffer Sub-metrics:						
	- Percent of Assessment Area with Buffer	12	12		12	12	12
	- Average Buffer Width	7	12		8	9	12
	- Buffer Condition	6	6		9	8	9
	Attribute Score (Raw/Final)	**10/43**	**11.5/48**		**13/53**	**12/50**	**13/54**
Hydrology	Water Source	12	12		12	12	12
	Hydroperiod	12	12		12	12	12
	Hydrologic Connectivity	12	8		12	10	12
	Attribute Score (Raw/Final)	**36/100**	**32/90**		**36/100**	**34/94**	**36/100**
Physical Structure	Structural Patch Richness	3	3		6	5	6
	Topographic Complexity	5	4		6	5	6
	Attribute Score (Raw/Final)	**8/34**	**7/28**		**12/50**	**10/42**	**12/50**
Biotic Structure	Plant Community Sub-metrics:						
	- Number of Co-dominant Species	5	4		5	5	6
	- Percent Invasion	8	6		9	8	12
	- Endemic Species Richness	3	3		4	5	6
	Horizontal Interspersion and Zonation	4	4		5	5	6
	Attribute Score (Raw/Final)	**9/37**	**9/36**		**11/46**	**11/46**	**14/58**
Overall AA Score		**53**	**51**		**62**	**58**	**66**

1 Mean scores calculated from CRAM scores conducted on 10 impact site pools, 5 mitigation site pools, and 3 reference site pools.
2 To be conducted immediately following restoration installation

8.3 FAIRY SHRIMP

Although all of the restored and enhanced vernal pools are intended to provide habitat for San Diego fairy shrimp, only 0.10 acre of the restored pools will be required to support San Diego fairy shrimp populations pursuant to the USFWS Biological Opinion.

Fairy shrimp sampling would be conducted each season, and the number of shrimp present in each pool would be estimated. The number of gravid females also would be estimated. Fairy shrimp data also would be collected in the control pools to help gauge the success of the restoration effort. In order for the fairy shrimp portion of the project to be considered successful, the shrimp should recur in each year that there is enough rainfall to produce ponding, and shrimp should also be present in the control pools. If both the restored and control pool shrimp populations decline in any given year, then it would be assumed that there are other outside, seasonal effects driving the change, as opposed to specific factors at the restoration site. Otherwise, the restored pool population numbers should either be stable or show an increasing trend over the 5-year monitoring period to be considered successful. If the restored pools exhibit appropriate hydrology but do not have sufficient presence of fairy shrimp, additional inoculum would be added.

8.4 TARGET HYDROLOGICAL REGIME

As previously stated, vernal pools restored under this mitigation program are primarily designed to emulate the conditions found in existing vernal pools on Otay Mesa. The restored pools would be excavated and situated to capture rainfall and runoff from the open space preserve. Restoration of the natural topography and the removal of weeds would restore the normal hydrological functions within the restored vernal pool complex.

During the 5-year monitoring period, water depth in the control pools and the restored vernal pools on site would be measured. Measurements would be taken every 2 weeks during each rainy season throughout the monitoring period. The depth and extent of ponding (surface area) would be recorded during each site visit in each restored vernal pool. This data would be used to create graphs showing extent, depth and duration of ponding. At the end of the 5-year monitoring period, the monitored pools would demonstrate hydrologic patterns similar to those of the control pools. The monitoring period will be extended if a drought period prevents the pools from demonstrating the desired hydrologic patterns. The pools must pond for sufficient time (estimated to be 30 days) to support San Diego fairy shrimp during 2 winters in a 5-year monitoring period or 3 winters in a 10-year monitoring period. This allows the resource agencies to be confident that the pools physical and chemical structure support a viable population of fairy shrimp versus the possibility of cysts inoculated emerging a single time.

8.5 UPLAND RESTORATION IN VERNAL POOL RESTORATION AREA

During annual monitoring, species richness in the uplands in the vernal pool restoration area would be determined only by visual assessment in Years 1 and 2 and by visual assessment and transect data in Years 3, 4, and 5. No specific richness criteria are established for Years 1 or 2, but annual success criteria for species richness in Years 3, 4, and 5 are provided in Table 13. Species richness will be compared to a reference transect within the Otay Mesa West preserve. If the species richness goal for a given year is not met, corrective measures (including reseeding and planting) would be implemented to ensure achievement of long-term restoration goals.

Table 13
DIEGAN COASTAL SAGE SCRUB RESTORATION
SPECIES RICHNESS SUCCESS CRITERIA

YEAR*	SPECIES RICHNESS**
3	30
4	50
5	75

*No success criteria for Years 1 and 2
** Percent of richness relative to control transects. Greater than or equal to amount shown.

In addition to species richness, project success would be determined based on native and non-native (weed) plant cover. Table 14 presents vegetative cover success criteria for Years 3, 4, and 5 in the Diegan coastal sage scrub restoration area. No specific richness criteria are established for Years 1 or 2 in the upland enhancement area. However, container plantings would achieve at least 80 percent survival at the end of each year, unless their functions are replaced by plants from seed. Several species of weeds are particularly problematic in the vicinity of the restoration site. Control of these target, invasive, site specific, weed species (Table 15) shall be conducted such that at the end of the 5-year monitoring period, the total cover of these weed species within the uplands of the vernal pool restoration area is less than one percent and total cover of all weed species does not exceed 5 percent (Table 14). If annual goals for vegetative cover are not met, remedial measures, including reseeding, planting, and weeding, may be implemented to ensure final success.

Table 14 DIEGAN COASTAL SAGE SCRUB RESTORATION VEGETATIVE COVER SUCCESS CRITERIA			
YEAR*	**NATIVE COVER****	**NON-NATIVE COVER†**	**TARGET WEEDS†**
3	≥40	<5	<1
4	≥50	<5	<1
5	≥70	<5	<1

*No success criteria for Years 1 and 2
** percent relative to reference transect
† total cover – not relative to reference

Table 15 TARGET UPLAND WEED SPECIES	
SCIENTIFIC NAME	**COMMON NAME**
Atriplex semibaccata	Australian saltbush
Brassica nigra	black mustard
Centaurea melitensis	tocalote
Chrysanthemum coronarium	garland daisy
Foeniculum vulgare	fennel
Hirschfeldia incana	shortpod mustard
Lolium multiflorum	Italian ryegrass
Mesembryanthemum crystallinum	crystalline iceplant

8.6 SUCCESS CRITERIA SUMMARY

A summary of the project's success criteria is presented below in Table 16.

Table 16 SUCCESS CRITERIA SUMMARY		
VERNAL POOL SPECIES RICHNESS SUCCESS CRITERIA		
Year	**Number of Indicator Species Relative to Control Pools (percent)**	**Minimum Number of Indicator Species Present in each pool**
1	35	1
2	50	1
3	65	2
4	80	3
5	100	3

Table 16 (cont.)
SUCCESS CRITERIA SUMMARY

VERNAL POOL PLANT NATIVE COVER SUCCESS CRITERIA	
Year	**Cover of Indicator Species Relative to Control Pools (percent)**
1	25
2	35
3	50
4	70
5	90
COVER LIMITS FOR NON-NATIVE SPECIES IN VERNAL POOLS	
Cal-IPC Moderate or High species	<1%
Other non-native species	<5%
Absolute cover for all non-native species (Cal-IPC and others combined)	<5%

DIEGAN COASTAL SAGE SCRUB RESTORATION SPECIES RICHNESS SUCCESS CRITERIA	
Year	**Species Richness***
1	≥10%
2	≥20%
3	≥30%
4	≥50%
5	≥75%

DIEGAN COASTAL SAGE SCRUB RESTORATION VEGETATIVE COVER SUCCESS CRITERIA			
Year*	**Native Cover***	**Non-native Cover†**	**Target Weeds†**
1	uniform seed germination	<5	<1
2	≥15%	<5	<1
3	≥40%	<5	<1
4	≥50%	<5	<1
5	≥70%	<5	<1

* percent relative to reference transect
† total cover – not relative to reference

Table 16 VERNAL POOL SUCCESS CRITERIA					
Year	**Number of Indicator Species Relative to Control Pools (Species richness; percent)**	**Minimum # of Indicator Species Present in each pool (Species Richness)**	**Cover of Indicator Species Relative to Control Pools (percent)**	**Cover limits for Non-native species in vernal pools**	**CRAM scores** Minimum score for each pool/Average across pools
1	35	1	25	--	--
2	50	1	35	--	--
3	65	2	50	<10% total	56/58
4	80	3	70	<5% Cal-IPC, <10% total	--
5	100	3	90	<1% Cal-IPC, <5% total	62/64

Table 2 DIEGAN COASTAL SAGE SCRUB RESTORATION SUCCESS CRITERIA				
YEAR*	**SPECIES RICHNESS****	**NATIVE COVER****	**NON-NATIVE COVER†**	**TARGET WEEDS†**
3	≥ 30	≥40	<5	<1
4	≥50	≥50	<5	<1
5	≥75	≥70	<5	<1

*No success criteria for Years 1 and 2
** Percent of richness relative to control transects.
Greater than or equal to amount shown.
† total cover - not relative to reference

9.0 MONITORING PLAN

9.1 MONITORING METHODS

Monitoring would be carried out by the restoration specialist to assess the progress of the restoration effort and determine any appropriate remedial measures. Monitoring by the restoration specialist allows for the identification of action items and the implementation of adaptive strategies to achieve high functioning habitat and reach final performance standards. Quantitative success criteria presented above (Section 7) would be used to measure mitigation success. Final and yearly success criteria are included to measure interim and ultimate habitat development.

9.1.1 Vernal Pools

Maintenance Monitoring

Monthly inspections of the restoration and maintenance efforts would be performed during Year 1, every other month during Year 2, and every 3 months during the remainder of the monitoring period. As conditions warrant, additional site visits may be required during the initial installation/establishment period. In addition, monitoring visits would be conducted every other week during the rainy season of each year to monitor pool hydrology and conduct wet season fairy shrimp surveys. During each of these visits, depth, extent, and duration of inundation of all pools (mitigation and control) would be measured. Depth measurements would be taken following the onset of winter rains and would continue until May 15 or until all pools are dry. Plant and animal species observed in each pool during the monitoring visits would be recorded.

The purpose of the fairy shrimp surveys is to determine presence/absence of San Diego fairy shrimp in the restored pools, in particular the estimated population size of hatched fairy shrimp, and estimates on the number of gravid female. Survey methodology will be consistent with the most current USFWS protocol for fairy shrimp. The presence of other faunal species occupying the pools also would be noted during the surveys. The results of the fairy shrimp surveys would be included in the annual monitoring reports.

Annual Monitoring

An annual monitoring visit would be conducted each year near the end of the rainy season when most vernal pool species are visible. The exact timing of annual monitoring would be dependent upon the time and amount of rainfall received each year. Monitoring would use standard techniques and be based on transect/quadrat sampling. Permanent transects would be established from pool edge to pool edge through the deepest portion of each pool. Each transect would be marked with rebar stakes at both ends and labeled with caps indicating the pool number. Decimeter quadrats would be measured at regular intervals along each transect. Each plant species present within each quadrat would be recorded, with the cover of each species estimated. Furthermore, the total vernal pool, native, and non-native covers for each quadrat would be estimated. A species list would be recorded for each pool, consisting of all species observed in the annual sampling transect and any other species observed in each pool during annual monitoring events. This species list will be used to determine pool species richness.

Photo documentation points shall be established for the preserve area, and photographs would be taken of each pool during the annual monitoring event. Representative photos would be provided in the annual monitoring report.

9.1.2 Upland Habitat

The status of the upland enhancement would be noted during each monitoring visit throughout the year. Overall health and vigor of the upland habitat would be qualitatively recorded. Species cover, richness, and weed cover would be visually estimated.

During annual monitoring, species richness in would be determined by visual assessment only in Years 1 and 2 and by visual assessment and quantitative transect data in Years 3, 4, and 5.

Quantitative measurements of plant growth would be taken along transects using the point intercept line transect sampling methods described in the California Native Plant Society's Field Sampling Protocol (Sawyer and Keeler-Wolf 1995). Two 25-meter (m) long by 5-m wide sampling transects would be established in Year 3. Each transect end would be physically marked, and have its' location recorded with a Global Positioning System (GPS) unit. With this transect sampling method, a point would be projected into the vegetation at 50-centimeter (cm) intervals along each transect and each species intercepted by the point would be recorded. For this site, plants would be divided into three height categories: herb layer (between 0 and 60 cm), shrub layer (between 61 cm and 3 m), and tree layer (greater than 3 m).

To calculate total vegetation percent cover, the number of points that intercept live plant material is summed and divided by the total number of intercepts possible along that transect. Multiple hits of plants at a single point resulting from overlap of 2 or more species were counted as a single hit for this calculation. To calculate the percent cover contributed by each species, the number of intercepts by each species is divided by the number of possible intercepts for the transect (i.e., 100).

All plant species observed within the 25 m by 5 m belt transect (excluding those within vernal pools) would be recorded, and used to calculate the species richness. All plants observed would be categorized by origin (native/non-native) and stratum (herb, shrub).

Photographs would be taken each year from the same locations to monitor change over time, and would be included in each annual report. Photo points would be physically marked, and have their locations recorded with a GPS unit.

9.2 ANNUAL REPORTS/INVITATION

As part of the monitoring program, annual reports prepared by the restoration specialist would be submitted to the regulatory agencies and the City Parks and Recreation Department evaluating the success of the vernal pool mitigation effort to date, along with any recommendations for future work that may be deemed necessary. Annual monitoring reports would provide comparisons of the annual monitoring data to the control site for that year. To detect the overall trend of the site, the annual monitoring report would contain comparisons of the monitoring data for the years that data are collected. As part of the annual reporting, the CRAM data and vernal pool boundaries will be uploaded to the cramwetlands.org website and the data provided in the annual monitoring report. This data can then be used to further the calibration of CRAM for vernal pools such that if the method is updated during the monitoring period, the data can be cross-walked easily by the project restoration specialist and by the CRAM managers.

9.3 ADAPTIVE MANAGEMENT

If annual goals are not being met, or the restoration specialist observes that some aspect of the restoration program requires attention, adaptive measures would be implemented. Adaptive measures for vernal pool restoration projects may include but are not limited to: importing new soil inoculum from an off-site source, recontouring of non-functioning pools, increasing weed maintenance frequency or intensity, and re-seeding with commercially available or collected seeds from the immediate area.

If maintenance monitoring indicates that the restoration program is not progressing towards meeting its performance standards as anticipated, the restoration specialist must notify the regulatory agencies as soon as possible, suggest site specific recommendations, and work with the regulatory agencies to address deficiencies. The goal of adaptive management is to ultimately provide vernal pool habitat functions consistent with those described in this restoration plan.

9.4 SCHEDULE

As described above, monthly inspections of the restoration and maintenance effort would be performed during Year 1, every other month during Year 2, and every 3 months for the remainder of the monitoring period. Monitoring events that focus on botanical data collection (i.e., percent cover, density, phenology, etc.) would occur annually for 5 years. Reports would be prepared and submitted to the City Parks and Recreation Department, USFWS, Corps, and RWQCB by October 1 of each year to ensure that adequate time remains in the dry season to make any necessary alterations to the preserve areas.

10.0 COMPLETION OF MITIGATION

10.1 NOTIFICATION OF COMPLETION

The permittee shall notify the USFWS, Corps, RWQCB, and City of completion of the mitigation effort through submittal of a final (Year 5) monitoring report. The final monitoring report would include an as-built map of the mitigation area. The report must show that the goals of the mitigation program (as described in Section 3) have been met. The Permittee will set up a site visit with all the resource agencies and only once the permittee receives a written confirmation from the resource agencies that the site has met its success criteria will maintenance and monitoring cease.

10.2 AGENCY CONFIRMATION

After receipt of the final monitoring report, the regulatory agencies will inspect the mitigation site to determine the success of the restoration effort. After evaluating the final report, the agencies shall determine if the restoration effort is acceptable. Once the restoration is considered successful by the regulatory agencies, a letter of final acceptance will be submitted by the agencies to the City Parks and Recreation Department.

10.3 LONG-TERM MANAGEMENT

The City of San Diego Park and Recreation Department will maintain ownership of the restoration area and the San Ysidro School District will establish a non-wasting endowment to fund the long-term management of this site. Once the restoration project has been successfully completed, the City will accept responsibility for long-term management upon receipt of a letter from the resource agencies stating that they accept the restoration effort as complete.

The Permittee shall prepare and submit at least 90 days prior to impacts to waters of the U.S. a draft detailed long-term management, maintenance and monitoring plan for the vernal pool mitigation site on the West Otay Mesa B parcel. The Permittee will submit the final Plan to the Corps and transfer the funds for the non-wasting endowment to the City, within 60 days of receiving approval of the draft plan. The Long-term Management Plan shall be placed as an appendix to this Plan. The Long-term Management Plan should include, but not limited to long-term management needs, monitoring schedule, measures to prevent human and alien species encroachment, annual cost estimates, Funding mechanism (endowment amount established by a PAR analysis), and contingency measures should problems occur.

11.0 CONTINGENCY MEASURES

11.1 INITIATING PROCEDURES

If the regulatory agencies determine upon receipt of any of the annual monitoring reports that the restoration effort is not meeting success standards for the project, they shall notify the project proponent in writing (letter or via email) that the restoration effort may require augmentation for successful implementation. The project proponent shall then have 30 days to respond to the notification. During this period, the project proponent may discuss alternatives to the suggestions of the regulatory agencies.

11.2 FUNDING MECHANISM

The permittee (Section 4.3) shall be responsible for all costs associated with any remedial measures.

11.3 RESPONSIBLE PARTIES

The permittee shall be the responsible party for any remedial measures.

12.0 LIST OF PREPARERS

The following individuals contributed to the preparation of this report.

Greg Mason	B.S., Natural Resources Planning & Interpretation, Humboldt State University, 1992
Dale Ritenour	B.S., Biology (emphasis in Ecology), San Diego State University, 1998
Sally Trnka	M.S., Biology, San Diego State University, 1997

13.0 REFERENCES

Bauder, E. 1986. San Diego Vernal Pools: Recent and projected losses; their condition; and threats to their existence 1979-1990. Vols. 1 & 2. Prepared for the Endangered Plant Project, CDFG.

Bauder, Ellen T. and McMillan, Scott. 1998. Current Distribution and Historical Extent of Vernal Pools in Southern California and Northern Baja California, Mexico. Ecology, Conservation and Management of Vernal Pool Ecosystems-Proceedings from a 1996 Conference. California Native Plant Society (CNPS), Sacramento, CA.

Bowman, R. 1973. Soil Survey of the San Diego Area. U.S. Department of Agriculture in cooperation with the USDI, UC Agricultural Experiment Station, Bureau of Indian Affairs, Department of the Navy, and the U.S. Marine Corps.

California Invasive Plant Council (Cal-IPC). 2006. California Invasive Plant Inventory. February.

California Native Plant Society (CNPS). 2010. Inventory of Rare and Endangered Plants. http://cnps.site.aplus.net/cgi-bin/inv/inventory.cgi

Collins, J.N., E.D. Stein, M. Sutula, R. Clark, A.E. Fetscher, L. Grenier, C. Grosso, and A. Wiskind. 2008. California Rapid Assessment Method (CRAM) for Wetlands. Version 5.0.2. 151 pp.

Hanes, T. and H. Stromberg. 1998. Hydrology of Vernal Pools on Non-Volcanic Soils in the Sacramento Valley. Ecology, Conservation and Management of Vernal Pool Ecosystems – Proceedings from a 1996 Conference. CNPS, Sacramento, CA.

HELIX Environmental Planning, Inc. (HELIX). 2004. Sweetwater Union High School District Vernal Pool Preserve Year 4 Annual Monitoring Report, December 29.

RECON. 1997. Dennery Canyon Vernal Pool, Coastal Sage Scrub, and Mule Fat Scrub Restoration and Preservation Plan.

Sarver, Matthew J., ed. 2007. Farm Management for Native Bees: a Guide for Delaware. Dover, DE: USDA NRCS and Delaware Department of Agriculture.

Scheidlinger, C., C. Patterson, and P. Zedler. 1985. Recovery of Vernal Pools and their Associated Plant Communities Following Disturbance: Miramar, San Diego County, CA.

Soil Ecology Restoration Group (SERG). Restoration Bulletin #6. Irrigation for Remote Sites. URL: http://www.sci.sdsu.edu/SERG/techniques/Irrigation.pdf.

The Planning Center. 2009 Final Subsequent Environmental Impact Report for Vista Del Mar. July.

U.S. Army Corps of Engineers (Corps). 1997. Vernal Pool Plant Indicator Species List. November.

Zedler, Paul. 1990. Life Histories of Vernal Pool Vascular Plants. Vernal Pool Plants: Their Habitat and Biology. CSU Chico. June.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix A

CRAM ASSESSMENT DATA

Appendix A
CRAM DATA SUMMARY

CRAM Attributes	METRICS	BASELINE SCORES[1]				TARGET SCORES	
		Impact Site	Pre-Restoration	Post-Restoration[2]	Reference Site	Year 3	Year 5
Buffer and Landscape Context	Landscape Connectivity	3	3		3	3	3
	Buffer Sub-metrics:						
	- Percent of Assessment Area with Buffer	12	12		12	12	12
	- Average Buffer Width	7	12		8	9	12
	- Buffer Condition	6	6		9	8	9
	Attribute Score (Raw/Final)	**10/43**	**11.5/48**		**13/53**	**12/50**	**13/54**
Hydrology	Water Source	12	12		12	12	12
	Hydroperiod	12	12		12	12	12
	Hydrologic Connectivity	12	8		12	10	12
	Attribute Score (Raw/Final)	**36/100**	**32/90**		**36/100**	**34/94**	**36/100**
Physical Structure	Structural Patch Richness	3	3		6	5	6
	Topographic Complexity	5	4		6	5	6
	Attribute Score (Raw/Final)	**8/34**	**7/28**		**12/50**	**10/42**	**12/50**
Biotic Structure	Plant Community Sub-metrics:						
	- Number of Co-dominant Species	5	4		5	5	6
	- Percent Invasion	8	6		9	8	12
	- Endemic Species Richness	3	3		4	5	6
	Horizontal Interspersion and Zonation	4	4		5	5	6
	Attribute Score (Raw/Final)	**9/37**	**9/36**		**11/46**	**11/46**	**14/58**
Overall AA Score		**53**	**51**		**62**	**58**	**66**

1 Mean scores calculated from CRAM scores conducted on 10 impact site pools, 5 mitigation site pools, and 3 reference site pools.

