Coachella Valley Conservation Commission

June 2017

Coachella Valley Multiple Species Habitat Conservation Plan &

Natural Community Conservation Plan

Coachella Valley Stormwater Channel and Delta Conservation Area

Vegetation Map Report

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Final Report

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EXECUTIVE SUMMARY

The University of California Riverside's Center for Conservation Biology (CCB) has created fine-scale vegetation maps for a number of Conservation Areas under the jurisdiction of the Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP) under contract with the Coachella Valley Conservation Commission (CVCC). The primary purpose for creating these maps is provide a landscape-scale approach to monitoring changes due to land use, invasive species, recreation, hydrology, and climate. These digital maps, documenting changes and their causes, are then tools for prioritizing future conservation actions. The vegetation classification follows Federal Geographic Data Committee (FGDC) and National Vegetation Classification Standards (NVCS; Federal Geographic Data Committee 2008). The classification is meant to align with previous and concurrent efforts previous survey and classification work done by California Department of Fish and Wildlife's Vegetation Classification and Mapping Program (VegCaMP) and Aerial Information Systems (AIS) for the Desert Renewable Energy Conservation Plan Area as well as the southeastern Salton Sea Mid-Desert Area, and by the National Park Service for Joshua Tree National Park. This unit was mapped using the California Department of Fish and Wildlife (CDFW) and California Natural Plant Society Combined (CNPS) Vegetation Classification and Mapping Program protocol (CNPS 2014).

This map and report addresses the Coachella Valley Stormwater Channel and Delta Conservation Area (4,404 acres). Fieldwork, photo-interpretation and mapping were performed from 2016-2017. Within the study areas, rapid assessment protocol vegetation plots and supplemental reconnaissance observations were obtained within the study at pre-determined points in order to document the plant community, disturbances, and invasive species across space and types. Photo-interpretation of 2013 imagery and field information were combined to produce delineations of vegetation alliances and associations according to the California Department of Fish and Wildlife classification system, outlined in the Manual of California Vegetation Second Edition (Sawyer *et al.* 2009). Thus, the current version of the map best represents the status of vegetation in 2013.

We digitized the vegetation of the Coachella Valley Stormwater Channel and Delta Conservation Area from 2013 imagery provided by the Coachella Valley Association of Governments (CVAG); it includes approximately 316 delineated polygons, each assigned one of 18 vegetation alliances or land-cover types. We assigned the still finer scale association attribute where field plot data (Rapid Assessment Plot or reconnaissance observation) was available within the polygon boundaries, or where the association could be clearly identified from aerial imagery. This unit has several map classes that have less than 2% absolute vegetation cover, including Disturbed/Built-Up, Water, and a generic Non-Vegetated Habitat type. The largest amount of land cover is of the non-vegetated habitat type, encompassing 1153 acres 467 ha), followed by iodine bush scrub (1040 acres, 421 ha), and Tamarix thickets (818 acres, 331 ha). This report and accompanying data are to be released at the end of 2017.

INTRODUCTION

This vegetation map is a tool to help aid in species monitoring and management in the Coachella Valley Stormwater Channel and Delta Conservation Area of the Coachella Valley MSHCP and Natural Community Conservation Plan. At the end of the twentieth century, 27 species and 27 vegetation communities in the Coachella Valley were identified as being affected by pressures of land development and conversion of habitats. The most direct threat to the biodiversity of the area is habitat loss. From 1996 to 2008, citizens, scientists, land managers, and federal and state agencies of the Valley developed a

conservation plan that offered protection to these species and preserved over 250,000 acres of open space (Figure 1). The plan was approved by federal and state agencies and was implemented in 2008, all cities involved in the collaborative effort.

