

Appendix A

Habitat Restoration Plan

Tijuana River Valley Invasive Species Removal and Restoration

Habitat Restoration Plan

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Prepared for:

County of San Diego
Department of Parks and Recreation
5500 Overland Avenue, Suite 410
San Diego, CA 92123



Peter Tomsovic
Principal Author

Prepared by:

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

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ACRONYMS AND ABBREVIATIONS

APN	Assessor's Parcel Number
ASMD	Area Specific Management Directives
BCC	Birds of Conservation Concern (USFWS designation)
BMO	Biological Mitigation Ordinance
BMP	Best Management Practice
CADPR	California Department of Pesticide Regulations
Cal-IPC	California Invasive Plant Council
CCA	California Coastal Act
CCC	California Coastal Commission
CCMP	California Coastal Management Program
CDFW	California Department of Fish and Wildlife
CDP	Coastal Development Permit
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CFGF	California Fish and Game Code
CFR	Code of Federal Regulations
CIAP	Coastal Impact Assistance Program
City	City of San Diego
CNPS	California Native Plant Society
County	County of San Diego
CRA	Core Resource Area
CRPR	California Rare Plant Rank
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DPR	Department of Parks and Recreation
ESA	Environmentally Sensitive Area
ESHA	Environmentally Sensitive Habitat Area
ESL	Environmentally Sensitive Lands
FE	Federal Endangered
FESA	Federal Endangered Species Act
FP	Federal Protected
FT	Federal Threatened
GPS	Global Positioning System
HCP	Habitat Conservation Plan
HELIX	HELIX Environmental Planning, Inc.
HRP	Habitat Restoration Plan

ACRONYMS AND ABBREVIATIONS (cont.)

I	Interstate
KSHB	Kuroshio Shot Hole Borer
LCP	Local Coastal Program
MBTA	Migratory Bird Treaty Act
MHPA	Multi-Habitat Planning Area
MSCP	Multiple Species Conservation Program
NADB	North American Development Bank
NCCP	Natural Communities Conservation Plan
NE	
NPPA	Native Plant Protection Act
PLS	pure live seeds
RGP	Regional General Permit
RMP	Resource Management Plan
RPO	Resource Protection Ordinance
RWQCB	Regional Water Quality Control Board
SAA	Streambed Alteration Agreement
SANDAG	San Diego Association of Governments
SCo	South Coast (floristic province)
SE	State Endangered
SSC	Species of Special Concern (CDFW designation)
SWPPP	Stormwater Pollution Prevention Plan
TRNERR	Tijuana River National Estuarine Research Reserve
TRVRP	Tijuana River Valley Regional Park
TSNWR	Tijuana Slough National Wildlife Refuge
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VCM	Vegetation Classification Manual
WL	Watch List

1.0 INTRODUCTION

This report presents a conceptual Habitat Restoration Plan (HRP) for the Tijuana River Valley Invasive Species Removal and Restoration Project (project). The development of this HRP, permitting for activities included in this HRP, and California Environmental Quality Act (CEQA) review is being performed per a grant obtained by the County of San Diego (County) Department of Parks and Recreation (DPR) from the California Department of Fish and Wildlife (CDFW) Prop 1 Watershed Restoration Grant Program. The restoration activities proposed in this HRP will occur on lands within the Tijuana River Valley Regional Park (TRVRP) that are County-owned and managed by DPR, as well as those lands that are owned by the City of San Diego (City). City-owned areas are included in this HRP to provide an opportunity for contiguous habitat restoration. Before moving forward with phases that include these areas, DPR would coordinate with the City and obtain all necessary approvals and agreements. Specifically, this HRP details a comprehensive approach for an Invasive Species Removal and Restoration Project located in southwestern San Diego County, California. The activities detailed in this plan include an implementation, maintenance, and monitoring program addressing the restoration of a Project Area totaling 1,740.75 acres comprising mixed wetland, riparian, and upland habitats. Specifically, the step-by-step process for implementation of this HRP will include (1) project identification/phasing, (2) Execution Plan development, (3) pre-restoration implementation activities, (4) restoration implementation activities, and (5) post-implementation maintenance activities. This report has been prepared in conformance with the County's Report Format and Content Requirements for Revegetation Plans (County 2007). The framework of this HRP was adopted from Southern California Edison's programmatic restoration practices for temporary impacts following transmission line construction (CH2M 2018).

