VISTA DEL MAR ELEMENTARY SCHOOL PROJECT

Year 5 California Rapid Assessment Method (CRAM) Report for Vernal Pool Systems

Prepared for:

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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). Project construction, which has been completed, included 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 vernal pools occurred within non-native grassland, disturbed, and coastal sage scrub habitats and were 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, San Diego fairy shrimp (*Branchinecta sandiegonensis*), a federal and state endangered species, were affected in two pools. As mitigation for Project impacts, 32 vernal pools were created, restored, or enhanced on land within the Otay Mesa West Preserve, which is owned by the City of San Diego, located approximately 2,700 feet south of the Project impact site (Figure 2).

1.1 Purpose

The purpose of this report is to document the results of a California Rapid Assessment Method (CRAM) assessment that was conducted to evaluate the Year 5 conditions of the Project's vernal pool restoration site. These results will be compared to target values established in the *Vista del Mar Elementary School Vernal Pool Restoration Plan* (Helix 2011, as amended by TAIC 2012; Restoration Plan) as part of the success criteria that must be met prior to resource agency sign-off. The Year 5 CRAM results will also be compared to pre-restoration (i.e., baseline), Year 1 and Year 3 CRAM results to show the overall trajectory of the biotic and abiotic conditions on the site.

1.2 CRAM Analysis Description

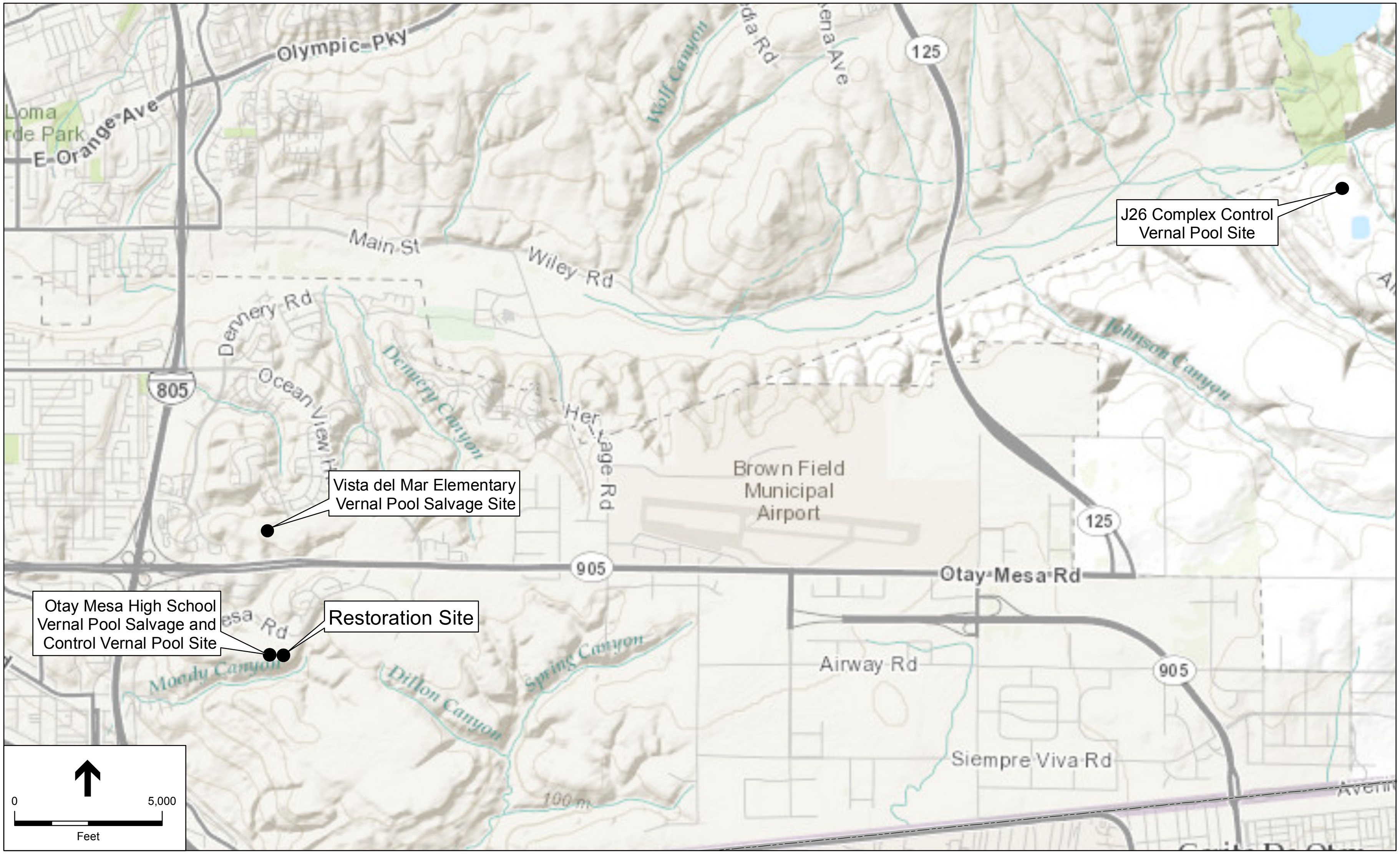
CRAM was developed by a consortium of local, state and federal agencies, wetland scientists, land managers and regulators as a means to monitor the conditions of wetlands in California. As described in the *California Rapid Assessment Method for Wetlands and Riparian Areas User's Manual, Version 6.1* (CWMW 2013a), the overall goal of CRAM is to "provide rapid, scientifically defensible, standardized, cost-effective assessments of the status and trends in the condition of wetlands and the performance of related policies, programs and projects throughout California."