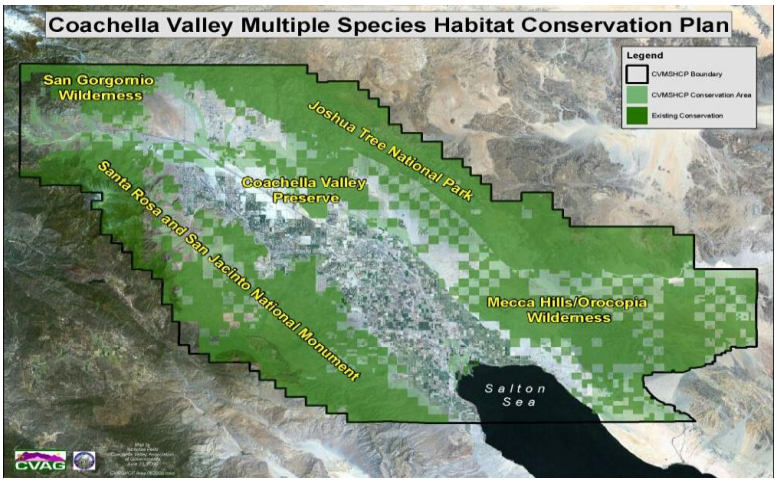

Figure 1: Coachella Valley Multiple Species Habitat Conservation Plan Boundary in relation to Joshua Tree National Park, the Santa Rosa and San Jacinto National Monument, the Coachella Valley USFWS Preserve, Wilderness areas, and the Salton Sea.

This comprehensive land planning essentially protects the ecological drivers and processes to enhance sustainability of community biodiversity. The plan is science-based and investigates hypotheses related to the persistence of species on conservation lands through adapting monitoring and management. The Coachella Valley is situated in the Colorado Desert which is situated on the northwest portion of the much larger Sonoran Desert, and consists of a variety of habitats. One hundred miles east of Los Angeles, it is bordered on the west by the San Jacinto, San Gorgonio, and Santa Rosa Mountain Ranges. The Valley lies at the northwest boundaries of the Colorado Desert, and to the east of the Valley lies the Salton Sea. The Coachella Valley is an extremely arid desert region that is characterized by aeolian sand communities, fan palm oases, creosote shrub, alluvial fan, and salt scrub communities.

Precipitation is the primary driver for vegetation growth in the Coachella Valley, which experiences both summer and winter precipitation events. Rains are highly variable from year to year, but tend to be more frequent at the far west of the Coachella Valley, due to the rain shadow of the San Jacinto, Santa Rosa, and San Bernardino mountain ranges. This causes a gradient of increasing temperature and aridness from west to east, as elevation decreases. During rare monsoonal events in July to September, weather systems that originate in the Gulf of Mexico, bring heavy but isolated thunderstorms to the Valley. During average years, the vast amount of reliable moisture comes from winter rains, which originate in the northwest and move into the area in October through May, contributing the greatest proportion of the annual rainfall.

Coachella Valley Stormwater Channel and Delta Conservation Area (Reserve Management Unit 5)

The Coachella Valley Stormwater Channel and Delta Conservation Area (hereafter, CVSCDCA) comprises over 4,404 acres acres at the southern end of a broad agricultural area within the Coachella

Valley that runs from the cities of Palm Desert and Rancho Mirage to the Salton Sea (Figure 2). It contains, of course, the stormwater channel that drains areas northwest of Monroe St., and this heavily-manipulated channel runs to the Salton Sea. Most areas within this Conservation Area are +/-40 feet of 200 feet below mean sea level. It is not contiguous with any other Conserved lands under the Plan and is made up primarily of private lands, Utility permittees (Coachella Valley Water District, Imperial Irrigation District), as well as small county and federal parcels.

This Conservation Area contains a variety of vegetation types that thrive in seasonally-flooded, riparian, and saline areas. The Conservation area supports Core Habitat of the crissal thrasher and desert pupfish. Also protected is suitable habitat to support burrowing owls (documented occurrences), Yuma clapper and California black rails. A general habitat map was produced prior with the inception of the Plan to document the distribution of conserved natural communities, documented at the time as mesquite hummocks, desert saltbush scrub, desert sink scrub, Sonoran cottonwood, willow riparian forest, and coastal and valley freshwater marsh, using the Holland Type system (Holland, 1986). This effort updates this outdated map, and provides more specific information about the acreage-extent of habitat in this Conservation Area.