2 To be conducted immediately following restoration installation

Scoring Sheet: Individual Vernal Pools

AA Name: San Ysedro Pool A					(m/d/y) 8/24/2010
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**
Buffer and Landscape Context					
(A) Landscape Connectivity			D	3	only small drainages and other vp's on site
	Alpha.	Numeric			
(B): Percent of AA with Buffer	A	12			large buffer to N & W
(C): Average Buffer Width	C	6			buffer around entire pool
(D): Buffer Condition	C	6			dirt roads, trails; high non-native veg, esp. grasses
Initial Attribute Score = A + [D x (B x C)$^{1/2}$]				10	Final Attribute Score = (Initial Score/24) x 100: 42
Hydrology					
Water Source			A	12	rainfall
Hydroperiod			A	12	natural hydroperiod
Hydrologic Connectivity			A	12	unrestricted
Initial Attribute Score			36		Final Attribute Score = (Initial Score/36) x 100: 100
Physical Structure					
Structural Patch Richness			D	3	very low structural richness
Topographic Complexity			C	6	single slope; little microtopography
Initial Attribute Score			9		Final Attribute Score = (Initial Score/24) x 100: 37.5
Biotic Structure					
Plant Community submetric A: Number of Co-dominant species	Alpha. D	Numeric 3			2 co-dominants
Plant Community submetric B: Percent Invasion	C	6			1 non-native
Plant Community submetric C: Endemic Species Richness	D	3			High cover of Psi brev; 1 endemic, common to vp's
Plant Community Metric (*average of submetrics A-C*)				4	
Horizontal Interspersion and Zonation			D	3	1 plant zone
Initial Attribute Score				7	Final Attribute Score = (Initial Score/24) x 100: 29
Overall AA Score (Average of Final Attribute Scores)					52

Photo 7

Scoring Sheet: Individual Vernal Pools

AA Name: San Ysidro Pool B					(m/d/y) 8/24/2010
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**
Buffer and Landscape Context					
(A) Landscape Connectivity			D	3	only small drainages and other vp's on site
	Alpha.	Numeric			
(B): *Percent of AA with Buffer*	A	12			large buffer to NAW
(C): *Average Buffer Width*	C	6			buffer around entire pool
(D): *Buffer Condition*	C	6			dirt roads, trails, high non-native veg., esp. grasses
Initial Attribute Score = A + [D x (B x C)$^{1/2}$]$^{1/2}$				10	Final Attribute Score = (Initial Score/24) x 100: 42
Hydrology					
Water Source			A	12	rainfall
Hydroperiod			A	12	natural hydroperiod
Hydrologic Connectivity			A	12	unrestricted
Initial Attribute Score			36		Final Attribute Score = (Initial Score/36) x 100: 100
Physical Structure					
Structural Patch Richness			D	3	very low structural richness
Topographic Complexity			C	6	8 tire ruts
Initial Attribute Score			9		Final Attribute Score = (Initial Score/24) x 100: 37.5
Biotic Structure					
Plant Community submetric A: Number of Co-dominant species	Alpha. C	Numeric 6			3 co-dominants, 2 upland species
Plant Community submetric B: Percent Invasion	B	9			1 non-native species, upland grass
Plant Community submetric C: Endemic Species Richness	D	3			1 endemic, common to vp's
Plant Community Metric (*average of submetrics A-C*)				6	
Horizontal Interspersion and Zonation			C	6	2 plant zones
Initial Attribute Score			12		Final Attribute Score = (Initial Score/24) x 100: 50
Overall AA Score (Average of Final Attribute Scores)					57

Photo 8

Scoring Sheet: Individual Vernal Pools

AA Name: San Ysedro Pool C				(m/d/y) 8/24/10
Attributes and Metrics	**Alpha.**	**Numeric**		**Comments**
Buffer and Landscape Context				
(A) Landscape Connectivity	D	3		only drainages and other vp's on site
(B): Percent of AA with Buffer	A	12		large buffer to N & W
(C): Average Buffer Width	C	6		buffer around entire pool
(D): Buffer Condition	C	6		dirt roads, trails; high non-native veg., esp. grasses
Initial Attribute Score = A + [D x (B x C)$^{1/2}$]$^{1/2}$		10		Final Attribute Score = (Initial Score/24) x 100: 42
Hydrology				
Water Source	A	12		rainfall
Hydroperiod	A	12		natural hydroperiod
Hydrologic Connectivity	A	12		unrestricted
Initial Attribute Score		36		Final Attribute Score = (Initial Score/36) x 100: 100
Physical Structure				
Structural Patch Richness	D	3		very low structural richness
Topographic Complexity	C	6		single slope, little microtopography
Initial Attribute Score		9		Final Attribute Score = (Initial Score/24) x 100: 37.5
Biotic Structure				
Plant Community submetric A: Number of Co-dominant species	C	6		3 co-dominants; 2 upland, 1 vp
Plant Community submetric B: Percent Invasion	B	9		1 non-native - grass
Plant Community submetric C: Endemic Species Richness	D	3		1 endemic, common to vp's
Plant Community Metric (*average of submetrics A-C*)		6		
Horizontal Interspersion and Zonation	C	6		2 plant zones
Initial Attribute Score		12		Final Attribute Score = (Initial Score/24) x 100: 50
Overall AA Score (Average of Final Attribute Scores)				57

Photo 9

Scoring Sheet: Individual Vernal Pools

AA Name: San Ysidro Pool D				(m/d/y) 8/24/10
Attributes and Metrics		**Alpha.**	**Numeric**	**Comments**
Buffer and Landscape Context				
(A) Landscape Connectivity		D	3	only small drainages and other vp's on site
(B): Percent of AA with Buffer	A		12	large buffer to N & W
(C): Average Buffer Width	C		6	buffer around entire pool
(D): Buffer Condition	C		6	dirt roads, trails; high non-native veg., esp. grasses
Initial Attribute Score = A + [D x (B x C)$^{1/2}$]$^{1/2}$			10	Final Attribute Score = (Initial Score/24) x 100: 42
Hydrology				
Water Source		A	12	rainfall
Hydroperiod		A	12	natural hydroperiod
Hydrologic Connectivity		A	12	unrestricted
Initial Attribute Score		36		Final Attribute Score = (Initial Score/36) x 100: 100
Physical Structure				
Structural Patch Richness		D	3	very low structural richness
Topographic Complexity		C	6	single slope, little microtopography
Initial Attribute Score		9		Final Attribute Score = (Initial Score/24) x 100: 37.5
Biotic Structure				
Plant Community submetric A: Number of Co-dominant species	C		6	3 co-dominants; 2 upland, 1 vp
Plant Community submetric B: Percent Invasion	B		9	1 non-native sp. - grass
Plant Community submetric C: Endemic Species Richness	D		3	1 endemic
Plant Community Metric (*average of submetrics A-C*)			6	
Horizontal Interspersion and Zonation		D	3	1 plant zone
Initial Attribute Score		9		Final Attribute Score = (Initial Score/24) x 100: 37.5
Overall AA Score (Average of Final Attribute Scores)				54

Photo 10

Scoring Sheet: Individual Vernal Pools

AA Name: San Ysidro Pool E				(m/d/y) 8/24/2010
Attributes and Metrics		**Alpha.**	**Numeric**	**Comments**
Buffer and Landscape Context				
(A) Landscape Connectivity		D	3	only small drainages and other vp's onsite
	Alpha.	Numeric		
(B): Percent of AA with Buffer	A	12		large buffer to N & W
(C): Average Buffer Width	B	9		buffer around entire pool
(D): Buffer Condition	C	6		dirt roads, trails high non-native veg., esp. grasses
Initial Attribute Score = A + [D x (B x C)$^{1/2}$]$^{1/2}$			11	Final Attribute Score = (Initial Score/24) x 100: 46
Hydrology				
Water Source		A	12	rainfall
Hydroperiod		A	12	natural hydroperiod
Hydrologic Connectivity		A	12	unrestricted
Initial Attribute Score		36		Final Attribute Score = (Initial Score/36) x 100: 100
Physical Structure				
Structural Patch Richness		D	3	very low structural richness
Topographic Complexity		D	3	steep-sided slope
Initial Attribute Score		6		Final Attribute Score = (Initial Score/24) x 100: 25
Biotic Structure				
	Alpha.	Numeric		
Plant Community submetric A: Number of Co-dominant species	C	6		3 co-dominant species, mix of upland & vp
Plant Community submetric B: Percent Invasion	B	9		only 1 non-native sp.
Plant Community submetric C: Endemic Species Richness	D	3		2 endemics, both common to vp's
Plant Community Metric (*average of submetrics A-C*)			6	
Horizontal Interspersion and Zonation		D	3	1 plant zone
Initial Attribute Score		9		Final Attribute Score = (Initial Score/24) x 100: 37.5
Overall AA Score (Average of Final Attribute Scores)				52

photo 4

Pool in road

Scoring Sheet: Individual Vernal Pools

AA Name: San Ysidro Pool F					(m/d/y) 8/24/2010
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**
Buffer and Landscape Context					
(A) Landscape Connectivity			D	3	only small drainages and other vp's on site
	Alpha.	Numeric			
(B): Percent of AA with Buffer	A	12			large buffer to N & W
(C): Average Buffer Width	C	6			buffer around entire pool
(D): Buffer Condition	C	6			dirt roads, trails; high non-native veg., esp. grasses
Initial Attribute Score = A + [D x (B x C)$^{1/2}$]				10	Final Attribute Score = (Initial Score/24) x 100: 42
Hydrology					
Water Source			A	12	rainfall
Hydroperiod			A	12	natural hydroperiod
Hydrologic Connectivity			A	12	unrestricted
Initial Attribute Score			36		Final Attribute Score = (Initial Score/36) x 100: 100
Physical Structure					
Structural Patch Richness			D	3	very low structural richness
Topographic Complexity			C	6	single slope, little microtopography
Initial Attribute Score			9		Final Attribute Score = (Initial Score/24) x 100: 37.5
Biotic Structure					
	Alpha.	Numeric			
Plant Community submetric A: Number of Co-dominant species	D	3			< 5% veg. Mostly unvegetated
Plant Community submetric B: Percent Invasion	A	12			0 non-native co-dominants
Plant Community submetric C: Endemic Species Richness	D	3			1 endemic, common species
Plant Community Metric (*average of submetrics A-C*)				6	
Horizontal Interspersion and Zonation			D	3	1 plant zone
Initial Attribute Score			9		Final Attribute Score = (Initial Score/24) x 100: 37.5
Overall AA Score (Average of Final Attribute Scores)					54

photo 5

Scoring Sheet: Individual Vernal Pools

AA Name: San Ysidro Pool G				(m/d/y) 08/24/2010
Attributes and Metrics		**Alpha.**	**Numeric**	**Comments**
Buffer and Landscape Context				
(A) Landscape Connectivity		D	3	only small drainages and other vps on site
(B): Percent of AA with Buffer	A		12	large buffer to N&W
(C): Average Buffer Width	C		6	buffer around entire pool
(D): Buffer Condition	C		6	dirt roads, trails; high non-native veg., especially grasses
Initial Attribute Score = A + [D x (B x C)$^{1/2}$]$^{1/2}$			10	Final Attribute Score = (Initial Score/24) x 100: 42
Hydrology				
Water Source		A	12	rainfall
Hydroperiod		A	12	natural hydroperiod
Hydrologic Connectivity		A	12	unrestricted
Initial Attribute Score		36		Final Attribute Score = (Initial Score/36) x 100: 100
Physical Structure				
Structural Patch Richness		D	3	very low structural richness
Topographic Complexity		D	3	single slope, little microtopography
Initial Attribute Score		6		Final Attribute Score = (Initial Score/24) x 100: 25
Biotic Structure				
Plant Community submetric A: Number of Co-dominant species	B		9	5 co-dominant species, mix of upland/vp
Plant Community submetric B: Percent Invasion	B		9	only 1 non-native sp.
Plant Community submetric C: Endemic Species Richness	D		3	2 endemics, both common
Plant Community Metric (*average of submetrics A-C*)			7	
Horizontal Interspersion and Zonation		D	3	1 plant zone
Initial Attribute Score		10		Final Attribute Score = (Initial Score/24) x 100: 42
Overall AA Score (Average of Final Attribute Scores)				52

photo 3

Scoring Sheet: Individual Vernal Pools

AA Name: San Ysidro - Pool H				(m/d/y) 03/24/2010
Attributes and Metrics		Alpha.	Numeric	**Comments**
Buffer and Landscape Context				
(A) Landscape Connectivity		D	3	only small drainages and other vp's on site
(B): Percent of AA with Buffer	Alpha. A / Numeric 12			large buffer to N & W
(C): Average Buffer Width	B / 9			buffer around entire pool
(D): Buffer Condition	C / 6			dirt roads, trails; high non-native veg, esp. grasses
Initial Attribute Score = A + [D x (B x C)$^{1/2}$]^{2}			11	Final Attribute Score = (Initial Score/24) x 100 = 46
Hydrology				
Water Source		A	12	rainfall - 31
Hydroperiod		A	12	natural hydroperiod
Hydrologic Connectivity		A	12	unrestricted
Initial Attribute Score		36		Final Attribute Score = (Initial Score/36) x 100 = 100
Physical Structure				
Structural Patch Richness		D	3	very low structural richness
Topographic Complexity		D	3	Single slope, little microtopography
Initial Attribute Score		6		Final Attribute Score = (Initial Score/24) x 100 = 25
Biotic Structure				
Plant Community submetric A: Number of Co-dominant species	Alpha. D / Numeric 3			2 upland co-dominants
Plant Community submetric B: Percent Invasion	D / 3			both non-native grasses
Plant Community submetric C: Endemic Species Richness	D / 3			0 endemics
Plant Community Metric (*average of submetrics A-C*)			3	
Horizontal Interspersion and Zonation		D	3	1 plant zone
Initial Attribute Score		6		Final Attribute Score = (Initial Score/24) x 100 = 25
Overall AA Score (Average of Final Attribute Scores)				49

photo 2

no wetland / VP vegetation

Scoring Sheet: Individual Vernal Pools

AA Name: San Ysidro - Pool J					(m/d/y) 08/24/10
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**
Buffer and Landscape Context					
(A) Landscape Connectivity			D	3	only small drainages and other up's on S.K
	Alpha.	Numeric			
(B): Percent of AA with Buffer	A	12			large buffer to N & W
(C): Average Buffer Width	B	9			buffer around entire pool
(D): Buffer Condition	C	6			dirt roads, trails; high non-native veg., esp grasses
Initial Attribute Score = A + [D x (B x C)$^{1/2}$]$^{1/2}$				11	Final Attribute Score = (Initial Score/24) x 100 = 46
Hydrology					
Water Source			A	12	rainfall
Hydroperiod			A	12	natural hydroperiod
Hydrologic Connectivity			A	12	unrestricted
Initial Attribute Score			36		Final Attribute Score = (Initial Score/36) x 100 = 100
Physical Structure					
Structural Patch Richness			D	3	very low structural richness
Topographic Complexity			C	6	Single slope, little microtopography
Initial Attribute Score			9		Final Attribute Score = (Initial Score/24) x 100 = 37.5
Biotic Structure					
Plant Community submetric A: Number of Co-dominant species	Alpha. C	Numeric 6			3 co-dominant species
Plant Community submetric B: Percent Invasion	D	3			2 are upland species
Plant Community submetric C: Endemic Species Richness	D	3			1 endemic - common
Plant Community Metric (*average of submetrics A-C*)				4	
Horizontal Interspersion and Zonation			D	3	1 plant zone
Initial Attribute Score			7		Final Attribute Score = (Initial Score/24) x 100 = 29
Overall AA Score (Average of Final Attribute Scores)					53

photo 1

Scoring Sheet: Individual Vernal Pools

pool in road on slope

AA Name: San Ysidro Pool L				(m/d/y) 8/24/2016
Attributes and Metrics		**Alpha.**	**Numeric**	**Comments**
Buffer and Landscape Context				
(A) Landscape Connectivity		D	3	only small drainages & other vp's on site
(B): Percent of AA with Buffer	Alpha. A / Numeric 12			large buffer to N & W
(C): Average Buffer Width	C / 6			buffer around entire pool
(D): Buffer Condition	C / 6			dirt roads, trails; high non-native veg., esp grasses
Initial Attribute Score = A + [D x (B x C)^1/2]			10	Final Attribute Score = (Initial Score/24) x 100: 42
Hydrology				
Water Source		A	12	rainfall
Hydroperiod		A	12	natural hydroperiod
Hydrologic Connectivity		A	12	unrestricted
Initial Attribute Score		36		Final Attribute Score = (Initial Score/36) x 100: 100
Physical Structure				
Structural Patch Richness		D	3	formed behind small dirt rise in road
Topographic Complexity		C	6	single slope
Initial Attribute Score		9		Final Attribute Score = (Initial Score/24) x 100: 37.5
Biotic Structure				
Plant Community submetric A: Number of Co-dominant species	Alpha. D / Numeric 3			only 2, upland co-dominants
Plant Community submetric B: Percent Invasion	C / 6			1 native
Plant Community submetric C: Endemic Species Richness	D / 3			no endemics
Plant Community Metric (*average of submetrics A-C*)			4	
Horizontal Interspersion and Zonation		D	3	1 plant zone
Initial Attribute Score		7		Final Attribute Score = (Initial Score/24) x 100: 29
Overall AA Score (Average of Final Attribute Scores)				52

Photo 6

Impact Pool A

Impact Pool B

Impact Pool C

Impact Pool D

Impact Site Vernal Pool Photos

VERNAL POOL RESTORATION PLAN FOR VISTA DEL MAR ELEMENTARY SCHOOL

HELIX

Impact Pool E

Impact Pool F

Impact Pool G

Impact Pool H

I:\ArcGIS\S\SFP-01 School8\Map\BIO\VernalPoolRestoration\Photos_ImpactSite2.indd -JP

Impact Site Vernal Pool Photos

VERNAL POOL RESTORATION PLAN FOR VISTA DEL MAR ELEMENTARY SCHOOL

HELIX

Impact Pool J

Impact Pool L

Scoring Sheet: Individual Vernal Pools

→ new pool #4

AA Name: West Otay Mesa Preserve - 12A			(m/d/y)	08/24/10
Attributes and Metrics	**Alpha.**	**Numeric**	**Comments**	
Buffer and Landscape Context				
(A) Landscape Connectivity	D	3	no wetlands other than on-site VP & possible WUS drains	
(B): Percent of AA with Buffer	A	12	buffer surrounds pools	
(C): Average Buffer Width	A	12	200m buffer avg; large open space to all sides except north	
(D): Buffer Condition	C	6	non-natives, esp. grasses	
Initial Attribute Score = A + [D x (B x C)$^{1/3}$]$^{1/2}$		11.5	Final Attribute Score = (Initial Score/24) x 100	48
Hydrology				
Water Source	A	12	rainfall	
Hydroperiod	A	12	natural hydroperiod	
Hydrologic Connectivity	A	12	unrestricted	
Initial Attribute Score	36		Final Attribute Score = (Initial Score/36) x 100	100
Physical Structure				
Structural Patch Richness	D	3	low	
Topographic Complexity	D	3	steep sides - 1 slope	←
Initial Attribute Score	6		Final Attribute Score = (Initial Score/24) x 100	25
Biotic Structure				
Plant Community submetric A: Number of Co-dominant species	D	3	2 co-dominant, both uplnd sp.	
Plant Community submetric B: Percent Invasion	C	6	1 non-native; filaree	
Plant Community submetric C: Endemic Species Richness	D	3	no VP species observed at this time	
Plant Community Metric (*average of submetrics A-C*)		4		
Horizontal Interspersion and Zonation	D	3	1 plant zone	
Initial Attribute Score	7		Final Attribute Score = (Initial Score/24) x 100	29
Overall AA Score (Average of Final Attribute Scores)			51	

same ↑ ~~Hydro~~ ~~Hydr~~

Photo 22

Scoring Sheet: Individual Vernal Pools

↑ new pool #11

AA Name: West Otay Mesa Preserve - Pool 15A			(m/d/y) 8/24/2010
Attributes and Metrics	**Alpha.**	**Numeric**	**Comments**
Buffer and Landscape Context			
(A) Landscape Connectivity	D	3	no wetlands other than on-site vp's & some potential drainages
(B): Percent of AA with Buffer	A	12	buffer surrounds pool
(C): Average Buffer Width	A	12	large buffer around most of pool, except to north
(D): Buffer Condition	C	6	non-natives, especially grasses
Initial Attribute Score = A + [D x (B x C)$^{1/2}$]^{2}		11.5	Final Attribute Score = (Initial Score/24) x 100: 48
Hydrology			
Water Source	A	12	rainfall
Hydroperiod	A	12	natural hydroperiod
Hydrologic Connectivity	C	6	←
Initial Attribute Score	30		Final Attribute Score = (Initial Score/36) x 100: 83
Physical Structure			
Structural Patch Richness	~~A~~ D	3	low
Topographic Complexity	D	3	steep sloped pool ←
Initial Attribute Score	6		Final Attribute Score = (Initial Score/24) x 100: 25
Biotic Structure			
Plant Community submetric A: Number of Co-dominant species	C	6	3 co-dominants; 2 upland species
Plant Community submetric B: Percent Invasion	B	9	1 non-native
Plant Community submetric C: Endemic Species Richness	D	3	1 endemic common to vp's
Plant Community Metric (*average of submetrics A-C*)		6	
Horizontal Interspersion and Zonation	C	6	2 plant zones
Initial Attribute Score	12		Final Attribute Score = (Initial Score/24) x 100: 50
Overall AA Score (Average of Final Attribute Scores)			52

Photo 20

Scoring Sheet: Individual Vernal Pools

→ new pool #17

AA Name: West Otay Mesa Preserve - Pool 7					(m/d/y)	8/24/10
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**	
Buffer and Landscape Context						
(A) Landscape Connectivity			D	3	no wetlands other than on-site vp's & some poten. drainages	
(B): Percent of AA with Buffer	Alpha. A	Numeric 12			buffer surrounds pools	
(C): Average Buffer Width	A	12			large buffer except to north	
(D): Buffer Condition	C	6			non-native grasses	
Initial Attribute Score = A + [D x (B x C)$^{1/2}$]$^{1/2}$				11.5	Final Attribute Score = (Initial Score/24) x 100	48
Hydrology						
Water Source			A	12	rainfall	
Hydroperiod			A	12	natural hydroperiod	
Hydrologic Connectivity			C	6		←
Initial Attribute Score			30		Final Attribute Score = (Initial Score/36) x 100	83
Physical Structure						
Structural Patch Richness			D	3	low	
Topographic Complexity			D	3	single slope	
Initial Attribute Score			6		Final Attribute Score = (Initial Score/24) x 100	25
Biotic Structure						
Plant Community submetric A: Number of Co-dominant species	Alpha. D	Numeric 3			1 co-dominant, upland	
Plant Community submetric B: Percent Invasion	D	3			1 non-native	
Plant Community submetric C: Endemic Species Richness	D	3			Psi. brev present but less than 10%	
Plant Community Metric (*average of submetrics A-C*)				3		
Horizontal Interspersion and Zonation			D	3	1 plant zone	
Initial Attribute Score			6		Final Attribute Score = (Initial Score/24) x 100	25
Overall AA Score (Average of Final Attribute Scores)					45	

Photo 24

Scoring Sheet: Individual Vernal Pools

2A → new pool #26

AA Name: West Otay Mesa Preserve - Pool 2				(m/d/y)	08/24/2010
Attributes and Metrics	Alpha.	Numeric	**Alpha.**	**Numeric**	**Comments**
Buffer and Landscape Context					
(A) Landscape Connectivity			D	3	negligable wetlands (on-site vp's) & potential drainages
(B): Percent of AA with Buffer	A	12			pool is surrounded by buffer lands
(C): Average Buffer Width	A	12			
(D): Buffer Condition	C	6			non-natives, esp. grasses
Initial Attribute Score = A + [D x (B x C)$^{1/3}$]$^{1/3}$				11.5	Final Attribute Score = (Initial Score/24) x 100: 48
Hydrology					
Water Source			A	12	rainfall
Hydroperiod			A	12	natural hydroperiod
Hydrologic Connectivity			A	12	unrestricted
Initial Attribute Score			36		Final Attribute Score = (Initial Score/36) x 100: 100
Physical Structure					
Structural Patch Richness			D	3	low patch richness
Topographic Complexity			C	6	single slope
Initial Attribute Score			9		Final Attribute Score = (Initial Score/24) x 100: 37.5
Biotic Structure					
Plant Community submetric A: Number of Co-dominant species	D	3			2 co-dominants; both upland
Plant Community submetric B: Percent Invasion	C	6			1 non-native
Plant Community submetric C: Endemic Species Richness	D	3			0 endemic
Plant Community Metric (*average of submetrics A-C*)				4	
Horizontal Interspersion and Zonation			D	3	1 plant zone
Initial Attribute Score			7		Final Attribute Score = (Initial Score/24) x 100: 29
Overall AA Score (Average of Final Attribute Scores)					54