Since the late 1800s, the Tijuana River Valley has been modified for agricultural practices and plagued by increasing populations of invasive non-native plants. These non-native and invasive species populations displace native habitats with monotypic stands which are inhospitable to native wildlife, alter riverine hydrology, impair water quality, hinder water filtration capabilities, trap sediments, and degrade habitat for wildlife species. Invasive non-native plant populations have been observed forming as dense stands of vegetation that retain water in stagnant ponds, leading to odor and vector issues. In recent years, trash, sediment, and invasive non-native plant species within the Tijuana River Valley have posed an increasingly serious threat to the overall health of the watershed and the ecosystems that depend on it. Accumulation of sediment, debris, and thick non-native vegetation have compounded and contributed to serious flooding in the valley. The overall condition of the TRVRP is such that a large-scale effort is warranted to fend off further damage and orient the environmental trajectory in a positive direction. Full remediation of the Valley is a large undertaking that will require a concerted effort from many stakeholders and persistence toward overarching goals; this HRP supports that larger effort through a focus on non-native species control and removal. Through the removal of invasive non-native species populations, many of the negative trends may be reversed while restoring the riverine and upland ecosystem that once existed. To restore portions of the TRVRP, the County DPR has adopted this HRP for implementation.

The goal of this HRP is to identify, prioritize through phasing, and implement, large-scale restoration throughout the TRVRP on properties that are County-owned and managed by DPR, in addition to those properties that are owned by the City. City-owned areas are included in this HRP to provide an opportunity for contiguous habitat restoration. Before moving forward with phases that include these areas, DPR would coordinate with the City and obtain all necessary approvals and agreements. Through

the implementation of this comprehensive HRP, invasive non-native plant species will be targeted for removal, and native plant restoration would occur over several independent phases. Subsequent to this HRP, Execution Plans would be prepared for each individual project phase. The Execution Plans would choose from methodologies identified in this HRP and provide specificity to implementation practices, methods, and expected project outcomes in that project phase.

Within three years following implementation, the goal is that each proposed project phase is expected to be approaching the functions and values of adjacent, preserved riparian and upland habitats found within the TRVRP. Restoration is expected to have secondary benefits resulting from improved ecological and hydrological functions, such as reduced concentrations of pollutants and sediments, improved water quality, and enhanced flood control. The restoration will also potentially supply suitable breeding and foraging habitat for special status species known to occur in the TRVRP, including quino checkerspot butterfly (*Euphydryas editha quino*), western spadefoot toad (*Spea hammondi*), Baja California coachwhip (*Coluber fuliginosus*), Blainville's horned lizard (*Phrynosoma blainvillii*), Belding's orange-throated whiptail (*Aspidoscelis hyperythra beldingi*), Cooper's hawk (*Accipiter cooperii*), northern harrier (*Circus hudsonius*), white-tailed kite (*Elanus leucurus*), yellow-breasted chat (*Icteria virens*), coastal California gnatcatcher (*Poliophtila californica californica*), yellow warbler (*Setophaga petechia*), and least Bell's vireo (*Vireo bellii pusillus*) (HELIX Environmental Planning, Inc. [HELIX] 2019). Following successful restoration, the entire site would continue to be preserved, managed, and maintained in perpetuity by the County.

Nomenclature used in this report generally comes from Holland (1986), Oberbauer et al. (2008), the Vegetation Classification Manual for Western San Diego County (San Diego Association of Governments [SANDAG] 2011), Jepson eFlora (2021), and Baldwin et al. (2012) for plants, North American Butterfly Association (2021) for butterflies, Society for the Study of Amphibians and Reptiles (2021) for reptiles and amphibians, American Ornithological Society (2021) for birds, and Bradley et al. (2014) for mammals. Plant species status is from the CNPS's Rare Plant Inventory (CNPS 2021), CDFW (2021a), County (2010a), and City (1997). Animal species status is from the CDFW (2021b), County (2010a), and City (1997).

1.1 PROJECT OVERVIEW

The project is being undertaken by the County DPR utilizing grant funds awarded through the CDFW Watershed Restoration Grant Program. The CDFW developed the Watershed Restoration Grant Program in response to the Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1). Proposition 1 amended the California Water Code to add Section 79737, authorizing the Legislature to appropriate funds to CDFW to fund multi-benefit ecosystem and watershed restoration and protection projects. This restoration effort is not being undertaken in response to any compensatory mitigation requirements associated with any other project; however, the County reserves the right to supplement the effort with any compensatory mitigation needs that may arise in the future.

The project includes restoration of degraded habitats on County-owned and City-owned lands throughout the TRVRP (Project Area). This HRP presents a long-term restoration framework to remove many of the invasive non-native plant species that have taken hold in the greater TRVRP. Expected benefits of the project include removal and maintained control of invasive, non-native plant species in the area, successful treatment and removal of invasive non-native plants, reestablishment of native plant species and communities, trash removal, **including the potential removal of remnant building materials**, enhanced water quality and flow, reduced concentration of chemicals and pollutants,

improved sediment deposition regimes, reduced risk of flooding, increased ecosystem diversity and species abundance, and improved recreational experience. These expected benefits are significant as the current condition of the TRVRP is critical, and the ecosystems and habitat dependent on this area are rapidly degrading (Boland 2016). They are further significant because several sensitive, threatened, and endangered species, such as the federally and state endangered least Bell's vireo, rely on the Tijuana River Valley for its abundant, early to mid-successional riparian habitat, which provides a structurally diverse canopy and dense shrub cover required for nesting and foraging, and as it is one of the last coastal estuaries in southern California that remains undeveloped (Safran et al. 2017). The likelihood that the beneficial outcomes of the project will be realized is high, as this project was designed to address County-owned and City-owned land within the TRVRP, which covers a large area; approximately 1,740 acres of the 1,800-acre park. The project's inclusion of all County-owned and City-owned lands will decrease the chance that invasive non-native plants would easily reestablish, which may occur if restoration were only focused on a small scale.