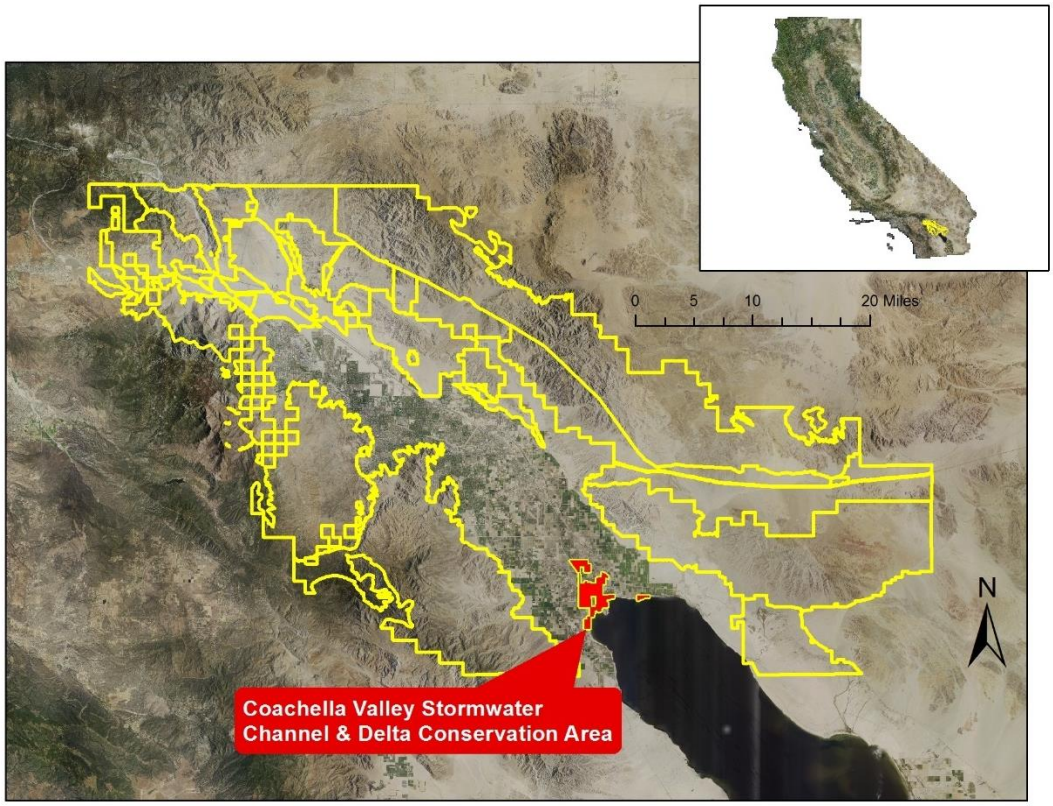

Figure 2: The Coachella Valley Stormwater Channel and Delta Conservation Area (CVSCDCA) is located in Riverside County, California, USA, at the south end of the Coachella Valley. CVMSHCP Conservation Areas boundary shown in yellow, CVSCDCA in red fill. Imagery from the National Agricultural Imagery Program (2014, USDA).

PURPOSE

The primary purpose for creating these maps is provide a landscape-scale approach to monitoring changes due to land use, invasive species, recreation, hydrology, and climate. These digital maps, documenting changes and their causes, are then tools for prioritizing future conservation actions. The outdated map of the Coachella Valley MSHCP areas, created before 1999, was based on the Holland classification system and was inconsistent with current standards prescribed by CDFW's Vegetation Classification and Mapping Program (VegCaMP). As part of the CVMSHCP/NCCP monitoring program, a phased work plan to remap all 746,000 acres of Conservation Areas began in 2012. These mapping areas together nearly complete the remap of the Plan Area, together with other Conservation Lands mapped by other entities, and previous work by UCR CCB. The completion of these maps updates the 2007 CVMSHCP/NCCP natural community map. This section of the map provides critical information to assist in monitoring habitat suitability in conservation areas, and quantifies attributes to help researchers understand the effects of environmental variability, including drought and climate change. An updated vegetation map was required to enhance understanding of species and their habitats, and identify management needs to ensure persistence of target species within the Plan area. The updated vegetation map is an essential element of monitoring for other covered species and natural communities and provides a baseline to monitor natural communities and landscape-scale vegetation change. Quantification of biotic habitat variables help document factors that may influence species population fluctuation. These data are key to conservation of biological diversity in the Plan area, in light of the listed threats to habitats in this management unit: invasive species; threats to hydrological regime/processes; climate change and habitat fragmentation, wildfire management, off-highway vehicle use, and other anthropogenic surface disturbance (CVMSHCP, Section 8). Understanding habitat requirements for species will help to guide the development of land management actions that support recovery and sustainability of healthy populations. Data produced under this effort is publicly available and supports concurrent CVMSHCP/NCCP monitoring.