SOURCE: Landiscor, 2010; ESRI

Vista Del Mar Elementary School . 211685

Figure 1

Project Location



SOURCE: USGS; RBF, 2012; ESA, 2013

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Figure 2

Site Map

2.0 Methods

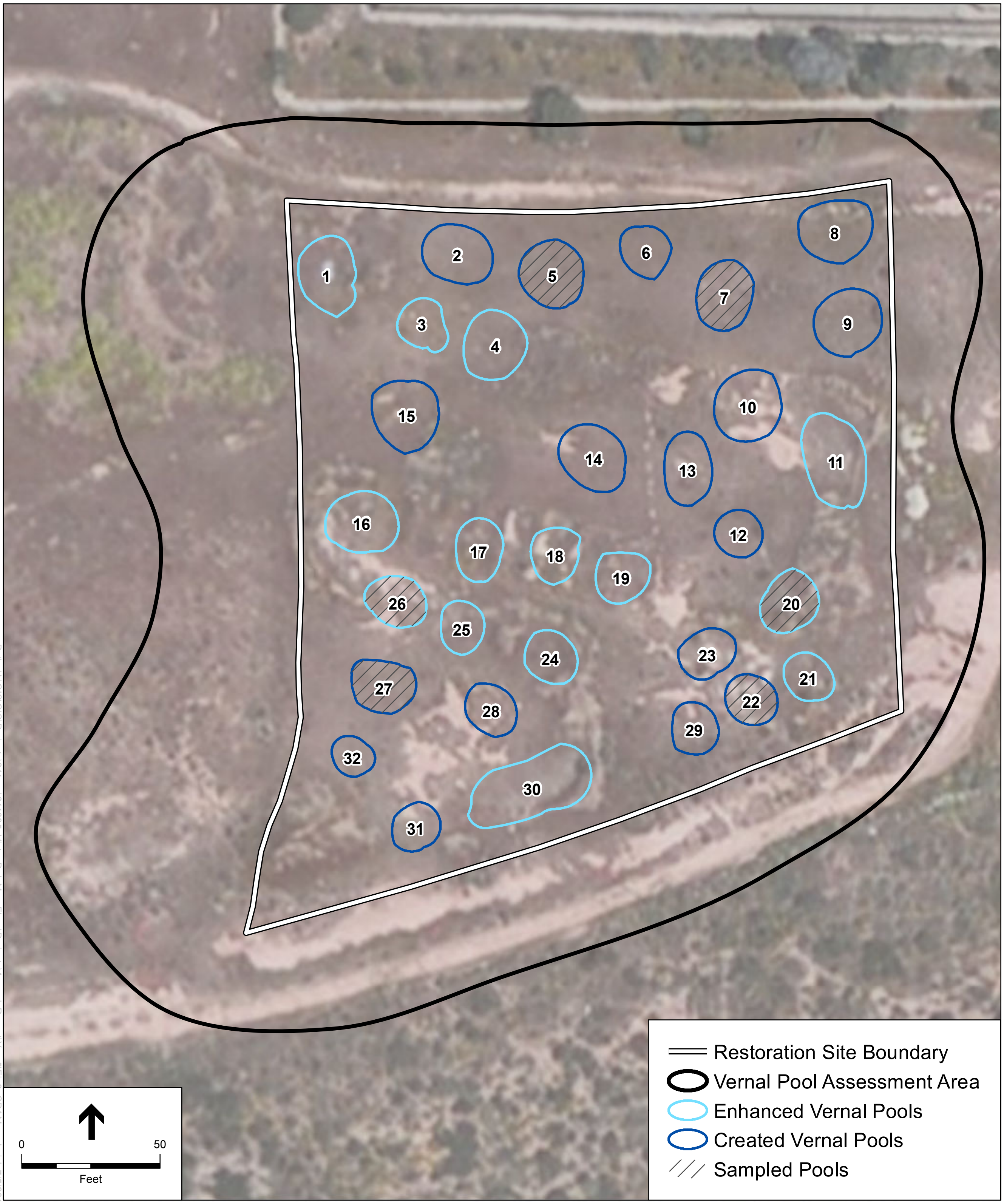
Following the methods described below, CRAM was conducted by ESA biologists Rosanne Humphrey (CRAM practitioner) and Alanna Bennett on April 28, 2016 to assess the Year 5 condition of the restored and enhanced vernal pools that will serve as mitigation for impacts to vernal pools on the Project site. Six individual sample pools were randomly selected for the assessment (Figure 3) pursuant to the *Vernal Pool Systems Field Book, Version 6.1* (CWMW, 2013b). 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). Four key attributes within the AA were evaluated, as described below. In addition, a stressor checklist was completed, which indicates potential threats to the vernal pool system.