The greater TRVRP encompasses 1,800 acres within the City of San Diego. Approximately 1,740 acres of the 1,800-acre TRVRP are owned by the County and/or City (herein referred to as the Project Area), with the remaining other landowners consisting of the CDFW, U.S. Federal government, and private entities. City-owned areas are included in this HRP to provide an opportunity for contiguous habitat restoration. Before moving forward with phases that include these areas, DPR would coordinate with the City and obtain all necessary approvals and agreements. The greater TRVRP is one of the closest areas to where the Tijuana River crosses the U.S.-Mexico border and, as a result, is one of the first areas impacted during periods of high flow and waste discharge. The geographic location, compounded by the nature of large river valley estuaries to act as a catching basin for upstream inputs, leads to threats from both invasive non-native species and trash (North American Development Bank [NADB], 2019).

Threats to native vegetative communities in the region have been exacerbated within the past five years due to the invasion of the Kuroshio Shot Hole Borer (KSHB; *Euwallacea* sp.) beetles (described in more detail in Section 2.5). The KSHB is an invasive beetle from Asia that has been recently introduced within southern California and was first detected within San Diego County in 2012 (Eskalen et al. 2013; Umeda et al. 2016). The species has been documented residing within the TRVRP since 2015 (Boland 2016). The KSHB creates a gallery of tunnels in the trunk of native and invasive non-native tree species, laying eggs and depositing the tunnels with a fungus (*Fusarium* sp.) that is used as a food resource (Biedermann et al. 2009). The fungus diseases the trees, stopping the flow of water and nutrients to the host plant, which causes individual branch death, or in severe cases, mortality to the entire tree. This process is generally referred to as Fusarium dieback. Reproductive host plants include a wide range of native and invasive non-native trees, with the species having been documented utilizing at least 63 different species (Eskalen 2018). The presence of the KSHB within the TRVRP and the surrounding area has caused extensive damage to native riparian vegetation, resulting in damage and mortality to a large number of trees along the Tijuana River (Boland 2018). The invasion of KSHB, and subsequent damage to native trees, has caused a reduction in the willow canopy along the Tijuana River floodplain, particularly in wetter areas. This has led to an increase in the presence and cover of invasive non-native plant species, such as giant reed (*Arundo donax*) and castor bean (*Ricinus communis*), in areas previously dominated by native vegetation. This project aims to reverse the trend from non-native plant species invasion of KSHB infested areas towards a native vegetation community that existed prior to KSHB infestation. Vegetation infested by KSHB was observed to be concentrated in riparian woodland and riparian forest communities rather than riparian scrub communities. The damaged trees responded by resprouting, with less than 10 percent of resprouts observed to show signs of KSHB infestation. Overall, the KSHB infestation resulted in dieback of mature riparian trees, but they did not die. Implementation of

restoration and perpetual management of restored areas in the TRVRP would help control re-infestation and spread of KSHB, as the infestation only affects a small portion of new tree growth (Boland 2018). Control of KSHB at the onset of signs of infestation would prevent large-scale re-infestation and spread of the infestation.

Based on the HELIX Environmental Planning, Inc. (HELIX) 2018 biodiversity study encompassing the greater TRVRP (HELIX 2019) and focused surveys conducted by HELIX in 2021, wetland, riparian, upland, and disturbed invasive non-native plant vegetation communities/habitats existing within the Project Area cover a total area of 1,740.75 acres. Within the Project Area, disturbed and invasive non-native plant vegetation communities/habitats total approximately 587.93 acres. These disturbed and invasive non-native plant species targeted for removal occur as dense patches of vegetation, as well as point locations¹ intermixed throughout areas of mapped native riparian and upland vegetation. Additionally, within these twelve phases, 7.24 acres of invasive species point locations occurring within native habitat will be treated and restored into native habitats.

While the Project Area includes approximately 1,740 acres of County-owned and/or managed land, invasive non-native plant treatment and restoration areas would not occur in the entirety of the Project Area, as patches of native vegetation would not be treated/restored. Following treatment of the invasive non-native plant areas and point locations, treatment areas and point locations would be restored to native habitats. Treatment of invasive non-native plants throughout the Project Area is proposed to occur in twelve separate phases based on a variety of conditions such as timing, funding availability, and capacity of County staff. Phase prioritization is detailed below in Section 4.1, and phase-specific planning activities are detailed below in Section 4.2. Restoration of upland habitats that is not contingent on aquatic resource agency permitting, may be initiated by DPR first. This plan does not include brown-headed cowbird (*Molothrus ater*) trapping, which is implemented separately by DPR as part of the County's Area Specific Management Directives (ASMDs) for the TRVRP (County 2007).