Photo 23

Scoring Sheet: Individual Vernal Pools

→ new pool #30

AA Name: West Otay Mesa Preserve Pool 14					(m/d/y) 8/24/2016
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**
Buffer and Landscape Context					
(A) Landscape Connectivity			D	3	no wetlands other than vp's on-site & some drainages
(B): Percent of AA with Buffer	Alpha. A	Numeric 12			buffer surrounds pool
(C): Average Buffer Width	A	12			large buffer in all directions except north, still 80m
(D): Buffer Condition	C	6			non-natives, esp. grasses
Initial Attribute Score = A + [D x (B x C)$^{1/3}$]^{2}				11.5	Final Attribute Score = (Initial Score/24) x 100: 48
Hydrology					
Water Source			A	12	rainfall
Hydroperiod			A	12	natural hydroperiod
Hydrologic Connectivity			C	6	Berm along edge
Initial Attribute Score			30		Final Attribute Score = (Initial Score/36) x 100: 83
Physical Structure					
Structural Patch Richness			D	3	low
Topographic Complexity			D	3	steep sloped pool ←
Initial Attribute Score			6		Final Attribute Score = (Initial Score/24) x 100: 25
Biotic Structure					
Plant Community submetric A: Number of Co-dominant species	Alpha. C	Numeric 6			4 co-dominant species / 3 upland
Plant Community submetric B: Percent Invasion	C	6			2 non-native sp. / both grasses
Plant Community submetric C: Endemic Species Richness	D	3			1 endemic, common to vp's
Plant Community Metric (*average of submetrics A-C*)				5	
Horizontal Interspersion and Zonation			C	6	2 plant zones
Initial Attribute Score			11		Final Attribute Score = (Initial Score/24) x 100: 46
Overall AA Score (Average of Final Attribute Scores)					51

Photo 25

Mitigation Pool 4

Mitigation Pool 11

Mitigation Pool 17

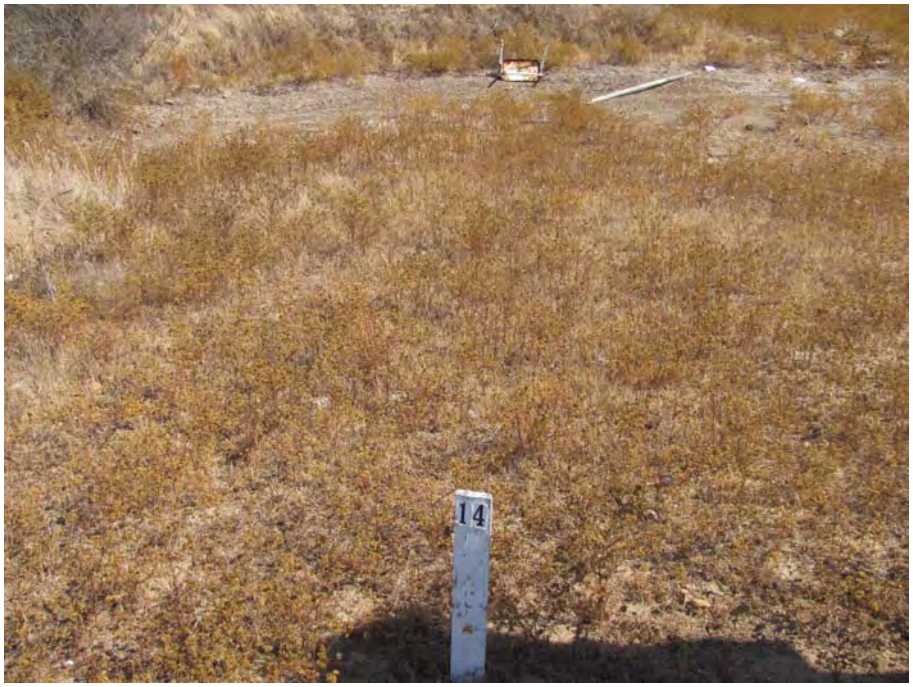
I:\ArcGIS\S\SFP-01 School8\Map\BIO\VernalPoolRestoration\Photos_MitigationSite1.indd -JP

Mitigation Site Vernal Pool Photos

VERNAL POOL RESTORATION PLAN FOR VISTA DEL MAR ELEMENTARY SCHOOL

HELIX

Mitigation Pool 26



Mitigation Pool 30

Scoring Sheet: Individual Vernal Pools

AA Name: Robinhood Ridge East Pool 19					(m/d/y) 8/27/2016
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**
Buffer and Landscape Context					
(A) Landscape Connectivity			D	3	only small drainages, other vp's to S & E
(B): Percent of AA with Buffer	Alpha. A	Numeric 12			buffer area surrounds pool
(C): Average Buffer Width	B	9			large buffer width to the S & W
(D): Buffer Condition	B	9			trail to the N, may be pets/people, but low non-natives - esp. grasses
Initial Attribute Score = A + [D x (B x C)$^{1/2}$]$^{1/2}$				13	Final Attribute Score = (Initial Score/24) x 100: 54
Hydrology					
Water Source			A	12	rainfall
Hydroperiod			A	12	natural hydroperiod
Hydrologic Connectivity			A	12	unrestricted
Initial Attribute Score			36		Final Attribute Score = (Initial Score/36) x 100: 100
Physical Structure					
Structural Patch Richness			C	6	small pool, moderate patch richness (5)
Topographic Complexity			C	6	single slope, w/o microtopography
Initial Attribute Score			12		Final Attribute Score = (Initial Score/24) x 100: 50
Biotic Structure					
Plant Community submetric A: Number of Co-dominant species	Alpha. C	Numeric 6			only 3 co-dominant species
Plant Community submetric B: Percent Invasion	D	3			2 are non-native
Plant Community submetric C: Endemic Species Richness	D	3			1 is endangered
Plant Community Metric (*average of submetrics A-C*)				4	
Horizontal Interspersion and Zonation			D	3	uniform pool, 1 plant zone
Initial Attribute Score			7		Final Attribute Score = (Initial Score/24) x 100: 29
Overall AA Score (Average of Final Attribute Scores)					58

Photo #10

Scoring Sheet: Individual Vernal Pools

AA Name: Robinhood Ridge			28	(m/d/y) 8/27/2010	
Attributes and Metrics		Alpha.	Numeric	**Comments**	
Buffer and Landscape Context					
(A) Landscape Connectivity		D	3	only small drainages, other vp's to W & S	
(B): Percent of AA with Buffer	Alpha. A / Numeric 12			buffer area surrounds pool	
(C): Average Buffer Width	B / 9			large open space to W & S	
(D): Buffer Condition	B / 9			trail to N; may be some pets/people non-natives, esp. grasses	
Initial Attribute Score = A + [D x (B x C)$^{1/2}$]$^{1/2}$			13	Final Attribute Score = (Initial Score/24) x 100	54
Hydrology					
Water Source		A	12	rainfall	
Hydroperiod		A	12	natural hydroperiod	
Hydrologic Connectivity		A	12	unrestricted	
Initial Attribute Score		36		Final Attribute Score = (Initial Score/36) x 100	100
Physical Structure					
Structural Patch Richness		C	6	small pool, moderate patch richness (5)	
Topographic Complexity		C	6	single slope w/o microtopography	
Initial Attribute Score		12		Final Attribute Score = (Initial Score/24) x 100	50
Biotic Structure					
Plant Community submetric A: Number of Co-dominant species	Alpha. C / Numeric 6			only 3 co-dominant species	
Plant Community submetric B: Percent Invasion	A / 12			some grasses	
Plant Community submetric C: Endemic Species Richness	C / 6			2 are endangered spp.	
Plant Community Metric (*average of submetrics A-C*)			8		
Horizontal Interspersion and Zonation		D	3	uniform pool, 1 plant zone	
Initial Attribute Score		11		Final Attribute Score = (Initial Score/24) x 100	46
Overall AA Score (Average of Final Attribute Scores)				63	

Photo 7

Scoring Sheet: Individual Vernal Pools

AA Name: Robinhood Ridge - East - Pool 79				(m/d/y)	8/27/2010
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**
Buffer and Landscape Context					
(A) Landscape Connectivity			D	3	only small drainages, other vp's to NW
	Alpha.	Numeric			
(B): Percent of AA with Buffer	A	12			buffer area surrounds pool
(C): Average Buffer Width	C	6			close to SE corner of mesa; lrg openspace to NW, SW, but small to NE, trail to N, may be some pets/people
(D): Buffer Condition	B	9			non-natives, esp. grasses
Initial Attribute Score = A + [D x (B x C)$^{1/2}$]$^{1/2}$				12	Final Attribute Score = (Initial Score/24) x 100 → 50
Hydrology					
Water Source			A	12	rainfall
Hydroperiod			A	12	natural hydroperiod
Hydrologic Connectivity			A	12	unrestricted
Initial Attribute Score			36		Final Attribute Score = (Initial Score/36) x 100 → 100
Physical Structure					
Structural Patch Richness			C	6	small pool, moderate patch richness
Topographic Complexity			C	6	single slope w/ microtopography
Initial Attribute Score			12		Final Attribute Score = (Initial Score/24) x 100 → 50
Biotic Structure					
Plant Community submetric A: Number of Co-dominant species	Alpha. D	Numeric 3			Only 2 co-dominant species
Plant Community submetric B: Percent Invasion	A	12			Both are native endemics; no co-dom. non-natives
Plant Community submetric C: Endemic Species Richness	D	3			few endemics
Plant Community Metric (*average of submetrics A-C*)				6	
Horizontal Interspersion and Zonation			B	9	
Initial Attribute Score			15		Final Attribute Score = (Initial Score/24) x 100 → 62.5
Overall AA Score (Average of Final Attribute Scores)					66

photo 1

Reference Pool 19

Reference Pool 28

Reference Pool 79

I:\ArcGIS\S\SFP-01 School8\Map\BIO\VernalPoolRestoration\Photos_ReferenceSite.indd -JP

Reference Site Vernal Pool Photos

VERNAL POOL RESTORATION PLAN FOR VISTA DEL MAR ELEMENTARY SCHOOL

HELIX

APPENDIX B

Selected Permits and Biological Opinion

DEPARTMENT OF THE ARMY
Los Angeles District, Corps of Engineers
Regulatory Division, South Coast Branch
6010 Hidden Valley Road, Suite 105
Carlsbad, CA 92011

June 13, 2011

REPLY TO ATTENTION OF:
Office of the Chief
Regulatory Division

San Ysidro School District
Attn: Dena Whittington
4350 Otay Mesa Road
San Ysidro, California 91723

Dear Ms. Whittington:

We have received your request to amend specific Special Conditions within Permit No. SPL-2009-00028-LLC, executed on April 29, 2011, which authorized you to discharge fill into waters of the U.S., in association with the San Ysidro School Vista Del Mar Elementary School (VDMES) Project. The executed permit authorized the fill of 0.02 acre of vernal pool wetlands in the southwest portion of the California Terraces Precise Plan (CTTP) area, in the City and County of San Diego, California. Two Special Conditions (SP #4 and 16), of the executed permit, are revised as follows:

Special Condition 4: The Permittee shall preserve, protect, and maintain in perpetuity the **5.03-acre on-site preservation area** (as shown in attached Figure 3). The Permittee shall record a Conservation Easement (CE), in a form approved by the Corps Regulatory Division, over the 5.03-acre on-site preservation area. Further, the Permittee shall receive written approval of the CE from the Corps' Regulatory Division prior to it being executed and recorded. The CE shall be held by a qualified third-party pursuant to California Civil Code section 815.3 and Government Code section 65965. The Permittee must provide monies in the form of an endowment (endowment amount to be determined by Property Analysis Record or similar methodology) for the purposes of fulfilling the third-party easement holder's responsibilities under the CE. The endowment holder must be approved by the Corps. The CE shall preclude establishment of fuel modification zones, paved public trails, drainage facilities, walls, maintenance access roads and/or future easements. Further, to the extent practicable, any such facilities outside the CE shall be sited to minimize indirect impacts on the preservation area.

Special Condition 16: Your responsibility to complete the required compensatory mitigation as set forth in Special Condition 11 will not be considered fulfilled until you have demonstrated compensatory mitigation project success (listed below), **have complied with all Special Conditions of this permit**, and have received written verification of that success from

the Corps Regulatory Division. Detailed mitigation objectives, performance standards, and monitoring requirements are described in the approved HMMP with key Year 5 success criteria **and Special Conditions that are required to be met prior to mitigation sign off** are outlined below.

a. A minimum of 5-years of maintenance and monitoring for the mitigation site has been completed;
b. All water suppliesshall be shut off for a minimum of 2 years prior to sign off;
c. A minimum of 16 restored pools, totaling a minimum of 0.10 acre AND a minimum of 4455 square feet, of the 18 restored pools proposed within the mitigation site shall support San Diego fairy shrimp;
d. At the end of the 5-year monitoring period, the monitored pools shall demonstrate hydrologic patterns similar to those of the control pools. The monitoring period will be extended if a drought period prevents the pools from demonstrating the desired hydrologic patterns. The vernal pools within the mitigation site must pond for sufficient time (estimated to be 30 days) to support SDFS during 2 winters in a 5-year monitoring period or 3 winters in a 10-year monitoring period in order to be deemed successful;
e. The mitigation site must meet all the vernal pool and Diegan coastal sage scrub (upland buffer) success criteria outlined in Table 1 and 2 in order to be deemed successful; AND
f. **The Permittee must also comply with and satisfy Special Conditions 4, 5, 11, and 13, of the April 29, 2011 executed permit or as modified herein, in order for the site to be eligible for sign-off.**

Table 1
VERNAL POOL SUCCESS CRITERIA

Year	Number of Indicator Species Relative to Control Pools (Species richness; percent)	Minimum # of Indicator Species Present in each pool (Species Richness)	Cover of Indicator Species Relative to Control Pools (percent)	Cover limits for Non-native species in vernal pools	CRAM scores Minimum score for each pool/Average across pools
1	35	1	25	--	--
2	50	1	35	--	--
3	65	2	50	<10% total	56/58
4	80	3	70	<5% Cal-IPC, <10% total	--
5	100	3	90	<1% Cal-IPC, <5% total	62/64

Table 2
DIEGAN COASTAL SAGE SCRUB
RESTORATION SUCCESS CRITERIA

YEAR*	SPECIES RICHNESS**	NATIVE COVER**	NON-NATIVE COVER†	TARGET WEEDS†
3	≥ 30	≥40	<5	<1
4	≥50	≥50	<5	<1
5	≥75	≥70	<5	<1

*No success criteria for Years 1 and 2
** Percent of richness relative to control transects.
Greater than or equal to amount shown.
† total cover - not relative to reference

All other terms and conditions of Permit No. SPL-2009-00028-LLC, executed on April 29, 2011, except as changed herein, remain in full force and effect.

Thank you for participating in our regulatory program. If you have any questions, please contact Lanika Cervantes at 760.602.4838 or via e-mail at Lanika.L.Cervantes@usace.army.mil.

Please be advised that you can now comment on your experience with Regulatory Division by accessing the Corps web-based customer survey form at: http://per2.nwp.usace.army.mil/survey.html.

Sincerely,

Therese O. Bradford
Chief, South Coast Branch
Regulatory Division

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road, Suite 101
Carlsbad, California 92011

In Reply Refer To:
FWS-SDG-09B0258- 11F0076

FEB 04 2011

Colonel R. Mark Toy
District Commander
U.S. Army Corps of Engineers, Los Angeles District
Regulatory Branch – San Diego Field Office
6010 Hidden Valley Road, Suite 105
Carlsbad, California 92011

Attention: Lanika Cervantes, San Diego Field Office

Subject: Formal Section 7 Consultation on the San Ysidro School District's Vista Del Mar Elementary School Project (Corps File No. SPL-2009-0028-LLC), San Diego County, California

Dear Colonel Toy:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion on the effects of the San Ysidro School District's (District) Vista Del Mar Elementary School Project located in San Diego County, California, on the federally endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*), in accordance with section 7(a)(2) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your April 20, 2010, request for formal consultation was received on the same date and included a "may affect" determination by your agency for the federally threatened coastal California gnatcatcher (*Polioptila californica californica*, "gnatcatcher").

The Multiple Species Conservation Program (MSCP) establishes a multiple species conservation program to minimize and mitigate habitat loss and the incidental take of covered species in association with specific activities covered by the program. The MSCP encompasses a 900-square mile (mi) [2,331-square kilometer (km)] area in southwestern San Diego County and includes the City of San Diego (City), 10 additional city jurisdictions, and unincorporated portions of the County of San Diego. On July 18, 1997, the Service issued a section 10(a)(1)(B) permit ("incidental take permit") to the City for their Subarea Plan under the broader MSCP. The proposed project is located within the City's Subarea Plan boundary.

The gnatcatcher is a covered species under the City's Subarea Plan, and the City's incidental take permit authorizes take of gnatcatcher for projects consistent with their Subarea Plan. The Service concurs with your agency's determination that the proposed project may affect gnatcatcher. We have also determined that the project, including the proposed conservation measures (enclosed), is consistent for impacts to gnatcatcher with the City's Subarea Plan and its

associated implementation agreement and permit. Therefore, upon receipt by the District of development approval from the City for the project, take of gnatcatcher by the Vista Del Mar Elementary School project will be authorized through the City's incidental take permit.

The status of the gnatcatcher and the effects of implementing the City's Subarea Plan under the MSCP were previously addressed in our biological opinion for the City's Subarea Plan dated June 6, 1997. In this biological opinion, we concluded that the level of anticipated take in the City's Subarea Plan area boundary was not likely to result in jeopardy to the gnatcatcher. Given that the proposed project is consistent with the City's Subarea Plan, we do not anticipate any adverse effects to the gnatcatcher that were not previously evaluated in our biological opinion for the Subarea Plan. No incidental take of gnatcatcher beyond that anticipated in the biological opinion for the City's Subarea Plan will occur. Therefore, it is our conclusion that implementation of the proposed project will not result in jeopardy to the gnatcatcher.

By this consultation, we are extending to the U.S. Army Corps of Engineers (Corps) the take coverage for gnatcatcher (incorporated herein by reference) already provided to the City through their incidental take permit for their Subarea Plan. Extension of take coverage to the Corps under the City's Subarea Plan is limited to the proposed project as described in this biological opinion and as provided in the incidental take statement of our biological opinion for the City's Subarea Plan dated June 6, 1997. Thus, the Corps' consultation obligations under the Act for gnatcatcher have been met.

This biological opinion is based on information provided in the: *Wetland Delineation for the 18.6-acre San Ysidro School Site* (Glenn Lukos Associates 2008); *U.S. Fish and Wildlife Service Dry Season Protocol Level Survey Report for San Diego and Riverside Fairy Shrimp (Branchinecta sandiegonensis and Streptocephalus woottoni), San Ysidro Elementary School 8* (Helix 2008); *Results of Wet Season Fairy Shrimp Surveys on the San Ysidro Elementary School 8 Site for 2007–2008* (Mariposa Biology 2008); *Final Vista Del Mar Elementary School Subsequent Environmental Impact Report* [The Planning Center (TPC) 2009a]; *Vista Del Mar Elementary School Vernal Pool Preserve Restoration Plan* (Helix 2010); field site visits; and other sources of information available in our files. The complete project file for this consultation is maintained at the Carlsbad Fish and Wildlife Office (CFWO).

CONSULTATION HISTORY

Our knowledge of this project began in April 2009 when we received a Draft Subsequent Environmental Impact Report (DSEIR) submitted under the requirements of the California Environmental Quality Act. We provided comments on the DSEIR in May 2009. On February 16, 2010, we met with the Corps and District to discuss the project and proposed locations to offset vernal pool impacts.

On April 20, 2010, we received a request for formal consultation from your agency. After initiation of consultation, the Corps worked with the District regarding alternatives to minimize impacts to waters of the U.S.

On July 22, 2010, we met on the project site to discuss alternatives to minimize vernal pool impacts and measures to offset unavoidable impacts. At the meeting, we recommended the District pursue vernal pool restoration, enhancement and management on the West Otay Mesa B parcel to offset project impacts. On October 5, 2010, we received the *Vista Del Mar Elementary School Vernal Pool Restoration Plan* (Helix 2010) for the West Otay Mesa B parcel.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed action is the issuance of a permit by the Corps to the District under section 404 of the Clean Water Act (CWA) to impact 0.02 acre (ac) [0.008 hectare (ha)] of waters of the U.S. to facilitate development of the proposed Vista Del Mar Elementary School. The project site covers 20.11 ac (8.1 ha) of vacant land and includes 19.2 ac (7.77 ha) of District-owned property and approximately 0.91 ac (0.37 ha) of private property. The project is located on Otay Mesa in the city of San Diego, approximately 1 mi (1.61 km) east of Interstate 805 (I-805) and immediately north of State Route 905 (SR-905) (Figure 1). Approximately 7.35 ac (2.97 ha) of the northwestern portion of the project site occurs within the Multi-Habitat Planning Area (MHPA), which is the City's preserve established under the MSCP. Access to the site will be via Del Sol Boulevard, which currently ends at the northeast border of the proposed project site.

The project consists of two components; 1) construction and operation of the Vista Del Mar Elementary School, and 2) extension of Del Sol Boulevard (Figure 2). The school will be constructed on 10.08 ac (4.08 ha) of the project site. The extension will begin at the existing terminus of Del Sol Boulevard and extend to the western boundary of the District-owned property and will encompass 5.47 ac (2.21 ha). Although the District will construct the extension of Del Sol Boulevard, the road extension will be funded by the City through reimbursement of fees to the District and/or through a mutual agreement between the City and District. Approximately 4.74 ac (1.92 ha) of the project site that is not directly impacted by the project will be conserved as part of the MHPA (Figure 2).

The project site includes 10 vernal pools that have a combined area of 0.02 ac (0.008 ha) (Table 1) (Figure 2), contain the vernal pool indicator plant species plantago (*Plantago elongata*), adobe popcornflower *(Plagiobothrys acanthocarpus*), and wooly marbles (*Psilocarphus brevissimus*), and support San Diego fairy shrimp. All of the vernal pools occur in disturbed coastal sage scrub on the mesa in the center of the project site.