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*, which is assessed 500 meters from the AA in four cardinal directions, 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 up to 250 meters outside of the riparian or wetland AA. The function of the buffer is to provide protection from pollutants, human intrusion, and other sources of stressors. 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.



SOURCE: ESRI 2014; RBF, 2012.

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Figure 3

Restoration Site Vernal Pool Assessment Area - Year 5

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 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* and *Plant Community* metrics. *Horizontal Interspersion* is assessed by looking at the spatial arrangement of different plant zones, and how much edge there is between them. *Plant Community* is described by three submetrics: *Number of Co-dominant Species*, *Percent Non-native species*, and *Endemic Species Richness*, which measure 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.

3.0 Results

As shown in Table 1, the overall Year 5 CRAM score for the restoration site is fairly high at 86. The overall score has steadily increased from Baseline (53) to Year 1 (74), Year 3 (80), and Year 5. However, when assessing CRAM scores, it is most informative to assess the attribute scores and metrics individually, as discussed below.

1. **Buffer and Landscape Connectivity.** The overall Year 5 *Buffer and Landscape Connectivity* attribute score was 68. This is a significant increase from the baseline score of 48. Scores for Years 1 and 3 were 75 and 68, respectively.

2. **Hydrology.** The *Hydrology* attribute score for Year 5 was the highest possible (100), and was unchanged from Years 1 and 3, but 10 points higher than the baseline score of 90.

3. **Physical Structure.** The *Physical Structure* score for Year 5 was 83. This is the same score as Year 3, but significantly higher than the baseline score (28) or Year 1 score (67).

4. **Biotic Structure.** The *Biotic Structure* attribute score for Year 5 was 92. This score is significantly higher than all previous years, including baseline (36), Year 1 (54), and Year 3 (67).

Table 1. CRAM Scores for the Restoration Site (Mitigation Area) – Baseline through Year 5

Attributes and Metrics	Pre-Restoration Baseline[1]	Year 1[2]	Year 3[2]	Year 5[2]
Buffer and Landscape Connectivity	**48**	**75**	**68**	**68**
Aquatic Area Abundance	3	6	6	6
Buffer				
% of AA with Buffer	12	12	12	12
Average Buffer Width	12	12	12	12
Buffer Condition	6	12	9	9
Hydrology	**90**	**100**	**100**	**100**
Water Source	12	12	12	12
Hydroperiod	12	12	12	12
Hydrologic Connectivity	8	12	12	12
Physical Structure	**28**	**67**	**83**	**83**
Structural Patch Richness	3	6	9	9
Pool and Swale Density		9	12	12
Topographic Complexity	4	9	9	9
Biotic Structure	**36**	**54**	**67**	**92**
Plant Community Metrics		7	7	10
PC: No. of Co-dominants	4	6	6	9
PC: Percent Non-native	6	9	12	12
PC: Endemic Species Richness	3	6	3	9
Horizontal Interspersion	4	6	9	12
Overall AA Score	**51**	**74**	**80**	**86**