1.2 CONCURRENT PLANNING AND RESTORATION EFFORTS

In addition to the proposed project discussed in this HRP, there are several other ongoing projects and studies for future projects within TRVRP and region that are being addressed by others, concurrent with this report. A summary of projects and technical studies which could affect the implementation of this HRP is provided below.

Tijuana River Valley Public Use Feasibility Study (AECOM 2017)

- Comprehensive feasibility document that will help guide future recreation, camping, and trail enhancement decisions within TRVRP
- Assesses the economic feasibility for revenue-generating opportunities for select potential recreational opportunities.
- Includes recommendations that focus on improving the current visitor experience at TRVRP
- Analyzes gaps in the regional trail network, focusing on supporting connections between TRVRP trails and the larger regional trail network.

¹ Point locations are singular or grouped individuals of non-native and invasive trees or shrubs, or herbaceous species that occupy a patch size of 1,256 square feet, or less, which is equal to a point with a 20' radius. All mapped point locations were given a patch size of 1,256 square feet.

- Presents conceptual site plans and location profiles for a number of potential recreational improvements.

Tijuana River Valley Needs and Opportunities Assessment (HDR 2020)

- Provides a comprehensive review and assessment of current and potential management strategies that could be implemented on the United States (U.S.) side of the border to address transboundary flows of sewage, trash, and sediment into the Tijuana River Valley.
- Focuses on analyzing potential projects to identify their potential benefits to addressing transboundary flows as well as planning-level costs for both capital investment and ongoing operations and maintenance expenses.
- Provides decision-makers in both countries with a list of potential projects that can be implemented on the U.S. side of the border to protect human and environmental health in the Tijuana River Watershed and coastal waters.
- Stakeholder-driven process using the Recovery Team as the core stakeholder group for ongoing input and feedback.

Tijuana River Diversion Study Flow Analysis, Infrastructure Diagnostic and Alternative Development (ARCADIS 2019)

- The study was directed by the NADB, in coordination with the U.S. Environmental Protection Agency (USEPA), USIBWC, CILA, Comisión Nacional del Agua, and CESPT.
- The study was initiated in the spring of 2018 and completed in July 2019.
- The study consists of transboundary flow analysis, diversion infrastructure and operations diagnostics, and an evaluation of technical alternatives identified for potential infrastructure improvements in Mexico, the U.S., or both countries for mitigation of transboundary flows.
- The study provides a summary of the treaty minutes that apply to the transboundary flows in the Tijuana River Valley.
- The study did not result in a recommendation for a single solution. The recommendations focused on the need for analysis through preliminary engineering and a feasibility study for any of the proposed investment options.

Tijuana River Valley Recovery Team Recovery Strategy (Tijuana River Valley Recovery Team 2012)

- The study was completed in collaboration with more than 30 federal, state, and local agencies (including California State Parks, USEPA, U.S. Customs and Border Protection, TRNERR, Regional Board, USIBWC, County of San Diego, City of San Diego, City of Imperial Beach, etc.), as well as other stakeholders on both sides of the border (including Coastal Conservancy, Surfrider, San Diego Coastkeeper, Tijuana River Valley Equestrian Association, etc.).
- The strategy plan was initiated in June 2008.
- The Recovery Strategy was completed in January 2012, and the Five-Year Action Plan was completed in March 2015.

- The objective of the Recovery Strategy is to document the existing conditions related to sediment and trash issues in the Tijuana River Valley and outline solutions that will allow beneficial uses of the Tijuana River Valley and its resources to be achieved.
- The objective of the Five-Year Action Plan is to maintain collaborative momentum and implement priority projects that advance Recovery Team goals as described in the Recovery Strategy.

Tijuana Estuary Tidal Restoration Project (TETRP 2011)

- Initially developed in 1991 for the California Coastal Conservancy and U.S. Fish and Wildlife Service (lead agencies), the Tijuana Estuary Tidal Restoration Program (TETRP) is a large, multi-phased wetland restoration program involving up to 500 acres of restoration. Its primary objective is to restore habitat values that have been lost and increase the exchange of water in a tidal cycle, which will, in turn, enhance flushing, improve water quality, and control sedimentation.
- The study was followed by the Tijuana Estuary – Friendship Marsh Restoration Feasibility and Design Study prepared in March 2008 for the California Coastal Conservancy and Southwest Wetlands Interpretive Association (SWIA).
- This feasibility and design study reexamines the potential for restoration of the southern arm of the Tijuana River and updates and refines the 1991 design/ plan to include a programmatic level feasibility analysis and engineering plans.