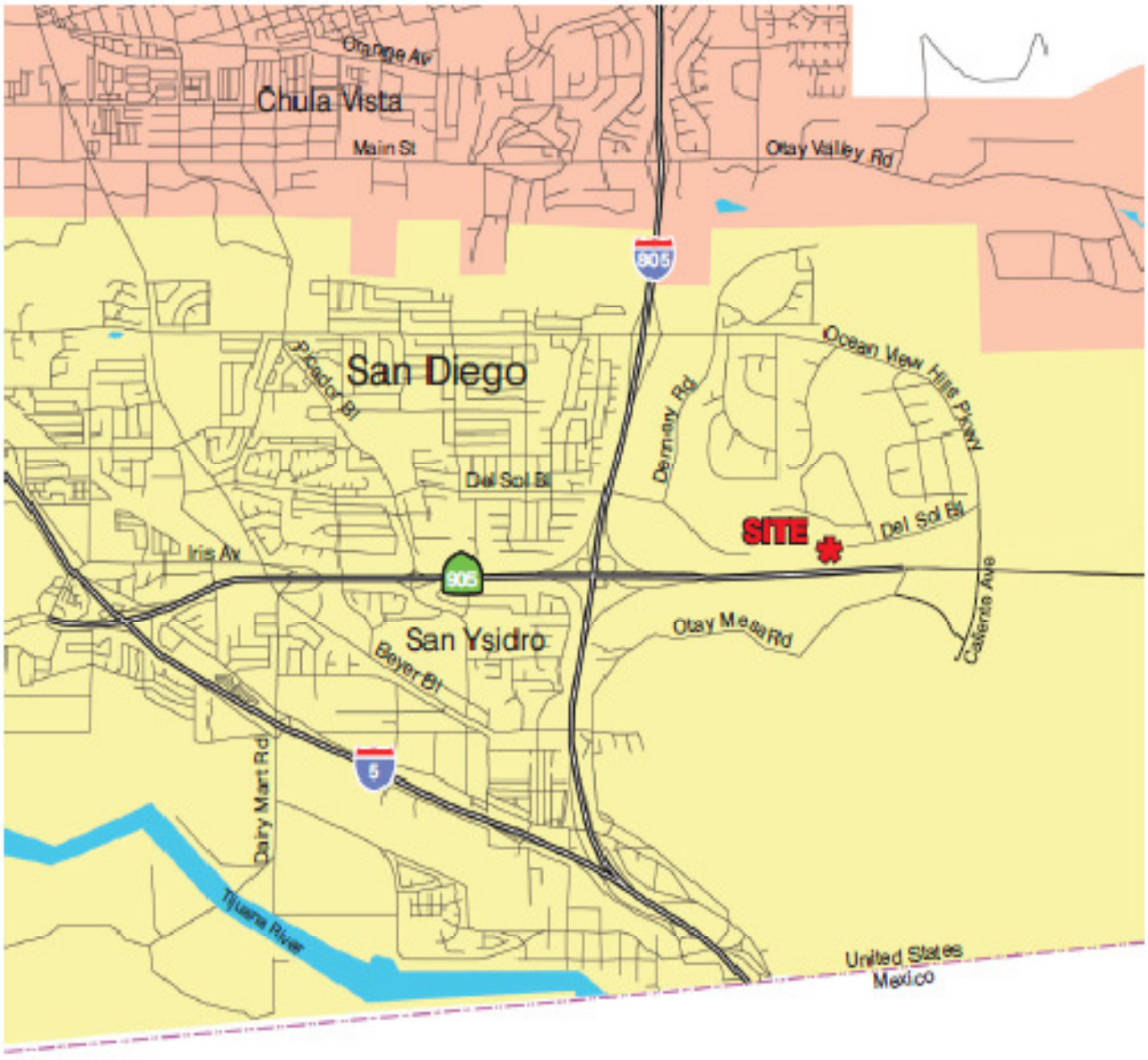


Figure 1: Project Location Map

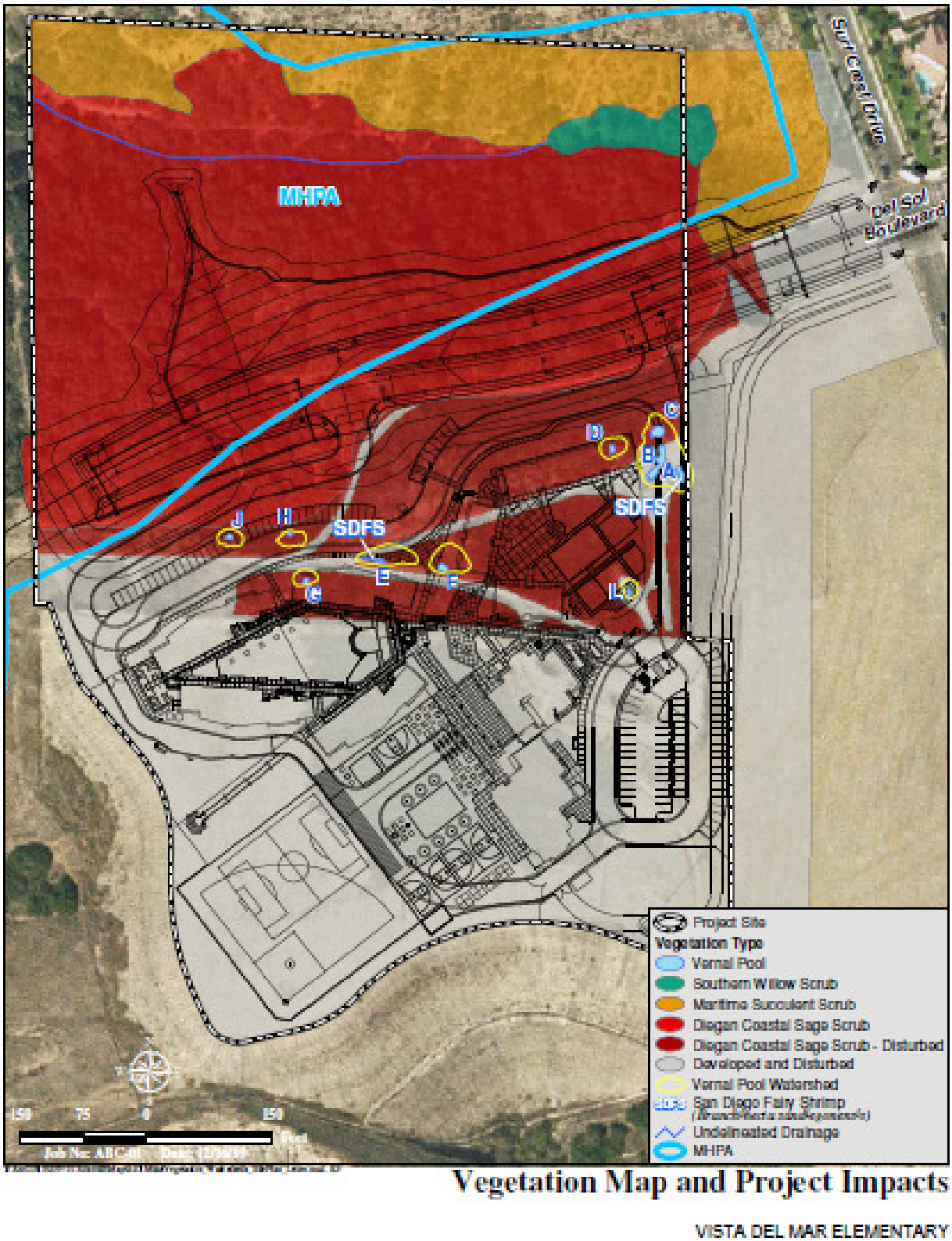


Figure 2: Vegetation, San Diego Fairy Shrimp and Project Impacts Map

Table 1. San Ysidro School District Vernal Pool and Watershed Area (square feet/ac)		
Basin	**Pool Area**	**Watershed Area**
A	121 (0.003 ac)	4,027* (0.09 ac)
B	303 (0.007 ac)	
C	157 (0.004 ac)	
D	45 (0.001 ac)	623 (0.01 ac)
E	47 (0.001 ac)	1,324 (0.03 ac)
F	74 (0.002 ac)	1,244 (0.03 ac)
G	43 (0.001 ac)	435 (0.01 ac)
H	26 (0.001 ac)	498 (0.01 ac)
J	45 (0.001 ac)	493 (0.01 ac)
L	29 (0.001 ac)	339 (0.01 ac)
Total	**891 (0.02 ac)**	**8,983 (0.20 ac)**

*pools A, B, and C share a single watershed area

The project will impact all 10 vernal pools on site. To offset these impacts, the project proposes to restore and enhance a total of 32 vernal pools with a basin area of 0.218 ac (0.09 ha) on the 1.05-ac (0.42-ha) West Otay Mesa B parcel, which is owned by the City and is in the City's MHPA (Figure 3). All restored pools and enhanced pools, as appropriate, will be planted with vernal pool indicator plant species and inoculated with San Diego fairy shrimp. However, based on the impacts to pools areas, to meet success criteria only 0.10 ac (0.04 ha) of the restored pools will be required to support reproducing San Diego fairy shrimp populations. In addition, the pool watersheds and surrounding uplands will be restored with maritime succulent scrub on the entire parcel. The District will also provide for long-term management of the West Otay Mesa B parcel.

According to 50 CFR § 402.02 pursuant to section 7 of the Act, the "action area" includes all areas to be affected directly or indirectly by the Federal action. Areas directly impacted include all areas within the project footprint, including construction vehicle access routes, staging areas, and grading areas. Habitat immediately adjacent to the project footprint may be indirectly impacted or degraded by construction activities or later in time due to the developed nature of the road. Thus, we have defined the action area for the proposed project to be the 20.11 ac (8.1-ha) project site and the 1.05 ac (0.42 ha) West Otay Mesa B parcel. Subsequent analyses of the environmental baseline, effects of the action, and levels of incidental take are based upon the action area.

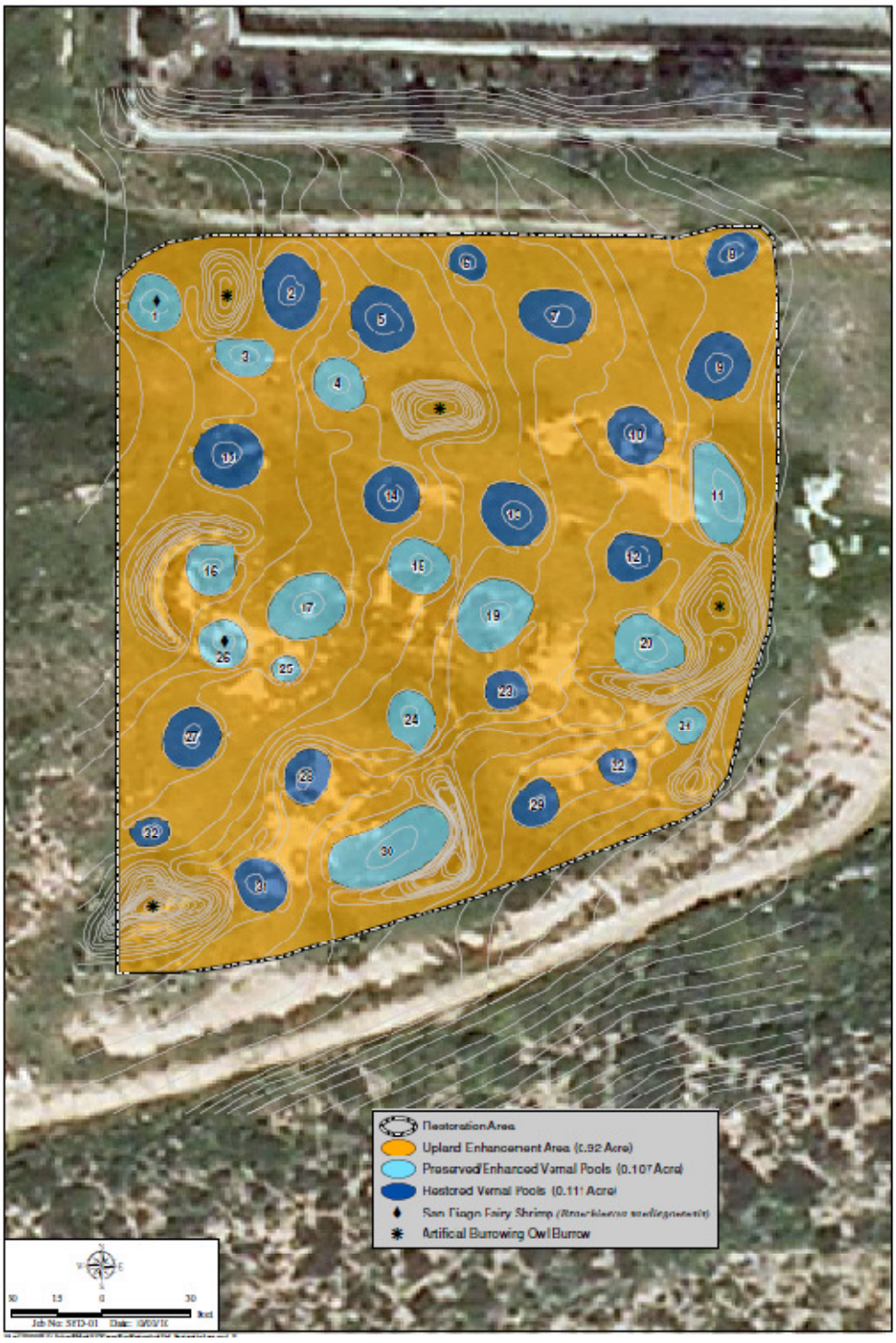


Figure 3: West Otay Mesa B Parcel Vernal Pool Restoration/Enhancement.

Conservation Measures

The following conservation measures will be implemented as part of the project to avoid, minimize, and offset adverse effects to San Diego fairy shrimp:

1. Impacts to 10 vernal pools [0.02 ac (0.008 ha)] will be offset through restoration of 15 vernal pools [0.10 ac (0.04 ha)] at the West Otay Mesa B parcel. In addition to this restoration, the existing 14 vernal pools on the site will be enhanced/expanded and 3 additional pools (i.e., pool 23, 31, and 32) will be restored for a combined total of 0.118 ac (0.047 ha) of surplus restored/enhanced vernal pool surface area. The surplus surface area is intended to provide a contingency surplus in the event that some of the restored pools are not successful. Upon completion, the site will support a total 0.218 ac (0.09 ha) of vernal pool habitat of which 0.10 ac (0.04ha) will offset project impacts. The remainder will be available to the City to offset future project impacts.

2. The District will submit a final vernal pool restoration/enhancement plan to the Corps and Service (Agencies) for approval at least 60 days prior to initiating project impacts. Project impacts will not occur until the Agencies have approved the final plan. The final plan will be based on the *Vista Del Mar Elementary School Vernal Pool Preserve Restoration Plan* (Helix 2010). In addition to the measures proposed in the draft plan, the final plan will include the following information:

    a) Implementation of the final plan will be conducted under the direction of a qualified biologist (vernal pool restoration specialist) with at least 3 years of vernal pool restoration experience; the biologist will be approved by the Agencies;

    b) The restoration area contains extant vernal pools. To avoid impacts to extant vernal pools, all measures required in Conservation Measure 4 will be implemented at the restoration site and thus specified in the restoration plan;

    c) All restoration/enhancement activities will commence the first summer-fall season prior to or concurrently with the start of construction of the project;

    d) All final specifications and topographic-based grading, planting and watering plans will have 0.5-foot (ft) [0.15-meter (m)] contours and show typical cross-sections for the vernal pools, watersheds and surrounding uplands (including adjacent mima mounds) at the restoration/enhancement sites. The basis for this fine-scale resolution is the shallow depth (i.e., several inches) of the vernal pools that will be restored/enhanced. The grading plans will also show overflow pathways that hydrologically connect the restored pools in a way that mimics natural vernal pool complex topography/hydrology;

    e) A fine-scale, detailed hydraulic analysis that shows each proposed restored vernal pool and its watershed, and hydrologic connection between the pools, as well as the

watershed of the extant vernal pools to be enhanced. The watersheds of the restored pools will not extend into the watersheds of the extant vernal pools to be enhanced;

f) Discussion and a table on the exact activities that will occur at each restored or enhanced vernal pool. The discussion and table will also include the initial conditions of the pools and the as- built conditions including basin size, average depth, ponding duration, existing native and nonnative cover and presence of listed species;

g) All enhancement activities in the pools occupied by San Diego fairy shrimp that require soil manipulation (e.g., removal/recontouring of tire ruts or road fills, recontouring of pool slopes) will be done by hand to reduce impacts to the existing pool resources. Soil manipulation will be limited to areas adjacent to the existing pool and will be the minimum area necessary to accomplish pool enhancement. Topsoil will only be salvaged from the portions of the pools subject to soil movement. The areas of existing habitat, which are to remain unaffected by enhancement activities, will be specified and protected by temporary barriers prior to implementation;

h) A map depicting the locations of the control pools within each reference site and a table detailing basin size, average depth, ponding duration, native cover, nonnative cover and presence of listed species for each pool;

i) As a last resort and after approval by the Agencies, additional inoculum from donor vernal pools in the Otay Mesa area may be used to supplement the inoculum collected at the project impact site and West Otay Mesa B parcel. The final plan will identify any proposed donor pools and include documentation that they are free of versatile fairy shrimp (*Branchinecta lindahli*). No more than 10 percent of the basin area of any donor pool will be used for collection of inoculum. Collection of inoculum from Agency-approved donor pools will be consistent with Conservation Measure 4;

j) Inoculum and planting will not be installed until the Agencies approve the habitat restoration site grading. All planting will be installed in a way that mimics natural plant distribution and not in rows. Inoculum will 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 San Diego fairy shrimp [i.e., at least 30 days (Hathaway and Simovich 1996, Ripley et al. 2004)] and have been surveyed for versatile fairy shrimp to the satisfaction of the Agencies. If versatile fairy shrimp are detected in the restored or enhanced pools, inoculum will not be introduced until measures approved by the Agencies are implemented in attempt to remove the versatile fairy shrimp from the pools. Inoculum will be placed in a manner that preserves, to the maximum extent possible, the orientation of the San Diego fairy shrimp cysts within the surface layer of soil (e.g., collected inoculum will be shallowly distributed within the pond so that cysts have the potential to be brought into solution upon inundation);

k) Plant palettes (species, size and number/acre) and seed mix (species and pounds/acre) will be included in the restoration/enhancement plan. The plant palette will include native species specifically associated with the onsite habitat type(s). If native plant species (no cultivars) cannot be obtained within Otay Mesa, an alternate site will be used only upon approval by the Agencies. The source and proof of local origin of all plant material and seed will be provided to the Agencies;

l) Native plants and animals will be established within the restored/enhanced pools, their watersheds and surrounding uplands. 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 offsite habitats; and by the use of commercially available native plant species and/or any vernal pool inoculum or plant material from an offsite source approved by the 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 will be implemented within the restoration areas to protect and enhance habitat remaining on site;

m) Any artificial watering of the restored/enhanced pool watersheds will be done in a manner that prevents water from entering into the pools. Any water to be used will be identified and documented to be free of contaminants that could affect the water quality of the pools and harm San Diego fairy shrimp;

n) All weeding within and immediately adjacent to the restored/enhanced pools will be performed by hand. No herbicide will be used within the restored/enhanced pools. Herbicide may be used in the uplands adjacent to pools only as approved by the Agencies (e.g., using the "glove" method). All workers conducting weed removal activities will be educated to distinguish between native and nonnative species so that local native plants are not inadvertently killed by weed removal activities;

o) A final implementation schedule that indicates when all vernal pool impacts and vernal pool restoration/enhancement grading and planting will begin and end. Any temporal loss of vernal pools caused by delays in restoration will be offset by additional habitat preservation and/or restoration as determined in coordination with the Agencies, unless the delays were caused by unforeseeable circumstances or were beyond the reasonable control of the project proponent;

p) A minimum commitment to 5 years of monitoring of vernal pool and upland habitat restoration/enhancement areas. The final success criteria methodology will include quantitative hydrological, vegetation transects, viable cyst, hatched San Diego fairy shrimp, and gravid female measurements; complete flora and fauna inventories; and photographic documentation. To minimize impacts to the soil surface of the vernal

pool during restoration, enhancement and monitoring activities, cobbles will be oriented within the restored vernal pools to serve as stepping stones;

q) In addition to the extant occupied vernal pools, 0.10 ac (0.04 ha) of the restored vernal pools will support San Diego fairy shrimp. Restoration success, as determined by the final success criteria, for San Diego fairy shrimp will be determined by measuring the ponding of water and density of viable cysts, hatched San Diego fairy shrimp, and gravid females within the restored pools. Water measurements will be taken in the restored pools to determine the depth, duration and quality (e.g., pH, temperature, total dissolved solids, salinity) of ponding. Dry samples will be taken in the restored pools to determine the density of viable cysts in the soils. Wet samples will also be taken in the restored pools to determine the density of hatched San Diego fairy shrimp and gravid females. Final success criteria will be set such that the pools must 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 San Diego fairy shrimp. The average viable cyst, hatched fairy shrimp, and gravid female density of the restored pools must not differ significantly ($p < 0.05$) from reference pools for, at least, 3 wet seasons before a determination of success can be made. Vernal pools selected as reference or control pools for evaluating restoration success will be identified and described in the restoration plan as per Conservation Measure 2(h). Alternate methods of determining success will only be used if approved by the Agencies;

r) Monitoring and success criteria for vernal pool and upland restoration/enhancement areas will include; species richness and cover criteria for all 5 years of monitoring, zero percent cover for weed species categorized as High or Moderate in the California Invasive Plant Council's (Cal-IPC) Invasive Plant Inventory, and relative cover of all other weed species is no more than 5 percent coverage for other nonnative invasive weed species for all 5 years of the 5-year monitoring period. Container plant survival will be 80 percent of the initial plantings for the first 5 years. At the first and second anniversary of plant installation, all dead plants will be replaced unless their function has been replaced by natural recruitment. The method used for monitoring will be described and a map of proposed sampling locations will be included. Photo points will be used for qualitative monitoring and stratified-random sampling will be used for all quantitative surveys;

s) A commitment by the District agreeing that restoration/enhancement of the vernal pools and uplands will be deemed complete once the final success criteria are met and only after written sign-off by the Agencies. Specifically, 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 will prepare an analysis of the cause(s) of failure and, if deemed necessary by the Agencies, propose remedial actions for approval. If any of the restored/enhanced vernal pools or upland habitat have not met a performance criterion during the initial 5-year period, the District’s maintenance and monitoring obligations will continue until the Agencies deem the restoration/

enhancement successful, or contingency measures are implemented. Restoration/ enhancement will not be deemed successful until at least 2 years after any contingency measures are implemented, as determined by the Agencies; and

t) Annual reports will be submitted to the Agencies by January 31 of each year. Those reports will assess both the attainment of yearly success criteria and progress toward the final success criteria. The reports will also summarize the project's compliance with the conservation measures committed to as part of the Vista Del Mar Project, terms and conditions included in the biological opinion, and Corps permit conditions.

3. Prior to project construction, topsoil will be salvaged from the vernal pools to be impacted on site. Vernal pool soil (inoculum) will be collected when dry to avoid damaging or destroying San Diego fairy shrimp cysts. Hand tools (i.e., shovels and trowels) will be used to remove the top 2 inches (in) [5.1 centimeters (cm)] of soil from the pools. Whenever possible, the trowel will 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 will be stored individually in labeled boxes that are adequately ventilated and kept out of direct sunlight 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 will not be mixed for translocation to any restored/enhanced pools. The collected soils will be spread out and raked into the bottoms of the restored/enhanced pools. Topsoil and plant materials salvaged from the upland habitat areas to be impacted will be transplanted to, and/or used as a seed/cutting source for, the upland habitat restoration/enhancement areas to the maximum extent practicable as approved by the Agencies.

4. Restoration grading activities at the West Otay Mesa B parcel will be timed to avoid wet weather to minimize potential impacts (e.g., siltation) to the extant vernal pools unless the area to be graded is at an elevation below the pools. To achieve this goal, grading will comply with the following:

a) Grading will occur only when the soil is dry to the touch at the surface and 1 in (2.5 cm) below. A visual check for color differences (i.e., darker soil indicating moisture) in the soil between the surface and 1 in (2.5 cm) below indicates the soil is dry;

b) After a rain of greater than 0.2 in (0.5 cm), grading will 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) Grading will commence only when no rain is forecast during the anticipated grading period;

d) To prevent erosion and siltation from storm water runoff due to unexpected rains, Best Management Practices (i.e., silt fences) will be implemented as needed during grading;

e) If rain occurs during grading, work will stop and resume only after soils are dry, as described above; and

f) Grading will be done in a manner to prevent run-off from entering extant vernal pools.