[1] Conducted by Helix Environmental, Inc. (Source: Restoration Plan)
[2] Conducted by Environmental Science Associates (ESA)

4.0 Discussion

Baseline to Year 5 Comparison

A comparison of the CRAM scores from baseline to Year 5 shows a clear trajectory towards improving wetland conditions. All attributes improved consistently and significantly over time. The *Buffer and Landscape Connectivity* was slightly higher in Year 1 (75) than Years 3 and 5 (68); however any change less than 10 points is not considered significant (C. Clark pers. comm). The overall increase between baseline and Years 3 – 5 were due to an increase in aquatic area abundance and buffer condition. The *Hydrology* attribute, which evaluates the extent, duration, and frequency of ponded conditions within the AA, remained unchanged between Years 1 and 5, with the highest score possible. The greatest amount of improvement occurred in the *Physical Structure* and *Biotic Structure* attributes. The *Physical Structure* attribute increased 55 points between baseline and Year 5. These improvements occurred between baseline and Year 1 (an increase of 39 points), and between Year 1 and Year 3 (an increase of 16 points). There was no change between Years 3 and 5. The increase in *Physical Structure* attribute score was due to higher structural patch richness, pool and swale density (which was not part of the CRAM module during the baseline period), and topographic complexity. The *Biotic Structure* attribute increased by 56 points between baseline and Year 5. The increase, which was fairly steady throughout the entire monitoring period, was due to an improvement in number of co-dominants, percent non-native species, endemic species richness, and horizontal interspersion.

Target CRAM Scores

The target CRAM scores for the vernal pool restoration site were defined in the Restoration Plan based on CRAM scores for the mitigation site prior to restoration, and a reference site as summarized in Table 2 below.

Table 2. 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**

During Year 3, the restoration area already exceeded the target Year 5 CRAM scores for individual attributes and overall AA scores recommended in the Restoration Plan, despite excessively high temperatures and drought conditions that occurred during the monitoring period. As discussed above, the Year 5 scores were even higher. These results suggest that the mitigation, including the location of the mitigation site and the vernal pool system restoration design and implementation, has been successful, at least in terms of the characteristics measured by CRAM. CRAM is a useful tool to assess the condition of the restored pools over time, but is only one of many methods described in the Restoration Plan that will determine if the restoration site is considered successful.

5.0 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.

California Wetlands Monitoring Workgroup (CWMW). 2013a. *California Rapid Assessment Method (CRAM) for Wetlands, User's Manual. Version 6.1. April 2013.*

California Wetlands Monitoring Workgroup (CWMW). 2013b. *California Rapid Assessment Method Vernal Pool Systems Field Book, version 6.1.* April 2013.

Helix Environmental Planning, Inc. 2012, amended by TAIC 2012. Vista del Mar Elementary School Vernal Pool Restoration Plan. Prepared for the San Ysidro School District.