TRVRP Brown Fill Restoration Project

- The County of San Diego is the landowner and project lead.
- Grant funding was secured for planning, environmental analysis and permitting, and design.
- The Hydraulic and Sediment Transport Analysis for the Brown Property Fill Removal was completed in 2019.
- Four conceptual fill removal alternatives were considered. The hydraulic results indicate that the alternatives will not significantly lower the water surface elevations or provide flood inundation benefits near the project over the range of flow events studied. The reductions vary depending on the alternative, flow event, and cross-section, and the maximum reduction is less than five inches.
- The County of San Diego is currently looking at revising the project scope and costs in consultation with key stakeholders.

Disney Property Rehabilitation (Pending Funding)

- This Project seeks to remove structures from the TRVRP floodplain and restore habitat adjacent to the County trails and the river parkway.
- The 2.5-acre disturbed land will then be restored through the removal of invasive non-native plant species, and planted with native riparian shrubs, trees, and salt-tolerant species to encourage native plant recruitment similar to the adjacent riparian vegetation and other restoration work occurring throughout the River Valley.
- Includes park trail realignment to provide one contiguous restoration area.

Nelson Sloan Quarry Restoration and Beneficial Reuse of Sediment Project (DUDEK 2021)

- California State Parks is the project lead in partnership with the County of San Diego and the City of San Diego.
- California State Parks secured grant funding for planning, environmental, and the development of operational agreements. A draft environmental document for the project was released in 2021. A final environmental document is expected to be released publicly in 2023.
- The study was initiated in 2010 (URS 2010), followed by the Nelson Sloan Management and Operations Plan and Cost Analysis in 2016 (AECOM 2016).
- The purpose of this plan is to provide stakeholders with sediment management responsibilities in the valley a description of how the quarry might be managed and operated as a location for the placement of sediment and concurrently meet the requirements of the conditional use permit and Restoration Plan.
- The project will also require the preparation of a multijurisdictional agreement that details roles and responsibilities during the operation of the proposed project.

Hydraulics and Hydrology Model, Phase 1 (USACE LA District 2017)

- This was developed by USACE in coordination with the City of San Diego.
- In September 2018, the USACE completed a Phase 1 Hydrology, Floodplain and Sediment Transport Study extending from the international border to the Pacific Ocean.
- The USACE initiated Phase 2 of the study in July 2018, which is still underway. It is anticipated that Phase 1 modeling will be extended into Mexico and include the operation of the reservoirs in Mexico.
- The overall study goals are to determine flow rates and flood risks for a range of storm events; plan for future flow management activities that may be used to mitigate flood risk in the U.S. Mexico border area; and help inform future flood, sediment, and trash management activities (including watershed conservations, preservation, and restoration management strategies).

Border Impact Bond

- 4 Walls, a registered 501(c)(3) nonprofit, has proposed a financing strategy (Border Impact Bond) to focus on the need for upstream source control to reduce the transboundary flow of trash and sediment across the U.S. Mexico border.
- The means of investing in and providing 3rd party financial support for such a bond are being examined at present.
- The Border Impact Bond would create value for plastics and repurpose trash in parts of Tijuana with the goal of developing a blueprint that can be employed more broadly across various parts of the border.

Tijuana River Valley Regional Park Trails and Habitat Enhancement Project

- Formally designates additional miles of trails in the TRVRP. After completion of the project, TRVRP now has 22.5 miles of trails.

- Constructs approximately 5,000 linear feet of new trail; widen, narrow, and resurface existing trails in specific areas, and repairs erosion.
- Installs 12 culverts to allow runoff to flow under the trail.
- Trims vegetation overhanging the trail in select areas and install trail markers, signage, and lodge pole fencing.
- Maintains the formal trail system, including repair, rehabilitation, or replacement of permitted culverts and removal of accumulated sediments and debris in the vicinity of existing trail-related structures, including intake and outfall structures.
- Decommissions 18.9 miles of informal trails, including active and passive restoration, and restores of 2.5 acres of riparian habitat in a currently ruderal area near the Butterfly Garden.

Tijuana River Valley Channel Maintenance Project (DUDEK 2016)