5. The District will post a performance bond or letter of credit with the Corps for grading, planting, and 5 years of maintenance and monitoring of the vernal pool and upland restoration/enhancement areas (including a 20 percent contingency to be added to the total cost). This financial assurance is to guarantee the successful implementation of the vernal pool/upland restoration/enhancement. The District will submit a draft financial assurance instrument with an itemized cost list to the Agencies for approval at least 60 days prior to initiating project impacts. The District will submit the final bond or letter of credit for the amount approved by the Agencies within 30 days of receiving Agency approval of the draft financial insurance instrument.

6. The District will prepare and fund a perpetual long-term management, maintenance and monitoring plan (e.g., HMP) for the restored vernal pools used to offset impacts to San Diego fairy shrimp on the West Otay Mesa B parcel. The HMP should include, but not be limited to, the following: monitoring schedule, measures to prevent human and alien species encroachment, funding mechanism, and contingency measures should problems occur. The District will also establish a non-wasting endowment in an amount approved by the 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, non-profit organization, or other entity approved by the Agencies. The District will submit a draft HMP including a description of perpetual management, maintenance and monitoring actions and the PAR or other cost estimation results for the non-wasting endowment to the Agencies for approval at least 90 days prior to initiating project impacts. The District will submit the final HMP to the Agencies and transfer the funds for the non-wasting endowment to a non-profit conservation entity, within 60 days of receiving approval of the draft plan. The District will not initiate project impacts until the HMP is approved and a funding mechanism acceptable to the Agencies is in place.

STATUS OF THE SPECIES

The status of the San Diego fairy shrimp is described in detail in the *San Diego fairy shrimp (Branchinecta sandiegonensis) 5-year review: Summary and Evaluation* ("5-year review for San Diego fairy shrimp") (Service 2008a). Additional information for this species can be found in the *Recovery Plan for Vernal Pools of Southern California* ("vernal pool recovery plan") (Service 1998). Please refer to these documents for detailed information on the San Diego fairy shrimp's listing status, life history requirements of this species, threats to the species, and conservation needs of the species.

Summary of Species' Distribution and Numbers Rangewide

The vernal pool recovery plan reported 155 complexes (series of vernal pool groups that are hydrologically connected with similar species compositions) occupied by San Diego fairy shrimp within the species range from southern Orange County to northern Baja California, Mexico (Service 1998). Based on information gained about San Diego fairy shrimp occurrences since listing and issuance of the vernal pool recovery plan, we revised this estimate in the 5-year review for San Diego fairy shrimp to approximately 137 vernal pool complexes (Service 2008a). The 5-year review estimated that approximately 24 of these vernal pool complexes occur specifically on Otay Mesa, but considered one complex (i.e., J1) as extirpated (Service 2008a). The vernal pools on the project site are either a previously unknown remnant of the J1 complex or a complex not identified in the recovery plan or 5-year review. The vernal pools on the West Otay Mesa B parcel were also not identified in the recovery plan or 5-year review.

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR § 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of State and private actions that are contemporaneous with the consultation in progress.

San Diego fairy shrimp historically occurred in vernal pool complexes throughout the Otay Mesa ecosystem, which is part of the San Diego Southern Coastal Mesa Management Area identified in the vernal pool recovery plan (Service 1998). Many of these vernal pool complexes have been developed, converted to agriculture, and/or degraded by off-highway vehicle (OHV) use.

The project site supports six plant communities: developed/disturbed, coastal sage scrub (CSS), disturbed CSS, maritime succulent scrub, southern willow scrub, and vernal pools[1] (Table 2). Much of the project site was previously graded and is devoid of any vegetation, and the vernal pools occur on the only native mesa top remaining on the project site. Soils on the mesa top consist of Olivenhain cobbly loam (Glen Lukos Associates 2008), which typically support vernal pools when they occur in flat areas like Otay Mesa. The mesa top has debris from human use and many OHV roads and lacks distinct mima mound features typically associated with vernal pool habitat on Otay Mesa. Ten vernal pools occur on the mesa top with a combined area of 0.02 ac (0.008 ha). All 10 of the vernal pools occur in or near the OHV roads and are relatively disturbed.

[1] "Vernal pools" technically do not constitute a plant community, but rather are a complex ecological system of unique plants, insects, and crustaceans associated with a seasonally wet habitat (Sawyer et al. 2009). Historically vernal pools were differentiated by edaphic (e.g., basalt flow, hardpan) or geographic/topographic (e.g., San Diego mesa, San Jacinto Valley) characteristics. Beginning in the 1990s and still ongoing (especially in southern California), a new classification based on ecological and floristic relationships between individual stands of plants (not individual pools or pool complexes) eventually will form the nomenclatural foundation for understanding vernal pool vegetation (Sawyer et al .2009). Until this effort is completed, we will use the term "vernal pools" in the sense of a plant community.

Table 2
Plant Communities on Project Site
(ac)

Plant Community	*Inside MHPA*		*Outside MHPA*		*Total Project Area*
	On Site	*Off Site*	*On Site*	*Off Site*	
Developed/disturbed	0.02	0.00	7.54	0.53	8.09
Coastal sage scrub	5.74	0.04	1.56	0.11	7.45
Disturbed coastal sage scrub	0.06	0.00	2.60	0.10	2.76
Maritime succulent scrub	1.36	0.01	0.14	0.12	1.63
Southern willow scrub	0.16	0.00	0.00	0.00	0.16
Vernal pools	0.00	0.00	0.02	0.00	0.02
Total	**7.35**	**0.04**	**11.86**	**0.86**	**20.11**

Service protocol wet-season surveys for fairy shrimp were conducted on the project site from December through March 2008 (Mariposa Biology 2008). No fairy shrimp were detected in the 10 pools during the wet season surveys. However, these results may be due to the lack of sufficient ponding for fairy shrimp to hatch (Mariposa Biology 2008).

Dry season protocol surveys for fairy shrimp were performed on the project site in April 2008 (Helix 2008). Fairy shrimp cysts, identified as San Diego fairy shrimp after hydration, were found in pools A and E (Figure 2). No other fairy shrimp species cysts were found in any of the depressions (Helix 2008). However, based on habitat conditions, San Diego fairy shrimp have the potential to occur in all 10 pools. Rather than conduct additional, updated surveys to determine presence or absence of San Diego fairy shrimp within each pool, the District agreed with our determination that for the purposes of assessing project impacts to consider all 10 pools as occupied.

San Diego fairy shrimp were detected in two pools on the West Otay Mesa B parcel in 1997 (KEA Environmental 1998) (Figure 3). San Diego fairy shrimp also have the potential to occur in all 14 pools on this site. Rather than conduct additional, updated surveys to determine presence or absence of San Diego fairy shrimp within each pool, all 14 pools are also considered occupied on the West Otay Mesa B parcel.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, which will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Direct Effects

Implementation of the Vista Del Mar Elementary School Project will directly impact (i.e., grade and fill) all 10 pools on the project site occupied by the San Diego fairy shrimp with a combined surface area of 0.02 ac (0.01 ha). These impacts will be offset through restoration, preservation and management of 15 new vernal pools [0.10 ac (0.04 ha)] occupied by the San Diego fairy shrimp at the West Otay Mesa B parcel. In addition to this restoration, 3 additional pools will be restored and the 14 extant vernal pools will be enhanced for a combined total of 0.118 ac (0.047 ha) of surplus restored/enhanced vernal pool basin area at the West Otay Mesa B parcel. Vernal pool restoration will occur around the extant pools on the West Otay Mesa B parcel, but will not impact the watersheds of extant pools. Enhancement will include pool re-contouring, expansion, and removing invasive species, trash and debris, as appropriate. While not required, surplus restored and enhanced pools may support San Diego fairy shrimp as well. Vernal pool restoration and enhancement will also include planting of vernal pool indicator plant species within the pools and maritime succulent scrub in the pool watersheds and surrounding uplands.

The long-term goal of the restoration and enhancement is to develop and preserve native habitats greater in area and superior in function to that presently on impact site, and to improve the potential for sustaining San Diego fairy shrimp in the vernal pool complex on the West Otay Mesa B parcel over the long-term. Upon project completion, the restored and enhanced pools will be within a 1.05 ac (0.42-ha) preserve that is connected to the MHPA in a configuration that maintains habitat functions and species viability.

Prior to initiation of impacts, soil containing San Diego fairy shrimp cysts will be salvaged from the pools to be graded and filled for use as inoculum in the vernal pools to be restored and enhanced on the West Otay Mesa B parcel. Additional inoculum with San Diego fairy shrimp cysts may be collected from donor vernal pools on the West Otay Mesa B parcel, or elsewhere on Otay Mesa, to supplement the inoculum collected at the project site. Inoculum will be collected when dry to avoid damaging or destroying San Diego fairy shrimp cysts, and no more than 10 percent of the basin area of any donor pool will be used for collection of inoculum. Hand tools (i.e., shovels and trowels) will be used to remove the first 2 in (5.1 cm) of soil from the pools. Whenever possible, the trowel will 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 will be stored individually in labeled boxes that are adequately ventilated and kept out of direct sunlight to prevent the occurrence of fungus or excessive heating of the soil, and stored off site at an appropriate facility for vernal pool inoculum.

The restored pools, and enhanced pools as appropriate, will be inoculated with cysts salvaged from the impacted pools and other pools on Otay Mesa approved by the Service. Inoculum will not be introduced into the restored/enhanced pools until after the pools have been demonstrated to retain water for the appropriate amount of time to support San Diego fairy shrimp [i.e., at least 30 days (Hathaway and Simovich 1996, Ripley et al. 2004)] and have been surveyed for versatile fairy shrimp to the satisfaction of the Agencies. If versatile fairy shrimp are detected in the restored/enhanced pools, inoculum will not be introduced until measures approved by the

Agencies are implemented in attempt to remove the versatile fairy shrimp from the pools. Inoculum will be placed in a manner that preserves, to the maximum extent possible, the orientation of the San Diego fairy shrimp cysts within the surface layer of soil (e.g., collected inoculum will be shallowly distributed within the pond so that cysts have the potential to be brought into solution upon inundation).

With the above measures, we expect that the majority of the cysts will be salvaged out of the pools to be graded and filled, and that while some may be crushed or otherwise destroyed, most will survive the salvage/inoculum collection and transplant process. Any cysts remaining in the pools after the salvage/inoculum collection efforts are completed will then be destroyed by grading and filling of the pools.

Restoration and enhancement activities, such as re-contouring of ponds, soil replacement, removal of nonnative invasive plant species, and monitoring activities, are expected to kill or destroy a small number of San Diego fairy shrimp cysts in each of the affected pools. Cysts are expected to be killed or destroyed as a result of being crushed by personnel conducting restoration and enhancement activities; being covered by soil as the pools are re-contoured; and by changes in micro-climate associated with re-contouring the soil. However, because the majority of cysts will be salvaged prior to the re-contouring efforts and reintroduced to suitable habitat within the enhanced basins, we expect the great majority of cysts to remain viable. Overall, the benefits to San Diego fairy shrimp associated with the restoration and enhancement are anticipated to be substantially greater than the destruction of some cysts during restoration, enhancement, and monitoring activities. The primary benefit of the enhancement activities will be to ensure that the hydrology of the vernal pool is enhanced by removing obstacles to water flow within the pool and replacing soil displaced from the tire tracks. In addition, the San Diego fairy shrimp will benefit from the removal of nonnative invasive plant species during vernal pool restoration and enhancement.

We anticipate that the restoration and enhancement protocols and associated adaptive management procedures will ensure that negative impacts to San Diego fairy shrimp are minimal. For example, disturbance will be limited to the area that is being enhanced; soil within areas that are being re-contoured will be salvaged and reintroduced to the pool where they were collected following re-contouring; cobbles will be oriented within the enhanced or restored vernal pools to serve as stepping stones; and restoration and enhancement activities will be overseen by a biological monitor familiar with vernal pool species and their habitats.

The District will also implement several other conservation measures to minimize impacts to San Diego fairy shrimp and to help ensure the success of vernal pool restoration, enhancement, and preservation efforts. Those efforts include: commencing restoration/enhancement activities the first summer-fall season prior to or concurrently with the start of construction of the project; posting a financial assurance approved by the Agencies to ensure successful implementation of vernal pool restoration and enhancement, upland restoration and maintenance, and overall monitoring; and funding a perpetual management, maintenance and monitoring plan. Implementation of these and the other proposed conservation measures discussed above will

minimize and offset the direct effects of the project on individual San Diego fairy shrimp and their habitats and are expected to ensure the long-term viability of San Diego fairy shrimp populations in the project area.

The vernal pools on the project site are highly degraded and subject to ongoing threats due to lack of management. While the vernal pools within the project footprint will be permanently impacted, the identified vernal pool restoration, enhancement and management is expected to result in a net increase in the acreage and quality of the vernal pools occupied by the San Diego fairy shrimp on Otay Mesa and range-wide. Therefore, the proposed project is not expected to result in an appreciable reduction in the numbers, reproduction, or distribution of the San Diego fairy shrimp.

Impact on Recovery

As stated above, the Service's 5-year review for San Diego fairy shrimp estimated that there are approximately 137 complexes occupied by San Diego fairy shrimp throughout the species range (Service 2008a). We also recommended in the 5-year review that the vernal pool recovery plan be updated to determine which of the known occurrences of San Diego fairy shrimp are needed for recovery of this species (Service 2008a). This evaluation has not been accomplished for the San Diego fairy shrimp.

Therefore, we are evaluating potential impacts to vernal pool complexes occupied by San Diego fairy shrimp on a project-specific basis to determine the impact of the project on the recovery of these species. For complexes that are not identified specifically in the vernal pool recovery plan, such as the complex at the Vista Del Mar Elementary School project site, we have supported a conservation strategy[2] that allows 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, minimizes edge effects) that helps ensure their long-term viability and supports recovery of the species. Because the onsite habitat at the Vista Del Mar Elementary School project site is highly disturbed with no management actions in existence or planned, we determined that following this same conservation approach would not preclude recovery of the San Diego fairy shrimp.

The proposed restoration and enhancement will be consistent with vernal pool recovery plan Task 2 (i.e., to reestablish vernal pool habitat to historic structure and composition) and Task 3 (i.e., to rehabilitate and enhance secured vernal pool habitats and their constituent species). The vernal pool recovery plan also emphasizes the need to manage and monitor protected habitat (see Recovery Tasks 4 and 5). Consistent with these tasks, the restoration and enhancement areas will be managed in perpetuity by a natural lands manager after the initial installation and 5-year monitoring period. The project is expected to result in a net increase in the acreage and quality of vernal pool habitat occupied by the San Diego fairy shrimp on Otay Mesa. Thus, the

[2] For other projects using this approach, please refer to the Robinhood Ridge biological opinion 1-6-97-F-57 (Service 1997); Calterraces biological opinion 1-6-95-F-35 (Service 1995), Sweetwater High School District biological opinion 1-6-99-F-77 (Service 1999), and Candlelight Villas biological opinion FWS-SDG-08B0715-08F0817 (Service 2008b).

breeding, feeding, and sheltering functions of the onsite habitat to San Diego fairy shrimp lost to project construction will be replaced and improved, and the overall project will be consistent with the habitat reestablishment and management goals outlined in the vernal pool recovery plan for the San Diego fairy shrimp.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. We have not identified any State, Tribal, local, or private actions within the action area that should be considered in this biological opinion.

CONCLUSION

After reviewing the current status of the San Diego fairy shrimp, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is the Service's biological opinion that development of the Vista Del Mar Elementary School, as proposed, is not likely to jeopardize the continued existence of the San Diego fairy shrimp.

The Service reached this conclusion for the following reasons:

1. Impacts from the Vista Del Mar Elementary School project will affect only 1 of the approximately 137 (less than 1 percent) vernal pool complexes known to support San Diego fairy shrimp within its U.S. range.

2. All of the individual pools to be impacted are highly degraded and subject to ongoing threats due to lack of management.

3. The loss of 0.02 ac (0.01 ha) (10 pools) supporting San Diego fairy shrimp will be offset through restoration and perpetual management of a minimum of 15 [0.10 ac (0.04 ha)] vernal pools at the West Otay Mesa B parcel that will support San Diego fairy shrimp. This action is expected to result in at least five times the amount of San Diego fairy shrimp vernal pool habitat that will be lost on site.

4. The restoration actions proposed likely will be successful because the restoration will be implemented in an area that likely supported vernal pools historically (soil types necessary to sustain vernal pool habitat are present) and the methods proposed for this restoration effort have been successful on other Otay Mesa sites.

5. The project supports recovery of the San Diego fairy shrimp because it is consistent with the overall habitat reestablishment and management goals outlined for the species in the vernal pool recovery plan (Service 1998); specifically, the project is expected to result in a

net increase in the acreage and quality of the vernal pools occupied by the San Diego fairy shrimp on Otay Mesa through the restoration and management of at least 15 [0.10 ac (0.04 ha)] vernal pools on the West Otay Mesa B parcel in a configuration that maintains habitat function and species viability.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary and must be implemented by the Corps and/or the Applicant (i.e., project proponent) in order for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity that is covered by this incidental take statement. If the Corps and/or Applicant (1) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

To monitor the impact of incidental take, the Corps and/or the Applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

The Service anticipates that it will be difficult to quantify the exact number of San Diego fairy shrimp cysts that could be affected by the proposed action because the exact population size of fairy shrimp species is difficult to estimate due to the dynamic conditions associated with their habitat. The reproductive success of fairy shrimp is dependent on seasonal fluctuations in their habitat, such as presence or absence of water during specific times of the year, duration of inundation, and other environmental factors that likely include specific salinity, conductivity, dissolved solids, and pH levels. Therefore, the population of fairy shrimp in any given pool varies dramatically.

Because the precise number of individual San Diego fairy shrimp cysts that will be taken cannot be determined, we have established take thresholds based on the number and area of pools impacted. If any take threshold is exceeded, it will trigger reinitiation of consultation.

Take of San Diego fairy shrimp cysts is authorized as follows:

- Collection of San Diego fairy shrimp cysts from pool basins within the project footprint of the proposed Vista Del Mar Elementary School for subsequent translocation into restored and/or enhanced pools on the West Otay Mesa B parcel; and death and injury of San Diego fairy shrimp cysts as a result of these collection and translocation efforts. The take threshold will be met if San Diego fairy shrimp cysts are identified and collected from more than 10 pools or 0.02 ac (0.01 ha) of vernal pool habitat within the project site's development footprint.

- Following collection and salvage actions, death and injury of, or harm to, San Diego fairy shrimp cysts remaining within the 10 pools identified for grading and filling within the project site's development footprint. The take threshold will be met if more than 10 pools or 0.02 ac (0.01 ha) of vernal pool habitat within the project site, development footprint are identified and impacted.

- Collection of San Diego fairy shrimp cysts from the West Otay Mesa B parcel and/or other offsite donor vernal pools identified and approved by the Agencies on Otay Mesa for subsequent translocation into restored and/or enhanced pools on the West Otay Mesa B parcel; and death and injury of San Diego fairy shrimp cysts as a result of these collection and translocation efforts. The take threshold will be met if more than 10 percent of the basin area of any donor pool is impacted.

- Death and injury of, or harm to, San Diego fairy shrimp cysts within the 32 pools identified for restoration and/or enhancement at the West Otay Mesa B parcel by crushing, burying with sediment, or changes to habitat characteristics associated with the proposed restoration/enhancement. The take threshold will be met if more than 32 pools are identified for restoration and are subsequently impacted without notifying the CFWO.

EFFECT OF THE TAKE

In the accompanying biological opinion, we determined that this level of take is not likely to result in jeopardy to San Diego.

REASONABLE AND PRUDENT MEASURE

The project proponent is implementing significant conservation measures to offset the incidental take of San Diego fairy shrimp during construction and implementation of the Vista Del Mar Elementary School project. We have not identified any other measures that would further minimize this incidental take of these species. We believe the following reasonable and prudent

measure is necessary and appropriate to monitor the incidental take of San Diego fairy shrimp and to provide a trigger for reinitiation of consultation, if necessary.

1. The Corps and/or project Applicant will monitor and report on compliance with the established take thresholds for San Diego fairy shrimp prior to and following construction impacting occupied pools at the Vista Del Mar Elementary School project site.

TERMS AND CONDITION

To be exempt from the prohibitions of section 9 of the Act, the Corps and/or Applicant must comply with the following term and condition, which implements the reasonable and prudent measure described above. This term and condition is non-discretionary.

1.1 The Corps and/or Applicant will notify the CFWO in writing within 30 days of collecting the San Diego fairy shrimp cysts from the 10 vernal pools at the Vista Del Mar Elementary School project site;

1.2 The Corps and/or Applicant will provide a report to the CFWO within 60 days of completing project construction documenting that no more than 10 pools or 0.02 ac (0.01 ha) of vernal pool habitat were impacted at the Vista Del Mar Elementary School project site;

1.3 The Corps and/or Applicant will notify the CFWO if more than 32 pools occupied by San Diego fairy shrimp are identified for restoration or enhancement at the West Otay Mesa B parcel

1.4 Consistent with the vernal pool restoration/enhancement plan, the Corps and/or Applicant will provide annual reports for each of the years in which restoration and enhancement activities take place (minimum of 5 years) at the West Otay Mesa B parcel. The annual reports will include a summary of actions at each of the 32 restoration or enhancement pools that may have resulted in impacts to San Diego fairy shrimp; and identify all San Diego fairy shrimp cyst donor pools and confirm that no more than 10 percent of the basin area of any donor pool was impacted by cyst collection.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans or to develop information.

1. Wherever possible, for all projects involving vernal pools, the Corps should work with project applicants to establish a minimum 100-ft (30.5-m) wide habitat buffer to be preserved around vernal pools and their watersheds to limit the more immediate indirect edge effects caused by surrounding development and to ensure natural hydrological regimes are maintained.

REINITIATION NOTICE

This concludes formal consultation on the development of the Vista Del Mar Elementary School Project, as outlined in the request for initiation. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions or concerns about this biological opinion, please contact Patrick Gower of my staff at (760) 431-9440.

Sincerely,

Jim A. Bartel
Field Supervisor

LITERATURE CITED

City of San Diego. 1997. Multiple Species Conservation Program: City of San Diego MSCP Subarea Plan. 109+ pp.

City of San Diego. 2004. City of San Diego vernal pool inventory. 125+ pp.

Glenn Lukos Associates. 2008. Wetland delineation for the 18.6-acre San Ysidro School site, San Diego, San Diego County, California. 18+ pp.

Hathaway, S. A. and M. A. Simovich. 1996. Factors affecting the distribution and co-occurrence of two southern California anostracans (Branchiopoda), *Branchinecta sandiegonensis* and *Streptocephalus woottoni*. *Journal of Crustacean Biology* 16(4):669-677.

HELIX Environmental Planning, Inc. 2008. Dry season protocol survey report for the San Diego fairy and Riverside fairy shrimp. 6 pp.

HELIX Environmental Planning, Inc. 2010. Vista Del Mar Elementary School vernal pool preserve restoration plan. 30+ pp.

KEA Environmental. 1998. Summary of restoration potential on The Environmental Trust vernal pool preserve, West Otay Mesa. 9+ pp.

Mariposa Biology. 2008. Results of wet season fairy shrimp surveys on the San Ysidro Elementary School 8 Site for 2007-2008. 9 pp.

The Planning Center [TPC]. 2009a. Final Vista Del Mar Elementary School subsequent environmental impact report. SCH NO. 2004111054. 100+ pp.