RECONNAISSANCE VEGETATION ASSESSMENT

Initial research on the vegetation communities present in this Conservation Areas included a search for existing vegetation maps (none were found) and development of a preliminary database of possible plant species, alliances and associations through reconnaissance visits in conjunction with monitoring for covered species (Crissal thrasher, burrowing owl). Between November and December 2016, CCB staff conducted surveys throughout the mapping area as a reconnaissance of vegetation types. The purpose of these field visits was to calibrate the photo-interpretation of aerial imagery to existing vegetation types within the area. The CNPS California Native Plant Society/Department of Fish and Game Protocol for Combined Vegetation and Rapid Assessment and Relevé Sampling Field Form was used for Rapid Assessment surveys (hereafter "RA plots"), in the study areas (CNPS 2016). The study areas were traversed on foot and by vehicle, and vegetation was assessed at optimal and accessible points, sited according to RA plot protocol (see CNPS 2016). The field staff completed RA plots both opportunistically-located as well as targeted at priority areas according to the photo interpreter's preference and priorities. A significant effort was made to access areas where little was known about the vegetation types from previous visits, or where few reconnaissance points existed. At each point, an RA form was completed, resulting in a database containing perennial vegetation percent cover (and annual cover of key species such as *Abronia villosa*, where it was likely to define the alliance); UTM easting and northing coordinates (NAD 1983 datum, Zone 11N); slope, aspect and elevation; percent surface cover of vegetation, litter and abiotic substrates; and other data (see protocol, CNPS 2016; Appendix A: RA Plot Database 2017). As well, file numbers for photos at each point in four cardinal directions were recorded

(photo database available upon request from CCB). For each RA plot, the field team assessed and assigned a Vegetation Alliance and Association, which was subsequently reviewed and formally assigned at the office. In addition, reconnaissance ("Recon") information including dominant species identities and other landscape cover notes were gathered throughout the area.

Because this vegetation map is tied to aerial imagery acquired by CVCC in 2013 (with the goal of a temporally-uniform snapshot of vegetation across the Plan Area), there is a 3 to 4-year gap between the temporal reference period for this map and the state of vegetation as it was recorded on RA plot field surveys. In any other case where field conditions in 2016-2017 differed from those on the aerial imagery in 2013 (dead or dying vegetation, different species composition or extent), the information about likely conditions in 2013 from photo interpretation took precedence.

In sum, 30 RA plots and 20 Recon plots completed in 2016 were used for mapping within the study area, plus an additional 27 Recon plots that were completed prior, at monitoring points for a specific covered species (*Toxostoma crissalis*, crissal thrasher), completed in 2014-2015.

AERIAL PHOTO INTERPRETATION AND DELINEATION

Mapping Imagery and Photointerpretation: The map was produced by applying heads-up digitizing techniques using the primary source imagery, six-inch resolution true-color (RGB) spring 2013 aerial imagery provided by the Coachella Valley Conservation Commission from local flights for the majority of the mapping area where this imagery was available. This was supplemented with 2014 one meter imagery from the National Agricultural Imagery Program (NAIP), both 4-Band and color infrared (CIR) as well as a variety of other sources such as ESRI WorldImagery (various sources, see: https://www.arcgis.com/home/item.html?id=10df2279f9684e4a9f6a7f08febac2a9). These supplemental sources were not used for delineation unless the primary source imagery was lacking, in which case the imagery with the nearest reliable time stamp was used. These ancillary sources were mostly useful as supporting information to help identify types and photosignatures, as well as boundaries between types. As well, fire history data from CalFire (http://frap.fire.ca.gov/data/frapgisdata-sw-fireperimeters_download; Fire15_1, released June 9th, 2016) was used as additional information for identifying stand and cover boundaries.