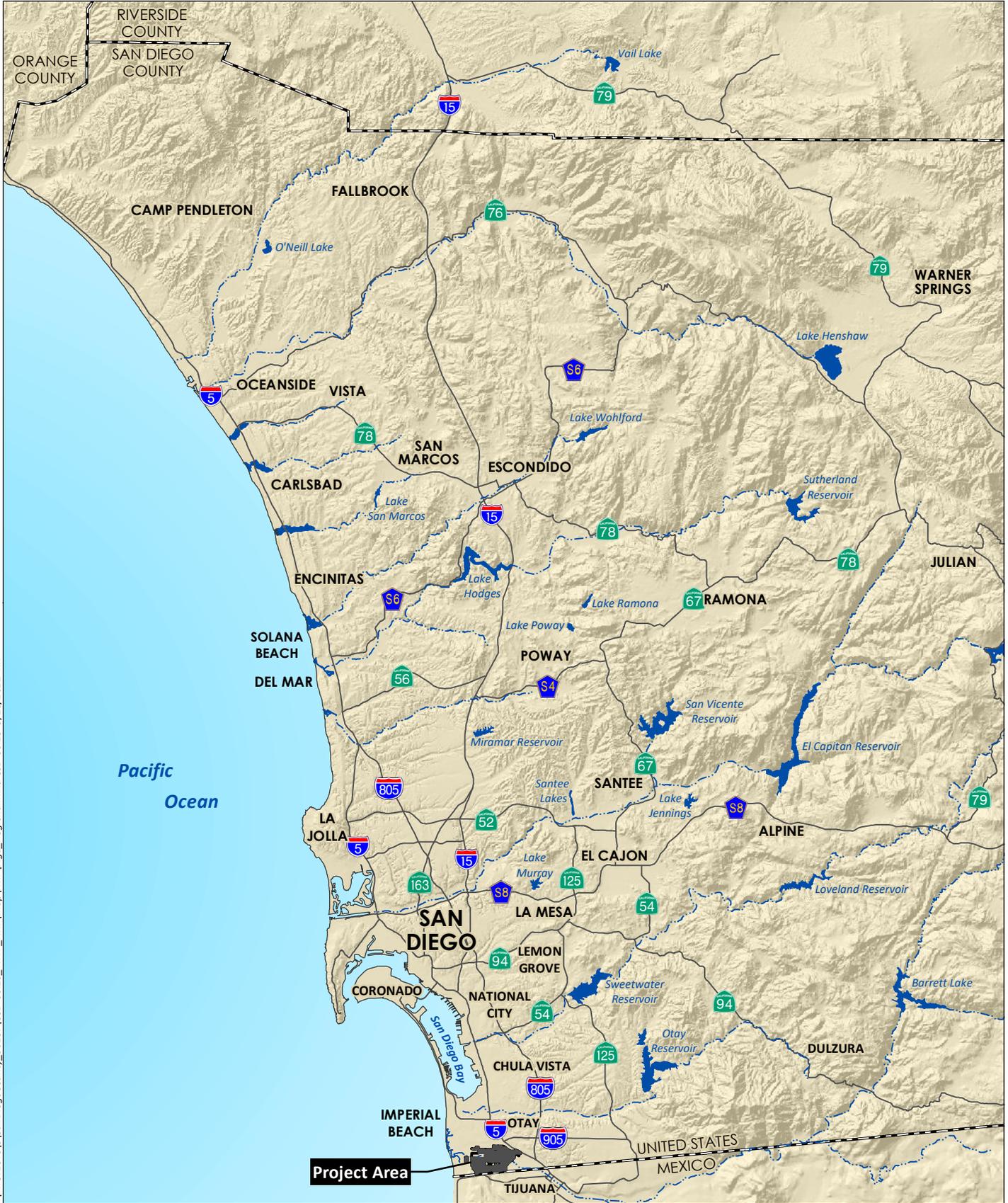
- As part of the City’s Master Storm Water System Maintenance Program, the City maintains the Smuggler’s Gulch channel and the Tijuana River Pilot Channel.
- Maintenance includes the excavation of sediment, which facilitates channel flows and prevents flooding.
- Activities in 2013 – 2014 also repaired previously built turnarounds within the Tijuana River Pilot Channel, repaired the previously built access ramp into Smuggler’s Gulch, and established a third turnaround in the eastern section of the Tijuana River Pilot Channel.

1.3 PROJECT LOCATION

The TRVRP is found within the boundaries of the City of San Diego in southwestern San Diego County (Figure 1, *Regional Location*). Approximately 1,617 acres of the 1,800-acre TRVRP are owned by the County, while other landowners in the area consist of the City, CDFW, U.S. federal government, and private landowners. City-owned areas are included in this HRP to provide an opportunity for contiguous habitat restoration. Before moving forward with phases that include these areas, DPR would coordinate with the City and obtain all necessary approvals and agreements.

The TRVRP is bound to the north by Sunset Avenue, to the south by the U.S.-Mexico International Border, to the west by Border Field State Park and the Tijuana River National Estuarine Research Reserve (TRNERR), and to the east by Dairy Mart Road and the residential community of San Ysidro (except for the part of the Dairy Mart Ponds that extend further east between the Interstate [I-] 5 corridor and Camino de la Plaza). The area is situated within Sections 2, 3, 4, 5, 32, 33, 34, and 35, Townships 18 and 19 South, and Range 2 West of the U.S. Geological Survey (USGS) Imperial Beach topographic quadrangle map (Figure 2, *Park/Preserve Vicinity Map*). The entire Project Area is located within the coastal zone, and portions of the Project Area along the Tijuana River are designated by U.S. Fish and Wildlife Service (USFWS) as final critical habitat for the federally listed endangered least Bell’s vireo (*Vireo bellii pusillus*). Designated federal and state open space is found next to the Project Area and includes Border Field State Park, TRNERR, and the Tijuana Slough National Wildlife Refuge (TSNWR; Figure 3, *Regional Designations and Conserved Lands*).