Ripley, B. J., J. Holtz, and M. A. Simovich. 2004. Cyst bank life-history model for a fairy shrimp from ephemeral ponds. *Freshwater Biology*. 49:221-231.

Sawyer, J. O., T. Keeley-Wolf, and J. M. Evans. 2009. A manual of California vegetation. California Native Plant Society Press, Sacramento, California. 1300 pp.

U.S. Fish and Wildlife Service (Service). 1995. Biological opinion for Calterraces, San Diego County, California (FWS-SDG-1-6-95-F-35). 30 pp.

U.S. Fish and Wildlife Service (Service). 1998. Biological opinion for Robinhood Ridge, San Diego County, California (FWS-SDG-1-6-97-F-57). 18 pp.

U.S. Fish and Wildlife Service (Service). 1998. Recovery plan for vernal pools of southern California. U.S. Fish and Wildlife Service, Portland, Oregon. U.S. Fish and Wildlife Service, Portland, Oregon. 113+ pp.

U.S. Fish and Wildlife Service (Service). 2008a. San Diego fairy shrimp (*Branchinecta sandiegonensis*) 5-year review: Summary and evaluation. Prepared by the Carlsbad Fish and Wildlife Office, Carlsbad, California. 56 pp. + appendices.

U.S. Fish and Wildlife Service (Service). 2008b. Biological opinion for Candlelight Villas Project, San Diego County, California (FWS-SDG-08B0715-08F0817). 65 pp.

ENCLOSURE

Measures to avoid and minimize potential adverse effects to the coastal California gnatcatcher (*Polioptila californica californica*) from the Vista Del Mar Elementary School Project

The Vista Del Mar Elementary School project includes the following conservation measures that the San Ysidro School District has committed to implement to avoid and minimize potential adverse effects to the gnatcatcher and to support a determination by the U.S. Fish and Wildlife Service (Service) that the project is consistent with the City of San Diego's Subarea Plan and its associated implementation agreement and Endangered Species Act (Act) section 10(a)(1)(B) permit.

1. Project activities will occur between August 15 and March 1 to avoid the gnatcatcher nesting season;

2. To offset the loss of 0.13 ac (0.052 ha) of maritime succulent scrub and 6.83 ac (2.76 ha) of Diegan coastal sage scrub, the remaining 4.74 ac (1.92 ha) of habitat on site will be preserved. This preserved land will be deeded over to the City of San Diego (City) for conservation in perpetuity as a component of the City's Multi-Habitat Planning Area (MHPA). The City will accept long-term management responsibility for the onsite preserved land. An additional 2.10 ac (0.85 ha) of coastal sage scrub credit will be purchased in the City of San Diego's Marron Valley Cornerstone Mitigation Bank. The District will provide proof of credit purchase to the Agencies prior to initiating project impacts;

3. Prior to project construction, the District will temporarily fence (with silt barriers) the limits of project impacts (including construction staging areas and access routes) to prevent additional habitat impacts and prevent the spread of silt from the construction zone into avoided adjacent areas. The entire impact limits will be fenced with silt fencing and/or orange construction fencing that will be maintained throughout the construction period to preclude human entry into the MHPA. Fencing will be installed in a manner that does not impact avoided habitats. No construction activities, materials, or equipment will be permitted outside the fenced project footprint. The District will submit to the Service and U.S. Army Corps of Engineers (Corps) (hereafter referred to collectively as the Agencies) for approval, at least 7 days prior to initiating project construction for each phase, final construction plans that include photographs of the fenced limits of impact and all areas to be impacted or avoided. If work occurs beyond the fenced limits of impact, all work will cease until the problem has been remedied to the satisfaction of the Agencies. Any impacts to riparian/wetland, upland habitat, and habitat for gnatcatcher or other federally listed species that occur beyond the approved fenced area will be offset as approved by the Agencies. Temporary construction fencing will be removed upon project completion;

4. Drainage from the construction area, new and proposed parking lots and developed areas in and adjacent to the preserve will not drain directly into the MHPA. The use of structural

and non-structural Best Management Practices, Best Available Technology, the restriction of grading and paving activity during a significant rain event, and the use of sediment catchment devices downstream of construction and paving activities will reduce potential impacts associated with construction. The project design will comply with the Standard Urban Stormwater Management Plan and Municipal Stormwater Permit criteria of the State Water Resources Control Board and the Clean Water Act section 401 Water Quality Certification issued by the Regional Water Quality Control Board for the Project.;

5. All lighting, including night lighting for project construction, installed in the vicinity of the MHPA, native vegetation communities, and other open space will be directed away or shielded to prevent light overspill. Streetlights will be low-intensity and shielded to minimize illumination of the adjacent MHPA. Night lighting of construction areas will be of the lowest illumination necessary for human safety, selectively placed, shielded and directed away from natural habitats;

6. Uses in or adjacent to the MHPA should be designed to minimize noise impacts. Berms or walls should be constructed adjacent to commercial areas, recreational areas, and any other use that may introduce noises that could impact or interfere with wildlife use of the MHPA. Excessively noisy uses or activities adjacent to breeding areas must incorporate noise reduction measures and be curtailed during the breeding season of sensitive species. Adequate noise reduction measures should also be incorporated for the remainder of the year;

7. If project construction (other than clearing and grubbing of sensitive habitats) is necessary adjacent to preserved on and offsite habitat during the gnatcatcher breeding season (March 1 to August 15, or sooner if a qualified biologist demonstrates to the satisfaction of the Agencies that all nesting is complete), a qualified biologist will conduct pre-construction surveys in the adjacent habitat to determine the location of any active gnatcatcher nests in the area. The biologist must be knowledgeable of gnatcatcher biology and ecology and have a minimum 3 years of experience. The survey should begin not more than 3 days prior to the beginning of construction activities. The Agencies will be notified if any nesting gnatcatchers are found. During construction, no activity will occur within 500 feet of active gnatcatcher nest, unless measures are implemented to minimize the noise and disturbance to those adjacent birds. Exceptions to this measure includes cases where surveys confirm that adjacent habitat is not occupied or where noise studies confirm that construction noise levels are below 60 dBA hourly L_{eq} along the edge of adjacent habitat. If construction activities are not completed prior to the breeding season and noise levels exceed this threshold, noise barriers will be erected to reduce noise impacts to occupied habitat to below 60 dBA hourly L_{eq} and/or the culpable activities will be suspended;

8. Storage and staging areas will be placed as far from sensitive areas as possible and kept free from trash and other waste. Staging areas for construction work will be located within previously disturbed sites and not adjacent to or within sensitive habitat. All construction-related debris will be removed off site to an approved upland disposal facility (not waters of the U.S., including Corps jurisdictional wetlands);

9. The changing of oil, refueling, and other actions that could result in a release of a hazardous substance will be restricted to designated areas that are a minimum of 100 ft (30.5 m) from any drainages. Such designated areas will be surrounded with berms, sandbags, or other barriers to further prevent the accidental spill of fuel, oil, or chemicals. Any accidental spills will be immediately contained, cleaned up, and properly disposed;

10. Impacts from fugitive dust will be avoided and minimized through watering and other appropriate measures;

11. The District will install permanent protective fencing along any interface with developed area, and/or use other measures approved by the Agencies, to deter human incursion into the biological conservation easement areas. Fencing will 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, especially cats. Signage for the biological conservation easement areas will be posted and maintained at conspicuous locations. Plans for fencing and/or other preventative measures will be submitted to the Agencies for approval at least 60 days prior to initiating project impacts. Fencing, as approved by the Agencies, will be installed within 60 days of execution of the conservation easement;

12. The District will ensure that development landscaping adjacent to the biological conservation easement area(s) does not include nonnative plant species that may be invasive to native habitats. Nonnative plant species not to be used include any species listed on the California Invasive Plant Council's (Cal-IPC) "Invasive Plant Inventory" List. This list includes such species as pepper tree, pampas grass, fountain grass, ice plant, myoporum, black locust, capeweed, tree-of-heaven, periwinkle, sweet alyssum, English ivy, French broom, Scotch broom, and Spanish broom. A copy of the complete list can be obtained from Cal-IPC's web site at http://www.cal-ipc.org. Plants that require intensive irrigation, fertilizers, or pesticides should not be used in landscaping adjacent to preserve areas and water runoff from landscaped areas should be directed away from the biological conservation easement areas and contained and/or treated within the development footprint. The District will submit a draft list of species to be included in the landscaping to the Agencies for approval at least 30 days prior to initiating project impacts. The District will submit to the Service the final list of species to be included in the landscaping within 30 days of receiving approval of the draft list of species. The District will not initiate project impacts until the list of species to be included in the landscaping is approved by the Agencies;

13. Any planting stock to be brought onto the project site for landscape or habitat creation/ restoration/enhancement will be first inspected by a qualified pest inspector to ensure it is free of pest species that could invade natural areas, including but not limited to, Argentine ants (*Iridomyrmex humil*), fire ants (*Solenopsis invicta*), and other insect pests. Any planting stock found to be infested with such pests will not be allowed on the project site or within 300 ft (91.4 m) of natural habitats unless documentation is provided to the Agencies that these pests already occur in natural areas around the project site. The stock will be quarantined, treated, or disposed of according to best management principles by qualified

experts in a manner that precludes invasions into natural habitats. The District will ensure that all temporary irrigation will be for the shortest duration possible, and that no permanent irrigation will be used, for landscape or habitat creation/restoration/ enhancement;

14. The District will provide a qualified project biologist for each phase of project construction who will be responsible for overseeing compliance with protective measures for the gnatcatcher and will be approved by the Agencies. The project biologist must be knowledgeable of gnatcatcher biology and ecology and have a minimum 3 years of experience. The District will submit the project biologist's name, address, telephone number, and work schedule on the project to the Agencies at least 30 days prior to initiating project impacts. The project biologist will perform the following duties:

    a. Be on site during work and/or grading adjacent to areas to be preserved to ensure compliance with all conservation measures;

    b. Oversee installation of and inspect the fencing and erosion control measures within the 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;

    c. Periodically monitor the work area to ensure that work activities do not generate excessive amounts of dust;

    d. 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 will include: 1) the purpose for resource protection; 2) a description of the gnatcatcher and its/their habitat(s); 3) the conservation measures given in the biological opinion that should be implemented during project construction to avoid and/or minimize impacts to the gnatcatcher, including strictly limiting activities, 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) the protocol to resolve conflicts that may arise at any time during the construction process; 5) the general provisions of the Act, the need to adhere to the provisions of the Act, and the penalties associated with violating the Act;

    e. Halt work, if necessary, for any project activities that are not in compliance with the conservation measures committed to as part of the project and specified in this biological opinion and conditions of the Corps permit. The biologist will report any non-compliance issues to the Agencies within 24 hours of its occurrence and confer with the Agencies to ensure the proper implementation of species and habitat protection measures; and

f. Submit a final report to the Agencies within 60 days of project completion that includes: as-built construction drawings with an overlay of habitats that were impacted or preserved, photographs of the minimization and avoidance measures, and other relevant information documenting that authorized impacts were not exceeded and that general compliance with the project as described in this biological opinion, including the conservation measures, was achieved.

15. The Construction Manager will keep the project biologist up-to-date with current plans for each phase. A pre-construction meeting will be conducted with the project biologist, the vernal pool restoration biologist, and construction supervisors prior to all earthwork. The Agencies will be invited to the pre-construction meeting with 14 days advance notice. The contractors will be informed that the fenced areas are "no-entry" areas for the duration of construction. Each employee (including temporary, contractors, and subcontractors) will participate in a training/awareness program that will be presented by the project biologist(s), prior to working on the proposed project. At a minimum, the program will include the following topics:

a) The purpose for resource protection;

b) A description of the gnatcatcher and its habitats;

c) The conditions of the Corps permit and the conservation measures described in the Service's biological opinion and the that should be implemented during project construction to conserve sensitive habitats, including strictly limiting activities, 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);

d) Project features designed to reduce impacts to these species and promote their persistence/survival within the project area;

e) Employees will strictly limit their activities, vehicles, equipment, and construction materials to the fenced project footprint;

f) To avoid attracting avian predators, the project site will be kept as clean of debris as possible. All food related trash items will be enclosed in sealed containers and regularly removed from the site;

g) Pets of project personnel will not be allowed on the project site;

h) Disposal or temporary placement of excess fill, brush or other debris will not be allowed in avoided waters of the U.S., as identified by flagging and/or fencing;

i) The protocol to resolve conflicts that may arise at any time during the construction process;

j) The general provisions of the Act, the need to adhere to the provisions of the Act, and the penalties associated with violating the Act; and

k) A fact sheet that includes color photographs of the listed species, which will be shown to the employees. Following the education program, the fact sheet will be posted in the contractor and Resident Engineer's office, where they will remain through the duration of the Project. The District and the biologist(s) will be responsible for ensuring that employees are aware of the listed species.

16. The District will execute and record a perpetual biological conservation easement over the onsite preserve. This easement will be in favor of an entity approved by the Agencies. The Service will be named as third party beneficiary in the conservation easement and the terms of the easement will be approved by the Agencies prior to its execution. This easement will state that no other easements or activities (e.g., fuel modification zones, public trails, drainage facilities, walls, maintenance access roads) that would result in soil disturbance and/or vegetation removal will be allowed within the biological conservation easement area. The District will submit a draft conservation easement agreement to the Agencies for review and approval at least 90 days prior to initiating project impacts and will not initiate project impacts until the easement is approved by the Agencies. The District will submit the final easement and evidence of its recordation to the Agencies within 90 days of recordation of the final map;

17. The District will implement a perpetual long-term management, maintenance and monitoring plan (e.g., HMP) for the biological conservation easement areas. The HMP should include, but not be limited to, the following: method of protecting the resources in perpetuity (e.g., conservation easement); monitoring schedule; measures to prevent human and alien species encroachment; funding mechanism; and contingency measures should problems occur. The easement holder will designate a qualified organization or individual with suitable natural resource management experience and approved by the Agencies to manage the site. The District will also establish a non-wasting endowment in an amount approved by the 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, non-profit organization, or other entity approved by the Agencies. The District will submit a draft HMP including a description of perpetual management, maintenance and monitoring actions and the PAR or other cost estimation results for the non-wasting endowment to the Agencies for approval at least 90 days prior to initiating project impacts. The District will submit the final HMP to the Agencies and transfer the funds for the non-wasting endowment to a non-profit conservation entity, within 60 days of receiving approval of the draft plan. The District will not initiate project impacts until the HMP is approved and a funding mechanism acceptable to the Agencies is in place.

APPENDIX C
Site Photographs Year 1

Photograph 1: Restoration Site Vernal Pool CRAM

Photograph 2: Restoration Site Vernal Pool CRAM

SOURCE: ESA, 2012.

Photograph 3: Restoration Site Fairy Shrimp Sampling

Photograph 4: Restoration Site Fairy Shrimp Sampling

SOURCE: ESA, 2012.

Photograph 5: Otay Mesa High School Site Vegetation Monitoring

Photograph 6: Otay Mesa High School Site Vegetation Monitoring

SOURCE: ESA, 2012.

Photograph 7: J26 Complex Site Vegetation Monitoring

Photograph 8: J26 Complex Site Vegetation Monitoring

SOURCE: ESA, 2012.

APPENDIX D

J26 Vernal Pools Complex Programmatic Reference Pool Monitoring Protocol

J26 VERNAL POOL COMPLEX PROGRAMMATIC REFERNCE POOL MONITROING PROTOCOL

Introduction

This memo addresses post-restoration monitoring methods for the programmatic reference vernal pools in the J26 vernal pool complex. The following vegetation monitoring methods are part of a post-restoration monitoring protocol specifically designed to programmatically monitor the success of vernal pool restoration projects on the Otay Mesa. The use of a programmatic reference site for vernal pool restoration projects will reduce monitoring-associated impacts on the remaining natural Otay Mesa vernal pools by collecting one set of monitoring data for all Otay Mesa vernal pool restoration projects.

The stipulation for this memorandum is the identification of vernal pool complex J26 as a suitable reference site for this programmatic monitoring approach. J26 has been used as a reference site for multiple restoration projects, including the restoration of vernal pools above Johnson Canyon as mitigation for the SR-125 construction project (EDAW 2005 – 2008), and data from these previous monitoring efforts are available. Monitoring data will be housed with the San Diego Management and Monitoring Program's (SDMMP) South Coast Multi Taxa database (www.mtx.sdmmp.com). The development of this database is in progress and data entry will be coordinated directly with SDMMP.

Data collection has begun in 2011 for the Vista del Mar Elementary School vernal pool restoration project. The data collected from 2012 onward will also benefit the following projects: State Route 11, Otay Mesa East Port of Entry, Otay Crossing Commerce Park and Otay Business Park.

This memo specifically addresses the 5-year monitoring requirements for a vernal pool restoration project that is part of a comprehensive mitigation program associated with construction of the San Ysidro School District's (SYSD) Vista Del Mar Elementary School. The vernal pool restoration project is being implemented in compliance with the following regulatory agency authorizations: Department of the Army Permit No. SPL-2009-00028-LLC, the Biological Opinion (FWS-SDG-09BO258-11F0076), and the Water Quality Certification No. 09C-017 (WDID 9-000001990). In accordance with these authorizations, an approximate one-acre vernal pool restoration site has been

installed within the City of San Diego West Otay Mesa Parcel B Vernal Pool Preserve. Installation was completed on March 23, 2012.

In addition to the above-referenced regulatory agency authorizations, the 5-year monitoring requirements for the SYSD vernal pool restoration site are guided by a vernal pool restoration plan that was approved by the agencies in 2011. That restoration plan addresses the enhanced and created vernal pools as well as the upland vegetation within the surrounding vernal pool watersheds onsite. This memo only pertains to the vernal pool monitoring requirements; implementation of the upland vegetation monitoring will follow the methods prescribed by the restoration plan.

Proposed Vegetation Monitoring Methods

The following vegetation monitoring methods are part of a post-restoration monitoring protocol specifically designed to monitor the success of vernal pool restoration projects on the Otay Mesa on a programmatic level. The use of a programmatic reference site for vernal pool restoration projects will reduce monitoring-associated impacts to the remaining natural vernal pools on the mesa. The stipulation for this memorandum is the identification of vernal pool complex J26 as a suitable reference site for this programmatic monitoring approach. J26 has been used as a reference site for multiple restoration projects, including the restoration of vernal pools above Johnson Canyon as mitigation for the SR-125 construction project (EDAW 2005 – 2008), and data from these previous monitoring efforts are available. Monitoring data will be housed within the San Diego Management and Monitoring Program's (SDMMP) South Coast multi-taxa database (http://www.sdmmp.com/SCMTX.aspx). The development of this database is in progress and data entry will be coordinated directly with SDMMP.

The Vista del Mar Elementary School project is the first vernal pool restoration project that would use the J26 complex as part of this programmatic monitoring approach. Vegetation monitoring is only one aspect of post-restoration monitoring. Because the project is at the tail end of the 2012 spring growth season, the development of a vegetation monitoring sampling design is of utmost importance, and is therefore prioritized in this memorandum.

Qualitative (Horticultural) Monitoring

The restoration and reference sites will be monitored monthly in the first year and quarterly for the remainder of the monitoring years. Qualitative surveys will give an overview of the general progress of the site, including the observation of invasive species, debris, trash, access issues, erosion, and other potential problems. Qualitative monitoring will consist of a general site walk-through and a characterization of the restoration planting. General observations, such as health of planted and seeded species, signs of over/under watering, and drought stress will be noted. Restoration plantings will be examined to visually estimate species mortality, species composition, seedling recruitment, and soil, weed, and pest problems.

Quantitative (Botanical) Monitoring

The following quantitative methods will be employed for all selected monitoring pools in the treatment (restored) and control (reference) sites; the same protocols must be used for the treatment and control pools to yield meaningful results. The purpose of quantitative sampling is to compare the restored pools to reference site to quantify the restoration success and determine, over time, the overall function of the restored vernal pool system compared to a naturally occurring system.

Quantitative monitoring of vernal pool flora will be taken along transects using the point intercept line transect sampling methods described in the California Native Plant Society's Field Sampling Protocol (Sawyer and Keeler-Wolf 1995), and at established photo points. These methods are suitable to determine the overall richness, density, and species distribution in vernal pools.

For the Vista del Mar restoration project, at least two sentinel pools will be selected in each monitoring site (restoration and reference pools). In addition, two random pools will be selected each year. Within each pool, the vernal pool basin and periphery will be identified. Per the Vernal Pool Hydrogeomorphic Method Guidebook (Vernal Pool HGM, Bauder et al. 2009), the periphery is a 20-foot wide band of transitional habitat around the edge of the vernal pool basin; however, on the Otay Mesa, this band may much narrower. The edge of the vernal pool basins is the level of elevation of standing water at full capacity. The distinct basin edge may be characterized by an abrupt change in the presence or absence of algae and/or debris, vegetation, cobble density, or soil color over a very small distance (~10 cm in small pools to 1 m in large pools) around the majority of the pool perimeter; an indistinct edge does not show a contrast in these features over a small area (Bauder 2009). In addition, the deepest point of each monitoring pool will be permanently marked (in accordance with hydrological monitoring methods).

One transect will be placed across the longest part of each pool basin. The transect tape will be extended along the deepest point of each vernal pool from the outer edge of the pool perimeters on either side of the pool. Each transect end and the point between periphery and basin would be recorded with a sub-meter accuracy Global Positioning System (GPS) unit.

Point intercept data will be collected at each 1-meter interval using a thin metal rod; standing vegetation that is incident at the point where the rod is vertically placed will be recorded in a datasheet as the species epithet (flora and bare ground in separate columns). Species occurrence will be measured by placing 0.25-meter quadrats at each 2.5-meter intercept and recording all species within the quadrat.

To calculate total vegetation **percent cover**, the number of points that intercept live plant material is summed and divided by the total number of intercepts possible along that transect. Multiple hits of plants at a single point resulting from overlap of 2 or more

species are counted as a single hit for this calculation. To calculate the percent cover contributed by each species, the number of intercepts by each species is divided by the number of possible intercepts for the given transect.

All plant species observed within the 0.25-meter quadrat will be recorded, resulting in **species richness** (the number of species in a given area). All plants observed are categorized by origin (native/non-native) and stratum (herb, shrub), and by plant distribution categories (Bauder 2009). **Frequency** will be calculated by the number of quadrats in which a species occurred.

Permanent photo points will be marked using sub-meter accuracy GPS units. Photographs will be taken at the same time each year from the same locations and vantage point (i.e., by using photo-equipped GPS units) to monitor change over time. Direction, height and angle of photographs will be recorded to assure that the same vantage point will be used repeatedly over the monitoring period.

Other Elements of Post-Restoration Monitoring

A variety of monitoring methods have been developed to assess functions and values of vernal pools, including the regional hydrogeomorphic approach to assessing vernal pool function (Bauer et al. 2009), USFWS Multiple Species Conservation Program (MSCP) Animal Monitoring Protocols (USFWS 2008), the City of San Diego Vernal Pool Habitat Conservation Plan (HCP – in progress), and the recent California Rapid Assessment Method (CRAM) Vernal Pool Module (California Wetlands Monitoring Workgroup 2012). The Corp and RWQCB will likely require CRAM analysis for all vernal pool restoration projects following the established CRAM protocol; therefore, the implementation of a CRAM is not addressed in this monitoring protocol.