The photo interpreter used the verified vegetation type locations (vegetation type photo signatures) to identify vegetation across the landscape, additionally using ecological characteristics of vegetation types in relation to landscape characteristics such as topographic features. Map polygons were assessed for vegetation type, percent cover, presence of exotic plants, anthropogenic alteration, development, and roadedness. Lines were drawn to delineate non-vegetated areas and vegetated areas, and within vegetated areas, to establish boundaries of Alliance and Association types. The photo interpreter drafted boundaries separating vegetation types generally at 1:1500 scale and attributed the type using RA plot information and relevant datasets. A finer visualization scale was used in some cases to delineate wetland types occurring in narrows bands and patchy areas. Absolute cover values from the RA plots was used to assist photo interpreters with delineating boundaries. Cover was quantified as non-vegetated habitat where it was less than 2%. Some coordinates for plots fall outside of the plot boundaries due to the extremely delicate habitat or accessibility challenges. For these surveys, the cover estimates, as they currently stand, apply to the projected coordinate locations indicated in the RA database where applicable.

Geodatabase: The photo interpreter worked with a GIS specialist to establish a geodatabase containing domain tables that relate alliance, group and macrogroup for assigned types in ArcGIS 10.3.1. Vegetation

delineation was done using a line feature class, assigned to type using point feature class, and finally, a polygon feature class was created, attributed with alliance and other attributes. A comprehensive quality control effort was conducted by senior GIS staff to finalize polygons, and geodatabase domains (Alliance, Common Name, Association, Group and Macrogroup). Continuous quality control checks were performed using query tools in ArcGIS as well as the utilization of a secondary reviewer from the team (other than the photo-interpreter) to review polygon assignments, identify problematic vegetation assignments errors and discrepancies as monitoring continued, and all were incorporated into the final geodatabase.

Minimum Mapping Unit: For upland alliances occurring in expansive areas, a minimum mapping unit of 10 acres was observed for breaking up classes, or major changes in the vegetation cover class. For the purposes of the CVMSHCP, habitat of sensitive species is of particular concern and therefore to improve the ability of researchers and land managers to target wildlife habitat that is patchily-distributed, there are several alliances where the minimum mapping unit (MMU) is less than an acre. These include *Prosopis glandulosa* Woodland Alliance (habitat for the covered species, *Toxostoma crissalis*, crissal thrasher), *Washingtonia filifera* Woodland Alliance (supporting Federally endangered *Cyprinodon macularius*, desert pupfish), as well as wetlands types (some support the federally endangered *Rallus longirostris yumanensis*, Yuma clapper rail and other sensitive species), and as well as certain wash types which displayed complexity that necessitated delineation (generally, Groups G499, G531, G533; see "Classification…" section below). Following common vegetation mapping standards, stands that did not meet minimum mapping unit criteria were lumped with, or drawn within the bounds of, the most similar adjacent vegetation type polygon, for example, tree alliances with other tree alliances, shrubs with other shrub types, upland types with upland types, and so forth.

Vegetation Mortality, Land Use and Other Changes: Due to the agricultural history of the area, many areas were heavily anthropogenically-altered, or contained stands of remnant produce vegetation (especially *Phoenix dactylifera*, date palm). These are noted on the vegetation map as indicated above, as an anthropogenic disturbance or invasive plant % cover class. No remnant or possible wild stand of date palm was large enough to map. For polygons in which the RA plot data indicated significant mortality of the vegetation or dormant vegetation, the photo interpreter visually assessed the greenness of the vegetation in the aerial imagery from 2013 (or the photo imagery nearest to that date) to decide how much of the dominant alliance vegetation was in fact living in 2013. Often, remaining basal sprouts or small percentage of the vegetation remained alive, with sufficient cover remaining alive to pass the assignment rules for the dominant vegetation type. In a very *few areas* was enough of the dominant vegetation dead, with certainty on the ground and from the aerial imagery, to justify assigning a different alliance. Where the vegetation could be clearly identified but where it was ambiguous as to whether the dominant vegetation type was sufficiently alive in 2013 after using the decision process described above, the photo interpreter defaulted to the assumption that the vegetation in question was still alive during the time stamp represented by the map in lieu of assigning a different alliance.