The Project Area is within the Coastal Zone, with portions in the Appealable Area and portions within the Deferred Certification Area. Appealable area means the area, as defined by California Public

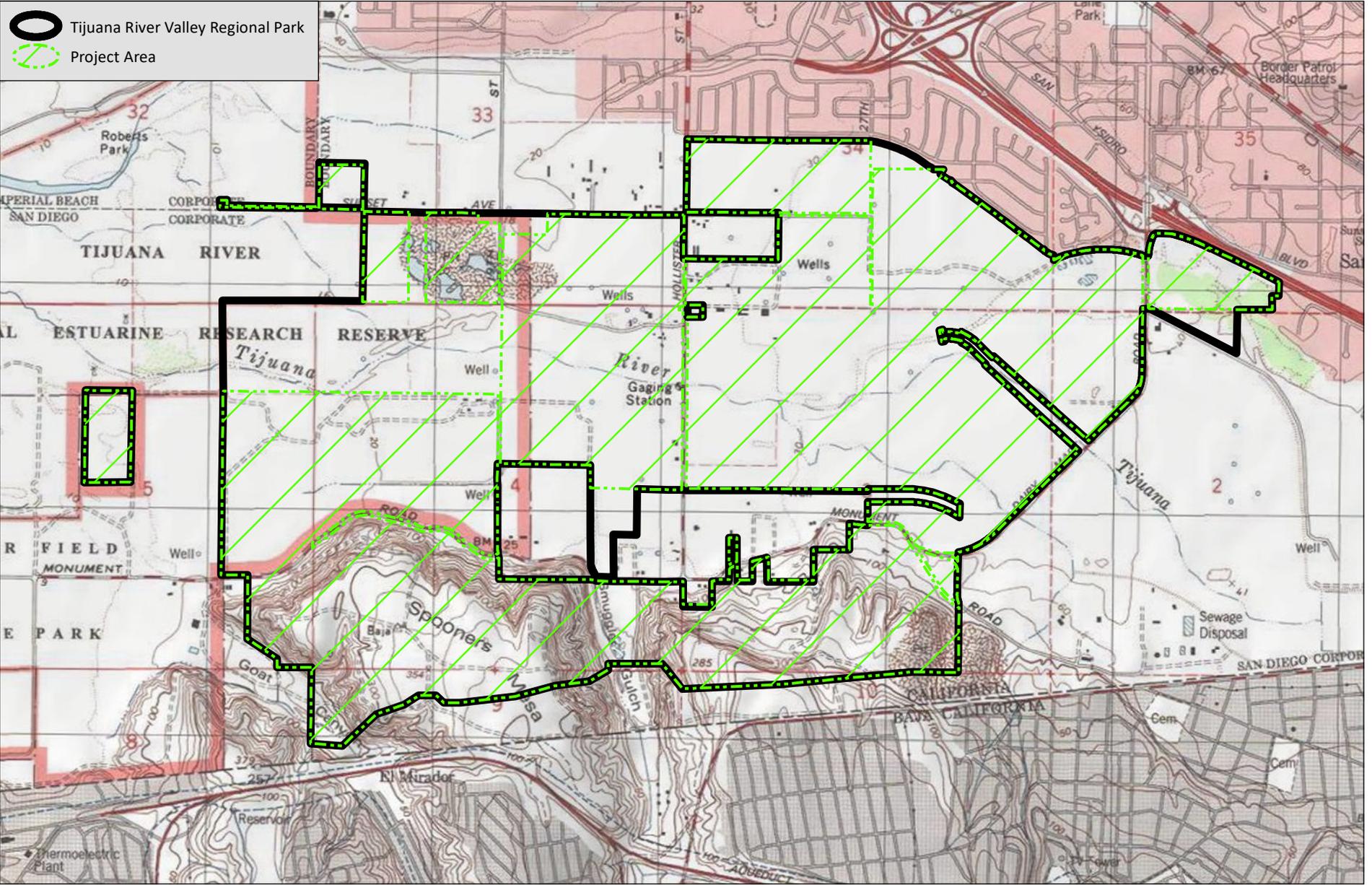


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Source: Base Map Layers (SanGIS, 2016)