The regional Vernal Pool HGM (Bauder el al. 2009) will be used as a basic guidance to determine the compatibility of the J26 vernal pool complex with the restoration site for which J26 is used as a reference site. The following assessments[1] will be conducted to establish a baseline for the monitoring effort, including determining

- Position of vernal pool complex/restoration project in the landscape
- Watershed
- Connectivity to other vernal pool complexes or open space
- Disturbance factors (within and adjacent to the restoration/reference site)
- Surface features (vernal pool basin, vernal pool periphery)
- Soils
- Stratified Sampling Design.

These assessments will be conducted at the onset of the monitoring efforts and will only be needed once during the post-restoration monitoring phase.

[1] Protocol will be determined as part of this monitoring effort and are forthcoming.

Hydrological and biological assessments will be performed throughout the monitoring period using repeatable, replicable and quantifiable methods. Except for the vegetation monitoring methods described in this document, a detailed description of these methods will be forthcoming. The following lists the basic parameters of hydrological monitoring and branchiopod surveys.

Hydrological Monitoring

Without proper hydrological function, the success of vernal pool restoration is significantly compromised. Therefore, hydrological monitoring is extremely important. Vernal pools periodically fill with water during the wet season and, in most cases, slowly evaporate over a period of about six months. During the wet season, multiple wetting and drying cycles may occur. Because vernal pools in Southern California are small and shallow, and due to the variability of inundation periods, hydrological monitoring requires methods specifically designed to work in vernal pools. A variety of methods have been tested and successfully implemented, including

- Frequent (daily) visits to record water levels off rulers installed in the deepest portion of the pool;
- Frequent visits to record water levels from Visitubes (clear PVC tubes with a 'floater' (cork) that marks water levels);
- Data recording from stack-mounted i-Buttons (electronic, button-sized temperature/humidity data loggers); and
- Pressure transducers (non-vented water level recorders).

The first two methods are easy, but very labor intensive and data are not always reliable. The other two methods require technological instrumentation; data loggers are installed in the vernal pools data are downloaded and analyzed, thereby requiring less frequent site visits. While i-Buttons are less expensive, they are not as accurate as is ideal to record vernal pool hydrology. Pressure transducers work the best, but they are relatively costly.

Faunal/Branchiopod Sampling

The vernal pool faunal community should also be monitored to gauge the long-term success of vernal pool restoration and determine the health and vigor of vernal pool species. Because vernal pool restoration projects are typically the means of compensatory mitigation for regulatory purposes, emphasis is often placed on the recovery of federally or state listed species, such as listed branchiopods. However, the entire faunal community should be monitored, at least qualitatively, to document the overall success of the vernal pool ecosystem.

While population density and trend monitoring would require the application of dry-season sampling protocols, these methods disturb the vernal pool basin and potentially impact the function of the vernal pool when applied frequently. The application of dry season sampling will be assessed by USFWS on a case-by-case basis and is usually stipulated in the Biological Opinion or other permits issued for projects. While this type

of sampling is important to monitor long-term functions of branchiopod populations, it is not required for the monitoring of the Vista del Mar vernal pool restoration success, which will be accomplished by using wet-season presence/absence protocols. Therefore, USWFS-protocol level wet season fairy shrimp sampling will be conducted in 20% of the pools by certified biologists immediately after vernal pool grading, and during monitoring years 1, 3, and 5.

References

EDAW. 2005 – 2008. Monitoring Report for the State Route 125 South Vernal Pool and Quino Checkerspot Habitat Restoration Site. Annual monitoring reports to U.S. Fish and Wildlife Services, U.S. Army Corps of Engineers, Regional Water Quality Control Board and California Department of Fish and Game. California Department of Transportation and South Bay Expressway (formerly California Transportation Ventures, Inc.).

Bauder, Ellen T., Andrew J. Bohonak, Barry Hecht, Marie A. Simovich, David Shaw, David G. Jenkins, and Mark Rains. 2009. A Draft Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Vernal Pool Depressional Wetlands in Southern California. Updated November 8, 2011. San Diego State University, San Diego, CA

California Wetlands Monitoring Workgroup (CWMW). 2009. Using CRAM (California Rapid Assessment Method) to Assess Wetland Projects as an Element of Regulatory and Management Programs.

Deutschman, D., and Strahm, S. 2009. Improving Statistical Sampling and Vegetation Monitoring for the San Diego MSCP, 2008 Final Report, Contract 5001033. Prepared for The San Diego Association of Governments. San Diego, California.

U.S. Fish and Wildlife Service (USFWS). 2011. Formal Section 7 Consultation on the San Ysidro School District's Vista Del Mar Elementary School Project (Biological Opinion).

U.S. Fish and Wildlife Service (USFWS). 2008. Draft San Diego Multiple Species Conservation Program Animal Monitoring Protocols. Prepared for the City of San Diego. February 2008.

APPENDIX E

Fairy Shrimp Survey 90 Day Report

ESA Biological Resources

9191 Towne Centre Drive
Suite 340
San Diego, CA 92122
858.638.0900 phone
858.638.0910 fax

www.esassoc.com

July 13, 2012

Ms. Erin McCarthy
U.S. Fish and Wildlife Service
Carlsbad Field Office
6010 Hidden Valley Road
Carlsbad, CA 92009

Reference: 90-Day Report: Post-Survey Notification of Fairy Shrimp Surveys on the San Ysidro School District's Vista Del Mar Elementary Vernal Pool Restoration Area, community of San Ysidro within the City of San Diego - San Diego County, CA

Dear Ms. McCarthy:

As required by our federal endangered species permit (USFWS permit #TE-027736-5), this letter is to notify the U.S. Fish and Wildlife Service (USFWS) of our results of wet season surveys for listed vernal pool branchiopod (fairy shrimp) species. The road rut pool adjacent to the San Ysidro School District's Vista Del Mar Elementary Vernal Pool Restoration Area (Restoration Area) was surveyed on February 23, 2012. The Restoration Area vernal pools were surveyed on April 19, 2012.

1.0 Introduction

Branchiopod surveys were conducted on the restoration site, as detailed below, by ESA biologist Erik LaCoste, authorized under USFWS permit #TE-027736-5, and assisted by ESA biologist Joseph Henry. Surveys were conducted according to USFWS 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 (dated April 19, 1996).

All of the vernal pools within the Restoration Area (Figure 1) are being restored or enhanced through implementation of the agency approved *Vista Del Mar Elementary School Vernal Pool Restoration Plan for the Off-Site Preserve* (Helix 2011). A total of 18 existing pools have been restored and were inoculated with vernal pool soils (from the impact site and a restored vernal pool donor site adjacent to the restoration site) containing San Diego fairy shrimp (*Branchinecta sandiegonensis*) cysts. A total of 14 pools have been enhanced and inoculated with San Diego fairy shrimp cysts. The road rut pool adjacent to the restoration site was used as an inoculum source for the 14 newly created pools.

Name of project: Vista Del Mar Elementary School

Permittee: San Ysidro School District

Property Owner: City of San Diego

Location: The project is located within the Imperial Beach 7.5 minute U.S. Geologic Survey (USGS) Quadrangle, on the Otay Mesa in the community of San Ysidro within the City of San Diego, San Diego County, California (Figure 1).

Survey Area: The 1-acre survey area comprises 18 restored vernal pools (2, 5 through 10, 12 through 15, 22, 23, 27 through 29, 31, and 32) and 14 enhanced vernal pools (1, 3, 4, 11, 16 through 21, 24 through 26, and 30) in the San Ysidro School District's Vista Del Mar Elementary Vernal Pool Restoration Area. The road rut pool surveyed is immediately adjacent to the southeastern corner of the Restoration Area (Figure 2).

2.0 Fairy Shrimp Biology

Fairy shrimp hatch from eggs once their habitat, usually vernal pools, fills with water during winter months. Fairy shrimp mature and lay eggs while the pools are filled, and the eggs remain in the soil when the pools dry in spring. Fairy shrimp may remain as eggs for years until pools fill. Fairy shrimp eggs do not all hatch at once, and each time a pool fills in a single season new eggs may hatch (Eriksen and Belk 1999).

3.0 Survey Methods

Focused surveys for listed fairy shrimp species were performed by ESA biologist Erik LaCoste under USFWS permit #TE-027736-5; ESA biologist Joseph Henry assisted. A 10-day notification letter was submitted on January 26, 2012 and is attached to this report (Appendix A). The surveys followed USFWS survey protocol for conducting wet season surveys (USFWS 1996). The protocol requires that depressions be examined for filling 24 hours after storms and within two weeks if depressions are determined to be inundated, defined as holding more than three centimeters of water. The 32 pools included in this restoration project, and the single road rut pool, were surveyed during the 2011/2012 wet season. The project site was visited at several points during the 2011/2012 wet season to conduct various other project related tasks; vernal pool inundation levels were noted during each site visit.

On February 23, 2012, after recent rain events, Erik LaCoste and Joe Henry visited the project site again to perform protocol-level surveys to determine the presence of federally listed fairy shrimp within the road rut pool immediately adjacent to the Restoration Area. High densities of adult fairy shrimp were observed within the pool. The pool was sampled using a hand-held net, which was swept through the water and the net contents were examined for invertebrates. The temperature on site at the start of the survey was 54.0 degrees Fahrenheit (degrees), with winds between 2 and 4 miles per hour (mph), and mostly cloudy conditions. The temperature at the end of the survey was 56.0 degrees, with winds between 1 and 4 mph, and mostly cloudy conditions.

On April 19, 2012, after a recent rain event, Erik LaCoste and Joseph Henry visited the project site again to perform protocol-level surveys to determine the presence of federally listed fairy shrimp. To sample, a hand-held net was swept through the water and the net contents were examined for invertebrates. The depth and water temperature were measured during the surveys. The temperature on site at the start of the survey was 63.0 degrees, with winds between 1 and 3 (mph), and scattered clouds. The temperature at the end of the survey was 67.0 degrees, with winds between 4 and 6 mph, and scattered clouds.

4.0 Existing Conditions

During the 2011/2012 wet season, the San Diego County region experienced seasonally late rainfall, with below-average rainfall throughout most of the typical wet season. Grading of the restored and enhanced vernal pools was completed on February 10, 2012, and planting was completed in March 2012. Since the focused surveys were conducted, the Otay Mesa has received sporadic rainfall, and none of the pools are currently inundated, although several of the pools show signs of residual moisture as recent as June 6, 2012.

The 1-acre restoration site is located on a plateau within coastal sage scrub vegetation on the Otay Mesa; the area has historically contained vernal pools. Prior to restoration, the site had been disturbed by off-road vehicles and was previously owned by The Environmental Trust (TET). After TET declared bankruptcy, the site and conservation easement was transferred to the City of San Diego.

As part of the mitigation requirements for the Vista del Mar Elementary School construction, the site was seeded and planted with native vernal pool and upland coastal sage scrub species as a part of the restoration efforts. Pools 2, 5, 6 through 10, 12 through 15, 22, 23, 27 through 29, 31, and 32 are newly constructed pools, and pools 1, 3, 4, 11, 16 through 21, 24 through 26, and 30 are extant pools that were enhanced. All pools were constructed or recontoured in January and February 2012.

Pools 8 through 10, 13, and 14 were inoculated with soil from impacted vernal pools sat San Ysidro Elementary School construction site. Pools 1 through 7, 11, 12, and 15 through 32 were inoculated with soil from the Otay High School vernal pool restoration site, located adjacent to (west of) the project site. Additionally, pools 2, 5 through 7, 11, 12, 15, 22, 23, 27 through 29, 31, and 32 were inoculated with soil from a road rut pool, located adjacent to the southwestern corner of the project, which contained the federally-listed San Diego fairy shrimp (versatile fairy shrimp (*Branchinecta lindahli*) were absent from the road pool sample).

5.0 Survey Results

During the February 23, 2012 survey, the road rut pool was significantly inundated, and high densities of adult fairy shrimp were observed. The pool was sampled in accordance with USFWS protocol. A total of 10 male shrimp were collected during the survey, all of which were identified to be the federally-listed San Diego fairy shrimp. The survey results are included in Table 1.

During the April 19, 2012 survey, six pools (1, 3, 16, 22, 23, and 31) were dry or nearly dry, and were therefore not sampled (Figure 2). The remaining 26 pools were sampled with inundated pool maximum depth ranging from 1.3 to 10.8 centimeters. Water temperatures in the inundated pools ranged from 62.3 to 77.1 degrees Fahrenheit. Figure 2 illustrates the branchiopod survey results. The USFWS Vernal Pool Data Sheets for Wet Season Surveys (USFWS 1996) are appended to this report (Appendix B), and the physical data collected on these data sheets, as well as the results of the February 23, 2012 road rut pool sampling, are summarized in Table 1. Photographs of site conditions at the time of surveying can be found in Photographs 3 and 4.

Sub-adult fairy shrimp, immature due to limited growth time, were observed in 21 pools (2, 4 through 12, 14, 15, 18, 19, 21, 25 through 28, 30, and 32). The immature fairy shrimp in these depressions were identified to be *Branchinecta*. Identification to the species level was not possible due to developmental stage of the shrimp.

Concentrations of fairy shrimp varied, but were considered low or very low throughout, with population estimates ranging from ones in eight pools (8 through 12, 18, 19, and 32) to tens in 13 pools (2, 4 through 7, 14, 15, 21, 25 through 29, and 30). Photographs of pools and the general landscape of the site are provided (Photographs 1 through 5).

San Diego fairy shrimp were identified within pool 29 on April 19, 2012 with the aid of a microscope in a lab setting. The California Natural Diversity Database (CNDDB) California Native Species Field Survey Form is amended to this report (Appendix C). The collected voucher specimens will be accessioned to the *Los Angeles Natural History Museum, Crustacea Section, Invertebrate Zoology, 900 Exposition Boulevard, Los Angeles, California 90007*.

Surveys were not conducted after April 19 as the site has not received sufficient rainfall to fill dry pools, or for inundated pools to remain full since that time. This branchiopod sampling event is considered the first annual post-restoration survey for fairy shrimp, and the low densities reported above are not unexpected. The site will be surveyed each year for the next four years of post-restoration monitoring.

Table 1: Survey Results

Pool Number	Description	Size (ft^2)	Maximum Depth (cm)	Water Temperature (°F)	Presence of Fairy Shrimp
1	Enhanced	466.17	Dry	--	--
2	Newly Constructed	440.98	2.5	77.1	*Branchinecta* sp.
3	Enhanced	264.79	Dry	--	--
4	Enhanced	455.52	4.4	74.1	*Branchinecta* sp.
5	Newly Constructed	452.87	2.5	73.9	*Branchinecta* sp.
6	Newly Constructed	271.53	Dry	--	--
7	Newly Constructed	417.51	7.6	73.0	*Branchinecta* sp.
8	Newly Constructed	489.82	3.8	72.5	*Branchinecta* sp.
9	Newly Constructed	470.42	5.1	72.1	*Branchinecta* sp.
10	Newly Constructed	509.45	4.4	74.4	*Branchinecta* sp.
11	Enhanced	627.56	2.5	71.7	*Branchinecta* sp.
12	Newly Constructed	234.85	3.2	68.3	*Branchinecta* sp.
13	Newly Constructed	372.93	5.1	73.0	*Branchinecta* sp.
14	Newly Constructed	460.04	5.1	75.5	*Branchinecta* sp.
15	Newly Constructed	501.90	1.2	72.0	*Branchinecta* sp.
16	Enhanced	470.83	Dry	--	--

17	Enhanced	312.69	7.0	72.2	*Branchinecta* sp.
18	Enhanced	287.81	2.5	74.8	*Branchinecta* sp.
19	Enhanced	296.45	7.6	72.3	*Branchinecta* sp.
20	Enhanced	364.36	5.1	70.8	*Branchinecta* sp.
21	Enhanced	248.98	3.2	70.5	*Branchinecta* sp.
22	Newly Constructed	276.49	Dry	--	--
23	Newly Constructed	288.60	Dry	--	--
24	Enhanced	292.12	10.2	70.7	*Branchinecta* sp.
25	Enhanced	244.31	2.5	76.9	*Branchinecta* sp.
26	Enhanced	323.87	5.1	71.4	*Branchinecta* sp.
27	Newly Constructed	367.13	7.6	69.4	*Branchinecta* sp.
28	Newly Constructed	276.95	5.7	71.0	*Branchinecta* sp.
29	Newly Constructed	260.76	10.8	62.3	*B. sandiegonensis*
30	Enhanced	861.16	2.5	75.1	*Branchinecta* sp.
31	Newly Constructed	242.13	Dry	--	--
32	Newly Constructed	175.04	7.0	73.0	*Branchinecta* sp.
Road Rut	Existing/Off-site	217.80	Inundated	--	*B. sandiegonensis*

If you have any questions concerning the survey methods and results, please do not hesitate to contact me by phone at (760) 500-8802. Please contact Joseph Henry at (213) 219-9474 or by e-mail at jhenry@esaassoc.com if you have any questions about the project.

Sincerely,

Erik LaCoste
ESA | Biological Resources & Land Management
9191 Towne Centre Drive, Suite 340
San Diego, CA 92122
858.638.0900 office | 858.638.0910 fax
858.768.7901 direct | 213.219.9474 cell
Elacoste.bio@sbcglobal.net

6.0 References

Eriksen, C.H. and D. Belk. 1999. *Fairy Shrimps of California's Puddles, Pools, and Playas*. Mad River Press.

Helix Environmental Planning (Helix). February 2, 2011; amended by TAIC August, 5, 2011. *Vista Del Mar Elementary School Vernal Pool Restoration Plan for the Off-Site Preserve.* Prepared for San Ysidro School District.

U.S. Fish and Wildlife Service (USFWS). 1996. 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.

Attachments:

Figure 1: Project Location
Figure 2: Presence of Fairy Shrimp
Photograph 1: Site Conditions
Photograph 2: Site Conditions
Photograph 3: Sample Pool
Photograph 4: Sample Pool
Appendix A: 10-Day Notification Letter
Appendix B: USFWS Vernal Pool Data Sheets for Wet Season Surveys
Appendix C: CNDDB California Native Species Field Survey Form

APPENDIX F
CRAM Assessment

VISTA DEL MAR ELEMENTARY SCHOOL PROJECT

Year 1 California Rapid Assessment Method (CRAM) Report for Vernal Pool Systems

Prepared for:
San Ysidro School District
4350 Otay Mesa Road
San Ysidro, CA 92173

September 14, 2012

This page intentionally left blank

TABLE OF CONTENTS

VISTA DEL MAR ELEMENTARY SCHOOL PROJECT

California Rapid Assessment Method (CRAM) Report for Vernal Pool Systems

Contents

List of Tables

List of Figures

This page intentionally left blank

1.0 Introduction

The Vista del Mar Elementary School Project (Project) consists of two components: (1) constructing the Vista del Mar Elementary School; and (2) extending Del Sol Boulevard (Figure 1). The Project is under construction and involves impacts to sensitive vegetation communities, jurisdictional wetlands and sensitive plant and wildlife species, including 10 vernal pools and associated vernal pool endemic species. The impacted pools occur on non-native grassland, disturbed, and coastal sage scrub habitats and are generally associated with dirt roads. Other than one reported occurrence of little mousetail (*Myosurus minimus* ssp. *apus*) – a non-listed species, no sensitive vernal pool plant species were impacted by the Project; however federal and state endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*) in two pools were affected. As mitigation for these impacts, 32 vernal pools were created, restored or enhanced on a City-owned mesa top that is within the Otay Mesa West Preserve, located approximately 2,700 feet south of the Project impact site (Figure 2).

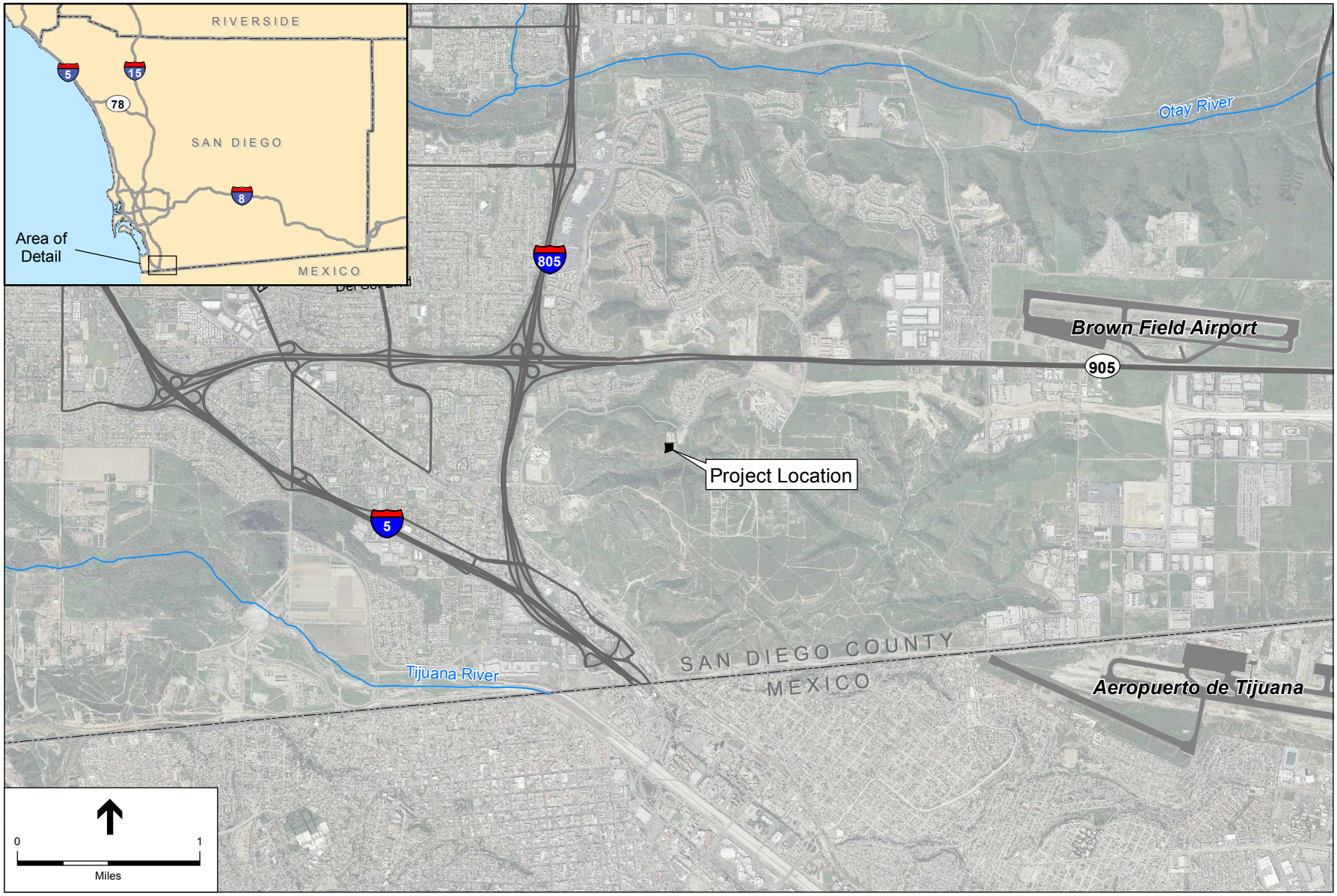
1.1 Purpose

In order to understand the impacts to functions and values of these resources, Helix Environmental Planning conducted an assessment based on the California Rapid Assessment Method (CRAM) on August 24, 2010, using the Individual Vernal Pool Field Book, Version 5.0.3 (March 2009). Because the vernal pool CRAM module has not been fully calibrated, the analysis was conducted primarily for informational purposes and to potentially further the calibration effort that is ongoing in California (Helix 2011 as amended by TAIC 2011).