Other cases in which RA plot data differed from photo imagery included: development, fire, expansion or management of invasive species, and other changes in land use or land management activities, and these were assigned to 2013 vegetation status similar to the above. Disturbance codes were entered for stands that were surveyed, per Rapid Assessment protocol, which aided in interpretation of imagery. As well, disturbance types and intensity were assigned for all polygons in the geodatabase: roadedness, development, anthropogenic alteration, as well as invasive species % cover (only if obvious from stand interpretation or as noted in RA plots). Definitions and protocol for assigning disturbance types in the

geodatabase were assigned using the criteria set forth in the DRECP vegetation map (CDFW 2013); differing only in that we did not separate hydrologic alteration from other types of anthropogenic alteration.

Time Period Represented: The time period aimed at in this map to classify the vegetation state during the year 2013. This aligns with the overall mapping goal for the CVMSHCP area to have a uniform temporal snapshot of vegetation across the Plan area for this year. However, as a living map, polygons and assignments will be regularly reviewed, updated, or flagged for further field visits as part of ongoing monitoring within the mapping area. It is recommended, due to ongoing changes within the Plan area, that that periodic updates should be published as additional information and newer imagery becomes available.

Accuracy Assessment: In sum, 16 RA plots and 15 Recon points were used for delineation and assignment of the vegetation and landcover types within this study area, while 14 RA plots and 5 Recon points were withheld from the mapper. Using the withheld information to assess accuracy of the map, the effort was scored at 92% accuracy.

CLASSIFICATION OF VEGETATION FOR THE MAPPING AREA

The map classification is based largely on work done in areas for previous and ongoing projects: Vegetation Mapping of Anza-Borrego Desert State Park and Environs (Keeler-Wolf *et al.* 1998), the Western Riverside County MSHCP Vegetation Map (2004), Vegetation of Joshua Tree National Park (La Doux *et al.* 2013), and the Vegetation Map in Support of the Desert Renewable Energy Conservation Plan (CDFW, 2013). No provisional or new alliances were described from this area and the 18 cover types found were well-documented using the current version of the Manual of California Vegetation online (http://vegetation.cnps.org/).

The nested hierarchy below, containing the vegetation types documented in the mapping area, including the Macrogroup and Group, was based on the National Vegetation Classification System (Federal Geographic Data Committee 2008); specifically, the recommendations of Evens (2014) to align the NVCS with the Manual of California Vegetation (Sawyer *et al.* 2009).

Class 1. Forest to Open Woodland
- Subclass 1.B. Temperate & Boreal Forest
  - Formation 1.B.3. Temperate Flooded & Swamp Forest
    - Division 1.B.3.Nd. Southwestern North American Flooded & Swamp Forest
      - Macrogroup M036. Warm Southwest Riparian Forest
        - Group G508. Sonoran-Chihuahuan Warm Desert Riparian Woodland
          - Populus fremontii Alliance
          - Salix gooddingii Alliance
          - Washingtonia filifera Alliance
      - Macrogroup M298. Warm Southwest Semi-natural Flooded & Swamp Forest
        - Group G510. Southwestern North American Semi-Natural Riparian Forest & Scrub
          - Tamarix spp. Semi-Natural Alliance

Class 2. Shrubland & Grassland
- Subclass 2.B. Temperate & Boreal Grassland & Shrubland
  - Formation 2.B.6. Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