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Appendix A

Site Photographs

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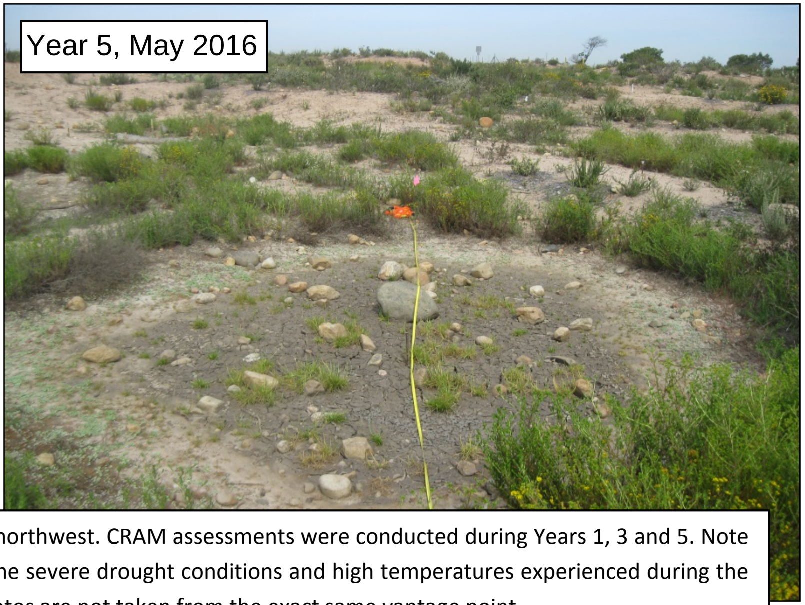
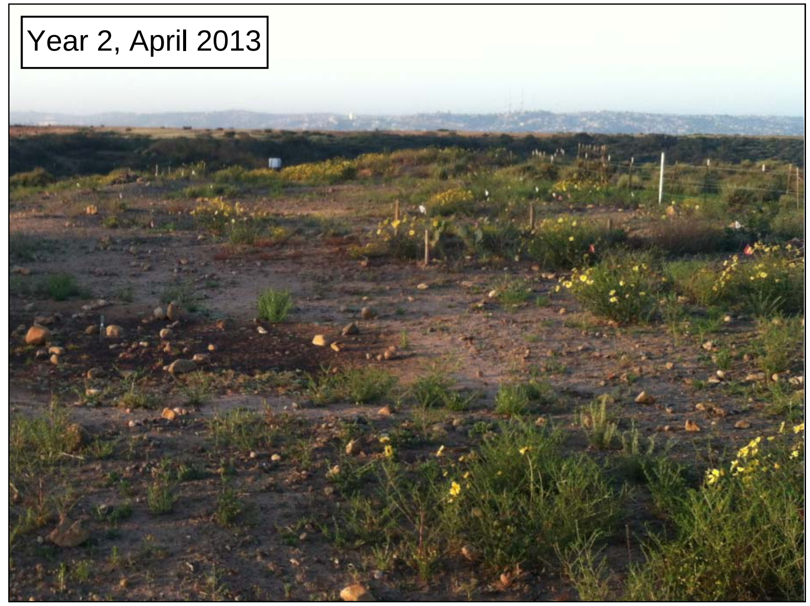
Site Photographs



Photos taken during Years 1, 2, 3, and 5 (2012 – 2016) from the east side facing northwest. CRAM assessments were conducted during Years 1, 3 and 5. Note that the vegetation onsite was much more robust in 2013 than in 2014 due to the severe drought conditions and high temperatures experienced during the 2014 growing season (photo of Year 2 is included to illustrate this). Note that photos are not taken from the exact same vantage point.

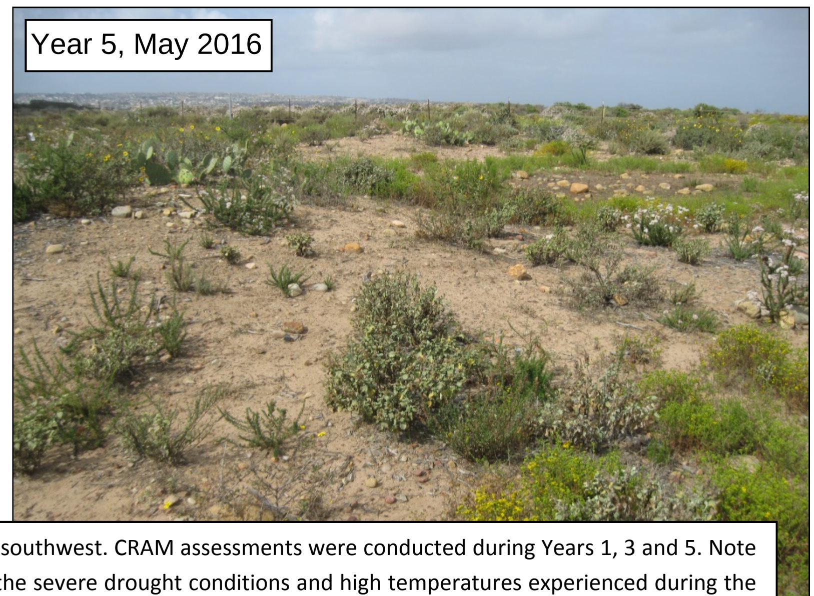
Site Photographs

Year 1, Oct. 2012



Year 2, April 2013

Year 3, May 2014



Year 5, May 2016

Photos taken during Years 1, 2, 3, and 5 (2012 – 2016) from the east side facing southwest. CRAM assessments were conducted during Years 1, 3 and 5. Note that the vegetation onsite was much more robust in 2013 than in 2014 due to the severe drought conditions and high temperatures experienced during the 2014 growing season (photo of Year 2 is included to illustrate this). Note that photos are not taken from the exact same vantage point.