Because the mitigated pools are required to replace or exceed the functions and values of the impacted pools, Helix used the results of the pre-construction analysis to determine the condition of the impacted vernal pools in order to identify the target conditions of the restored pools. In addition, a set of reference pools at the Robinhood Ridge area in Otay Mesa were also assessed by Helix in 2010 using CRAM (Individual Vernal Pool Field Book, Version 5.0.3). Results of this analysis helped establish a target condition that is based on existing, healthy restored pools in the vicinity of the Project.

1.2 CRAM Analysis Description

CRAM was developed by a consortium of local, state and federal agencies, wetland scientists, land managers and regulators as a means to monitor the conditions of wetlands in California. As described in the California Rapid Assessment Method for Wetlands and Riparian Areas User's Manual, Version 6 (O'Connor, 2012), the overall goal of CRAM is to "provide rapid, scientifically defensible, standardized, cost-effective assessments of the status and trends in the condition of

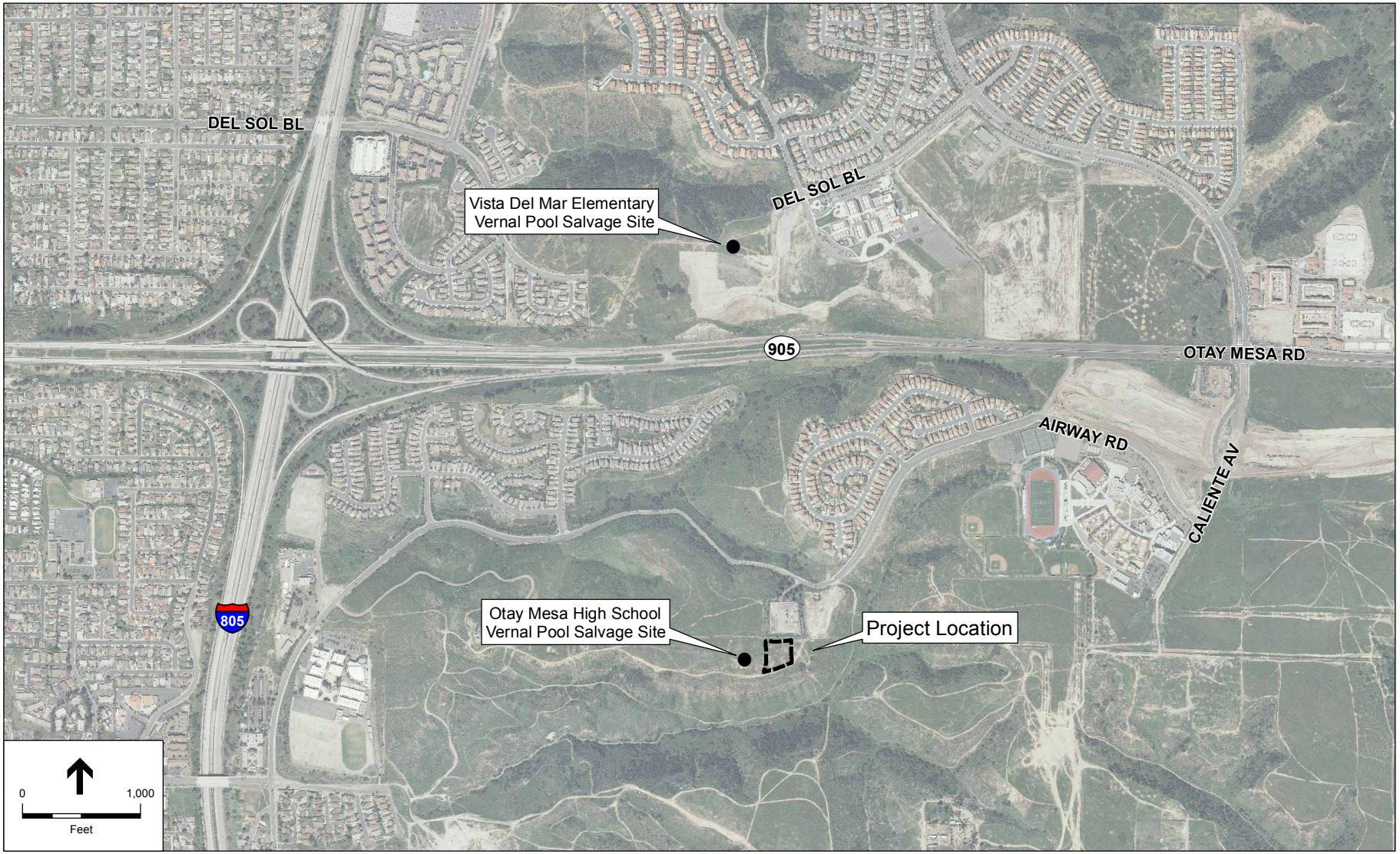


SOURCE: ESA, 2012.

Vista Del Mar Elementary School . 211685

Figure 1

Regional Location



SOURCE: Landiscor, 2010; RBF, 2012.

Vista Del Mar Elementary School . 211685

Figure 2

Site Map

wetlands and the performance of related policies, programs and projects throughout California."

To date, separate modules have been developed for the following types of wetlands: riverine (confined and non-confined), depressional (individual vernal pool, vernal pool systems and other depressional), slope (spring/seep and wet meadow), lacustrine, playa, and estuarine (perennial saline, perennial non-saline and seasonal). However, module development is an iterative process. After the initial design, the module is calibrated and validated. *Calibration* consists of clarifying and modifying the metrics; testing and selecting methods of scaling and weighting the attributes and associated metrics; and testing and selecting scoring formulas. As new information becomes available through increased use of CRAM throughout California, methods continue to be revised. *Validation* consists of using quantitative data about selected functions and values, such as water quality testing or biological surveys, to assess the overall performance of CRAM. Validation has been conducted for the riverine and estuarine modules. The other wetland types will be validated as CRAM is implemented (O'Connor, 2012).

To begin CRAM, background information about the wetland is collected and reviewed; the wetland is classified to the appropriate type; the appropriate assessment window is identified; and the Assessment Area (AA, the portion of the wetland that is assessed using CRAM) is delineated. The AA is defined based on a set of rules established for a specific wetland type. The next step is to conduct an office assessment of stressors and on-site conditions. The field assessment is then conducted by verifying the on-site conditions and scoring the AA based on the condition metrics of each attribute and filling out the stressor checklist.

By assessing the key attributes described below, it is possible to evaluate the condition of a given wetland and how well the wetland functions to provide ecological values. Each of these attributes has multiple metrics and/or submetrics that assess specific characteristics of that attribute. Scoring is conducted by giving each metric a letter score of A (highest), B, C or D (lowest) based on tables in the appropriate Fieldbook that describe four mutually exclusive conditions for that metric. The final calculations are done by converting the letter scores to their numeric values (A = 12, B = 9, C = 6, and D = 3) and using the appropriate calculations on the summary worksheet.

1. Buffer and Landscape Context

The *Landscape Connectivity* metric in previous versions of CRAM is now referred to as the *Aquatic Area Abundance* metric for this attribute. The *Aquatic Area Abundance* is a measure of the spatial association with other areas of aquatic habitat. It is assumed that wetlands in close proximity have the potential to interact beneficially both hydrologically and ecologically. A *Buffer* is defined as the area outside of the riparian or wetland AA. The function of the buffer is

to mitigate the effects of stressors that may affect the wetland. Three submetrics are used to assess the buffer: *Percent AA with Buffer*, *Average Buffer Width*, and *Buffer Condition*.

2. Hydrology

Three metrics are used to describe the *Hydrology* of an AA: *Water Source*, *Hydroperiod* and *Hydrologic Connectivity*. *Water Sources* affect the direct input of water into the AA or diversions of water away from the AA during the dry season, which affects the hydrological dynamics within an AA. *Hydroperiod* is a measure of the duration of saturation or inundation of a wetland during a typical year. *Hydrologic Connectivity* describes the degree to which water can move into or out of the wetland.

3. Physical Structure

Physical Structure is assessed through *Structural Patch Richness*, *Pool and Swale Density*, and *Topographic Complexity*. *Structural Patch Richness* is the number of different types of physical surfaces or features, which may provide habitat for aquatic, wetland or riparian species. *Pool and Swale Density* is a measure of hydrologic connectivity within an AA. *Topographic complexity* describes the variability of the micro- and macro-topography due to physical and abiotic features and elevation gradients.

4. Biotic Structure

The *Biotic Structure* of an AA is assessed by looking at the *Horizontal Interspersion*. The *Plant Community* metric is described by three submetrics: *Number of Co-dominant Species*, *Percent Non-native species*, and *Endemic Species Richness*. *Horizontal Interspersion* is assessed by looking at the spatial arrangement of different plant zones, and how much edge there is between them. Plant Community metrics are a measure of the native biological diversity within the AA.

Stressor Checklist

The *Stressor Checklist* is a worksheet that is filled out after all four attributes have been assessed to identify the factors that may affect the functions and values of the wetland system. CRAM defines a *stressor* as a human-caused disturbance that is likely to negatively impact the CRAM AA. Disturbances from natural phenomenon are also assessed. The worksheet is a useful tool that may help land managers prioritize management actions and may help in choosing an appropriate mitigation site for habitat restoration.

2.0 Methods

Following the methods described in Section 1.3 above, CRAM was conducted by ESA biologists Rosanne Humphrey (CRAM practitioner) and Kelcey Stricker on May 17, 2012, to assess the Year 1 condition of the restored vernal pools that will serve as mitigation for impacts to vernal pools on the Project site. The CRAM module used for this assessment was the *Vernal Pool Systems Field Book, Version 6.0* (2012). This module has been calibrated; however, minor refinements of the metrics and scoring may be made in the future as a result of validation efforts conducted by the California Wetlands Monitoring Workgroup (CWMW 2009). Six individual sample pools were chosen to capture the diversity of the site, including inoculum source, created vs. restored/enhanced pools, location within the restoration site (edge versus center), and size (small and large) (Figure 3). As part of the field assessment, scores were recorded for buffer and landscape context, hydrology, physical structure and biotic structure. Attribute and final AA scores were then calculated and the stressor checklists were filled out.

3.0 Results and Discussion

3.1 Impacted Pools and Reference Pools

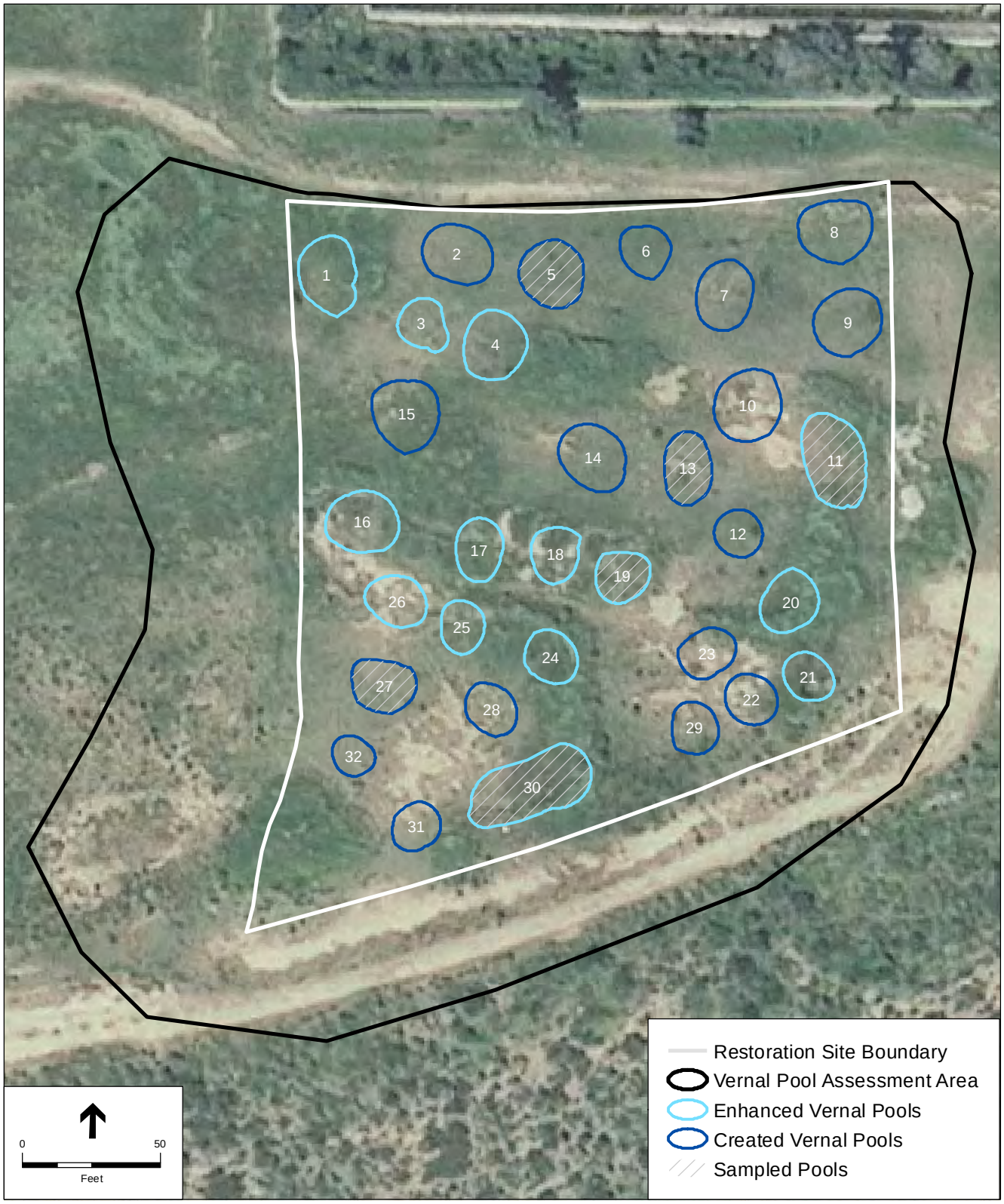
The 2010 pre-construction CRAM scores for the 10 impacted vernal pools are as follows:

- Buffer and Landscape Connectivity = 42 to 46
- Hydrology = 100 for all pools
- Physical Structure = 25 to 37.5
- Biotic Structure = 25 to 37.5

These pools scored very high in the Hydrology attribute because the pools are at the top of a mesa and are not affected by artificial water sources such as urban runoff. The pools scored lowest in Physical and Biotic structure because they are simple pools with little macro- or micro-topography and few endemic species or other native plant species.

The Robinhood Ridge vernal pool area in Otay Mesa was selected by Helix as a CRAM reference site for the Project. Three pools were selected for a CRAM analysis, which was conducted on August 27, 2010 to serve as a guide to determine target CRAM scores (e.g., success criteria) for the vernal pool mitigation site. The scores for this analysis are as follows:

- Buffer and Landscape Connectivity = 50 to 54
- Hydrology = 100 for all pools
- Physical Structure = 50
- Biotic Structure = 46



SOURCE: Landiscor, 2010; RBF, 2012.

Vista Del Mar Elementary School . 211685

Figure 3

Restoration Site Vernal Pool Assessment Area

3.2 Vernal Pool Mitigation Area

3.2.1 Pre-Restoration CRAM

Prior to restoration, the off-site vernal pool mitigation area supported low quality vernal pools in an area that was previously used as a track for off-road vehicles. Vernal pool indicator plant species in the pools consisted of low densities of common species such as wooly marbles (*Psilocarphus brevissimus*) and dwarf plantain (*Plantago elongata*). One pool was reported to contain little mousetail, which has a state rare plant rank of 3.1, and two of the pools contained San Diego fairy shrimp.

A pre-restoration CRAM was conducted in this area by Helix Environmental in 2010 on 5 of the 32 pools using the 2009 Individual Vernal Pool Field Book Version 5.0.3, which was the most current version at the time of the assessment. Results of the pre-restoration analysis are as follows:

- Buffer and Landscape Connectivity = 48 for all pools
- Hydrology = 83 or 100
- Physical Structure = 25 to 3.75
- Biotic Structure = 25 to 50

These pre-restoration scores are similar to the impacted pools, with the lowest scores in the Physical and Biotic Structure attributes and the highest score in the Hydrology attribute.

3.2.2 Target CRAM Scores

The target CRAM scores for the off-site vernal pool restoration were defined in the revised Vernal Pool Preserve Restoration Plan for Vista del Mar Elementary School (ESA 2011) based on CRAM scores for the reference site and pre-restoration mitigation site, as summarized in Table 1 below. Note that there are limitations when comparing current CRAM scores from the restored pools with these target scores due to the different field books that were used. Target scores are based on pre-construction assessments using the Individual Vernal Pool Field Book, Version 5.0.3, which was the most current version at the time of the assessment. The current assessment was based on a revised version (Version 6.0) of the Vernal Pool Systems Field Book (both "individual" and "systems" vernal pool field books were updated), which was the appropriate module based on the CRAM guidelines for identifying wetland type.

Table 1. Target CRAM Scores

Attribute	Year 3	Year 5
Buffer and Landscape Context	50	54
Hydrology	94	100
Physical Structure	42	50
Biotic Structure	46	58
Overall Assessment Area Score	**58**	**66**

3.2.3 Year 1 CRAM Scores for Restoration Site

As shown in Table 2, the overall CRAM score for the restoration site is fairly high at 74.0. However, when assessing CRAM scores, it is most informative to assess the attribute scores and metrics individually.

Hydrology. Similar to the CRAM scores for the reference site and pre-construction impact area, the Hydrology attribute scored highest (100) and for the same reasons (e.g., not affected by urban run-off or other artificial water sources, resulting in regular annual cycles of filling and drying).

Table 2. Summary of Attribute Scores for the Restoration Area

METRIC	Alpha.	Numeric	Score
Buffer and Landscape Connectivity		**18**	**75.0**
(A) Aquatic Area Abundance	C	6	
(B) % of AA with Buffer	A	12	
(C) Average Buffer Width	A	12	
(D) Buffer Condition	A	12	
Hydrology		**36**	**100.0**
Water Source	A	12	
Hydroperiod	A	12	
Hydrologic Connectivity	A	12	
Physical Structure		**24**	**66.7**
Structural Patch Richness	C	6	
Pool and Swale Density	B	9	
Topographic Complexity	B	9	
Biotic Structure		**13**	**54.2**
PC: No. of Co-dominants	C	6	
PC: Percent Non-native	B	9	
PC: Endemic Species Richness	C	6	
Plant Community Metrics		**7**	
Horizontal Interspersion	C	6	
Overall AA Score			**74.0**

Buffer and Landscape Connectivity. The second highest score was for the Buffer and Landscape Connectivity attribute (75.0). This metric scored significantly higher than the reference site used by Helix or the impacted pools for the following reasons:

1. The *Aquatic Area Abundance* metric is measured by assessing the amount of aquatic resources (including vernal pool Assessment Areas, swales and other wetland features) in 4 cardinal directions from the outer boundary of the AA being assessed. Vernal pools adjacent to the western boundary of the AA (i.e., previously restored pools on Otay Mesa West) were added to the aquatic area, resulting in a relatively high score;
2. There is no development on three sides of the restoration area, resulting in a wide buffer to the west, south and east. The area to the north is not assessed as buffer because the strip of land between the restoration site and the San Diego Gas and Electric substation is not wide enough to fit the definition. Because width is only measured within areas of existing buffers, this area was not included in the calculation. In addition, it should be noted that there is a vacant dirt lot to the northeast of the restoration site that currently qualifies as buffer. If and when this lot is developed, that portion of the buffer will be eliminated, potentially lowering the score for this metric in the future[1]; and
3. The buffer condition metric scored high because the surrounding area is off-limits to the public and is dominated by moderate to high quality native habitat.

Physical Structure. The Physical structure of the restored site scored significantly higher than reference or impact sites (66.7) for the following reasons:

1. Pool and swale density, which is a metric that is not used for the Individual Vernal Pool module, scored fairly high because the pools are small and densely packed together; and
2. Topographic complexity scored fairly high due to the design of the restoration, which included large and small cobbles, mima mounds, and clay soils which cause large cracks to form in the ground.

Biotic Structure. The Biotic Structure attribute scored the lowest (54.2), although the score for the restoration area is much higher than the scores for the reference or pre-construction impact sites. This is likely due to the fact that (1) the area was seeded and inoculated with vernal pool

[1] Development on the vacant lot during the 5-year restoration maintenance and monitoring period could result in an artificial lowering of the Buffer and Landscape attribute score, which would not be a true representation of the conditions (i.e., vernal pool health) at the restoration site.

endemic species, and (2) the site is actively managed for non-native species during frequent site visits.

3.3 Discussion

The pre-construction impact area and reference site CRAM analyses were intended to be used as a baseline to help determine the target functions and values for the mitigated pools. However, data interpretation comparing the baseline data with restoration monitoring data using CRAM methodology should be done with caution for a number of reasons:

1. The appropriate CRAM module for the restored pools and reference pools is the Vernal Pool *Systems* Fieldbook because there are more than two pools that are hydrologically connected; however, the impacted pools and reference pools were assessed using a different CRAM module -the *Individual* Vernal Pool Fieldbook;
2. The CRAM version used in 2012 by ESA for the restoration area was Vernal Pool Systems Field Book, Version 6.0, which was revised on March 21, 2012; as such, some of the methodology and/or scoring methods may have changed from the 2009 Individual Vernal Pool Fieldbook, Version 5.0.3 that was used by Helix Environmental; and
3. When comparing different years at the same site, individual attribute scoring within 10% is considered within the margin of error (e.g., comparable) (Clark and O'Connor 2012). This would also hold true when comparing CRAM scores between sites.

With the exception of the Biotic Structure, the restoration area at Year 1 has already exceeded the Year 5 CRAM scores for individual attribute and overall AA scores recommended in the vernal pool restoration plan. The Biotic Structure attribute is within the 10% acceptable margin of error, so it could be argued that this target has also been met. These results suggest that the mitigation plan, including the location of the mitigation site and the vernal pool system restoration design and implementation, have so far been successful, at least in terms of the characteristics measured by CRAM.

The attribute scores for the restoration site are not expected to change much between now and the end of Year 5; however, some of the metrics may show slight improvement over time or variability from year to year. For example, the Biotic Structure attribute has the greatest potential for improvement because the vernal pool plant community is not yet well developed. As native endemic species mature and become more established, the Plant Community and Horizontal Interspersion scores should increase. In addition, variability in the timing and amount of rainfall could affect the Hydroperiod metric, although the overall change in the Hydrology attribute score would likely be minimal. Other sources of variability could result from adjacent

development (e.g., on the vacant lot northeast of the site) or poor invasive species management in the adjacent buffer, which could lower the Buffer and Landscape Connectivity attribute score, or enhancement of the adjacent habitat, which could increase the Buffer and Landscape Connectivity score.

CRAM is a useful tool that should continue to be used to assess the condition of the restored pools over time, but is only one of many methods described in the Vernal Pool Restoration Plan that will determine if the restoration site will be successful.

4.0 References

Clark, Cara, and Kevin O'Connor. Wetland scientists and CRAM instructors for riverine and estuarine CRAM modules. Central Coast Wetlands Group at Moss Landing Marine Labs, Moss Landing, California. 2012.

California Wetlands Monitoring Workgroup (CWMW). 2009. Using CRAM (California Rapid Assessment Method) to Assess Wetland Projects as an Element of Regulatory and Management Programs. 46 pp.

Helix Environmental Planning, Inc. 2001, amended by TAIC 2011. Vista del Mar Elementary School Vernal Pool Restoration Plan. Prepared for the San Ysidro School District.

O'Connor, K. ed. *California Rapid Assessment Method (CRAM) for Wetlands and Riparian Areas, User's Manual, Version 6, a product of the Level 2 Committee of the California Wetlands Monitoring Workgroup.* March 2012.