Division 2.B.6.Nb. Western North American Freshwater Shrubland, Wet Meadow & Marsh
Macrogroup M073. Western North American Temperate Lowland Wet Shrubland, Wet Meadow & Marsh
Group G531. Arid West Interior Freshwater Emergent Marsh
Phragmites australis Alliance (G524)
Schoenoplectus americanus Alliance (G499)
Typha (angustifolia, domingensis, latifolia) Alliance
Macrogroup M301. Western North American Semi-natural Wet Shrubland, Meadow & Marsh
Group G524. Western North American Semi-natural Wet Shrubland, Meadow & Marsh
Arundo donax Semi-Natural Alliance
Division 2.B.6.Nc. Southwestern North American Warm Desert Freshwater Marsh
Macrogroup M076. Warm Desert Freshwater Shrubland, Meadow & Marsh
Group G533. North American Warm Desert Riparian Low Bosque & Shrubland
Pluchea sericea Alliance
Prosopis glandulosa Alliance (G287)
Formation 2.B.7. Salt Marsh
Division 2.B.7.Nc. Temperate & Boreal Pacific Coastal Salt Marsh
Macrogroup M081. North American Pacific Coastal Salt Marsh
Group G499. Temperate Pacific Tidal Salt & Brackish Marsh
Distichlis spicata Alliance (G538)
Division 2.B.7.Nd. North American Western Interior Brackish Marsh
Macrogroup M082. Cool Semi-Desert Alkaline-Saline Wetland
Group G537. North American Desert & Semi-Desert Alkaline-Saline Shrub Wetland
Allenrolfea occidentalis Alliance
Atriplex lentiformis Alliance
Suaeda moquinii Alliance
Class 3. Desert & Semi-Desert
Subclass 3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland
Formation 3.A.2. Warm Desert & Semi-Desert Scrub & Grassland
Division 3.A.2.Na. North American Warm Desert Scrub & Grassland
Macrogroup M092. North American Warm-Desert Xero-Riparian Scrub
Group G541. Warm Semi-Desert Shrub & Herb Dry Wash
Parkinsonia florida–Olneya tesota Alliance

ALLIANCES AND LANDSCAPE ATTRIBUTES IDENTIFIED

Vegetation Alliance or Land Cover Type	Area (ha)	Area (acres)
Non-vegetated Habitat (less than 2% absolute cover)	466.6	1,153.0
Allenrolfea occidentalis Shrubland Alliance	421.1	1,040.5
Tamarix spp. Shrubland Semi-Natural Alliance	331.0	818.0
Disturbed/built-up	319.4	789.2
Water	107.9	266.7
Atriplex lentiformis Shrubland Alliance	64.8	160.1
Typha (angustifolia, domingensis, latifolia) Alliance	25.1	62.1
Prosopis glandulosa Woodland Alliance	19.2	47.3
Pluchea sericea Shrubland Alliance	12.5	30.9
Populus fremontii Forest Alliance	8.7	21.4
Distichlis spicata Herbaceous Alliance	2.2	5.5

Washingtonia filifera Woodland Alliance	1.9	4.7
Schoenoplectus americanus Herbaceous Alliance	0.5	1.3
Suaeda moquinii Shrubland Alliance	0.5	1.1
Parkinsonia florida--Olneya tesota Woodland Alliance	0.3	0.8
Salix gooddingii Woodland Alliance	0.2	0.5
Phragmites australis Herbaceous Alliance	0.2	0.4
Arundo donax Herbaceous Semi-Natural Alliance	0.1	0.2
TOTAL	**1,782.1**	**4,403.6**

ASSOCIATIONS IDENTIFIED

Vegetation Association or Land Cover Type
Allenrolfea occidentalis--Suaeda moquinii Association
Allenrolfea occidentalis--Tamarix spp. Association
Allenrolfea occidentalis Association
Distichlis spicata / Allenrolfea occidentalis Association
Pluchea sericea--Tamarix spp. Association
Prosopis glandulosa / Allenrolfea occidentalis Association
Prosopis glandulosa Association
Tamarix spp.--Allenrolfea occidentalis Association
Tamarix spp.--Pluchea sericea Association
Typha domingensis / Tamarix spp. Association
Allenrolfea occidentalis / Phoenix dactylifera Association
Atriplex lentiformis Association

VEGETATION MAP

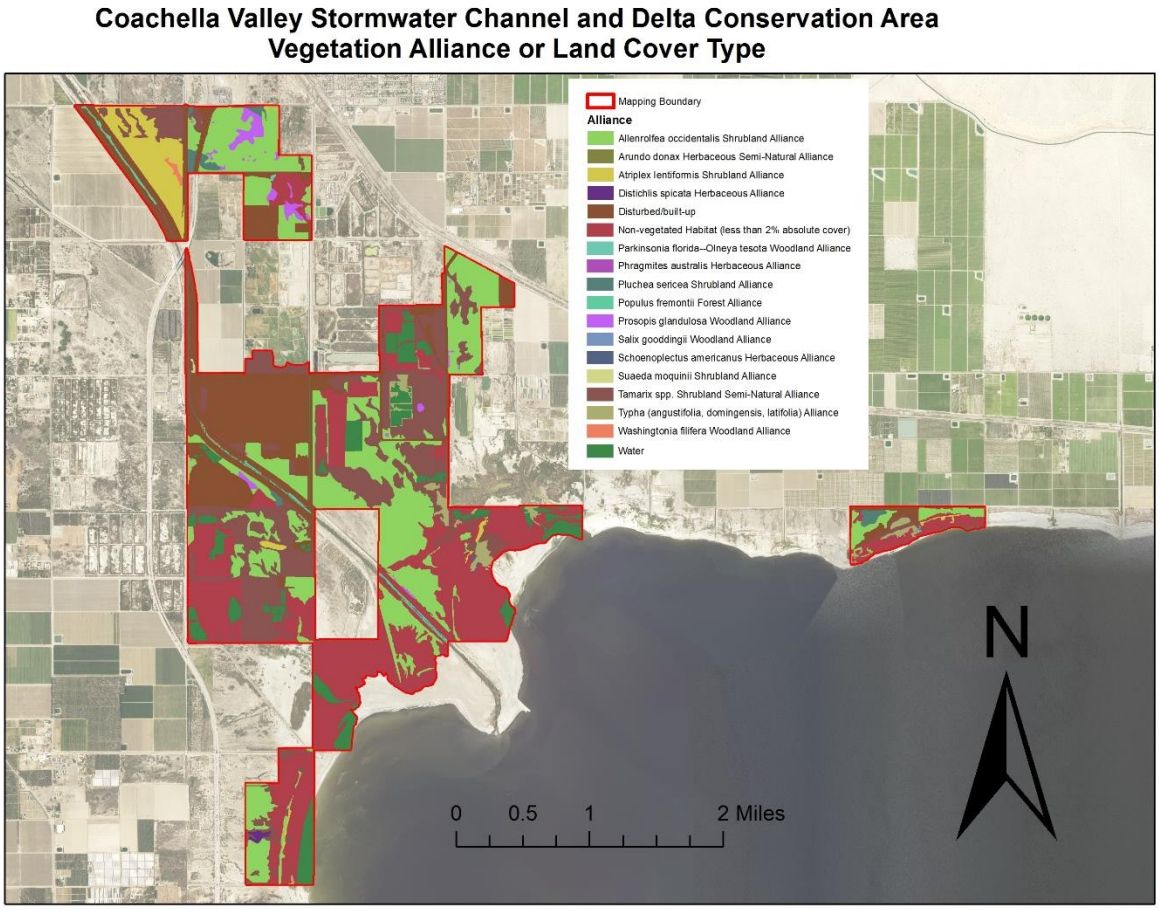

Figure 3: Alliance-level vegetation map of the Coachella Valley Stormwater Channel and Delta Conservation Area.

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APPENDICES

Appendix A: Vegetation Geodatabase 2017

Geodatabase components:

"CVSD_RA_plots" (Rapid Assessment Database)
"CVSD_Recon_points" (Reconnaissance Information Database)
"CVSD_Veg_Poly_postAA" (Vegetation and Land Cover)
"CVAG_CVSD_MappingBoundary" (Mapping Area Boundary)

File name and type: CVAG_CVSD_Vegmap_2017.gdb
ArcGIS 10.3.1 Geodatabase

Appendix B: Coachella Valley Stormwater and Delta Conservation Area Alliance Map

File name and type: UCR_CCB_CVAG_CVSD_Vegetation_2017.pdf
File name and type: PDF