Regional Location

Figure 1



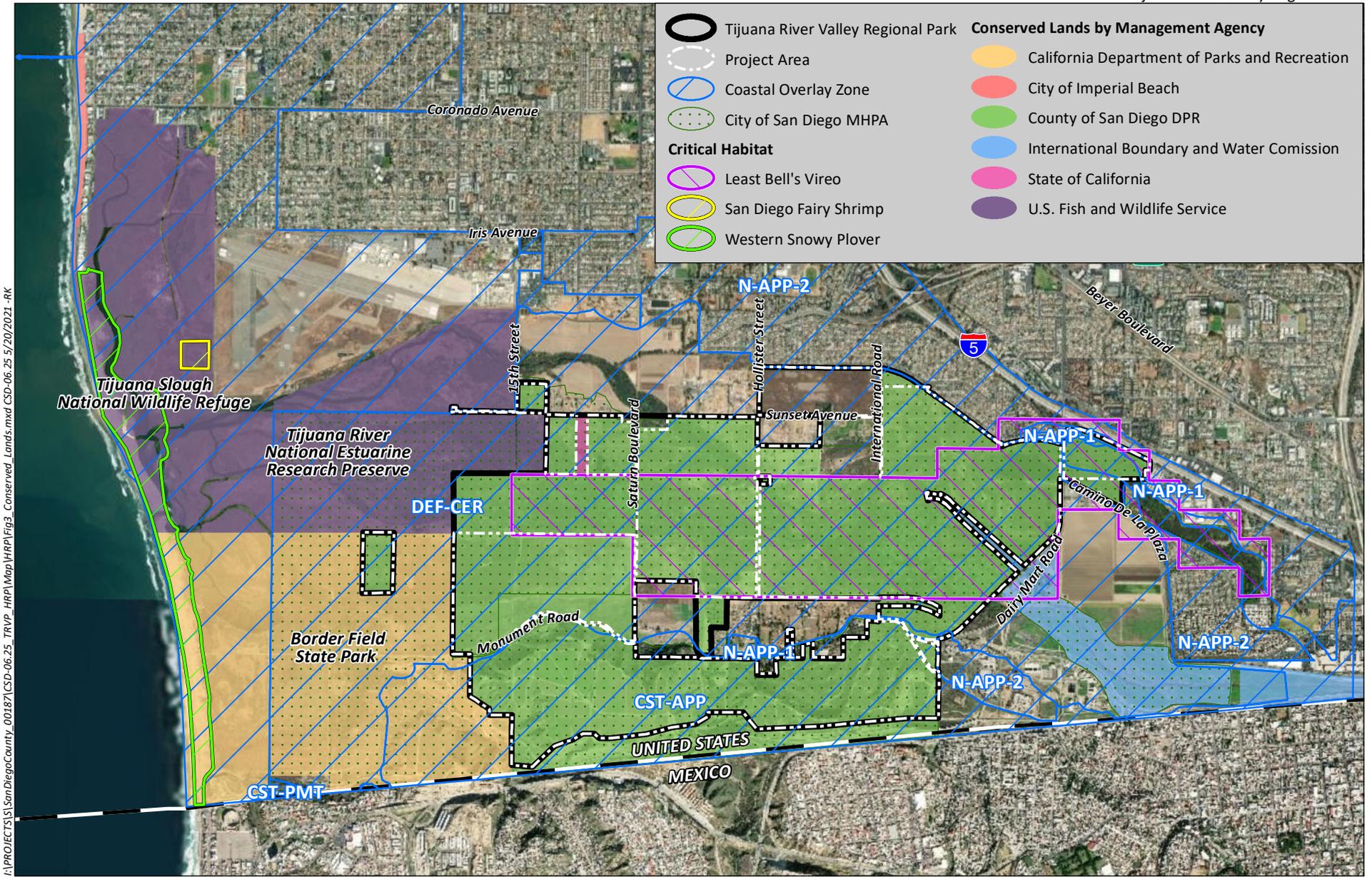
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Source: Imperial Beach 7.5' Quad (USGS)



Park/Preserve Vicinity Map

Figure 2



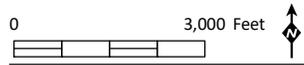
Conserved Lands by Management Agency	
	California Department of Parks and Recreation
	City of Imperial Beach
	County of San Diego DPR
	International Boundary and Water Commission
	State of California
	U.S. Fish and Wildlife Service

Critical Habitat	
	Least Bell's Vireo
	San Diego Fairy Shrimp
	Western Snowy Plover

	Tijuana River Valley Regional Park
	Project Area
	Coastal Overlay Zone
	City of San Diego MHPA

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Source: Aerial Photo (Esri 2020); Conserved Lands (SANDAG Technical Services - GIS 2018); MHPA (SanGIS 2006); Critical Habitat (U.S. Fish and Wildlife Service 2020)



Regional Designations and Conserved Lands

Figure 3

Resources Code Section 30603, within the coastal zone that constitutes the appeal jurisdiction of the California Coastal Commission (CCC). This area includes lands between the sea and the first public road paralleling the sea, or within 300 feet of the inland extent of any beach or of the mean high tideline of the sea where there is no beach, whichever is the greater distance; or within 100 feet of any wetland, estuary, or stream, or within 300 feet of the top of the seaward face of any coastal bluff. Development within this zone is regulated under the City’s approved Local Coastal Program (LCP), although the CCC retains appeal authority. Developments in deferred certification areas designated by the certified LCP require a permit or exemption issued by the CCC in accordance with the procedure as specified by the Coastal Act.

The TRVRP is comprised of 88 Assessor’s Parcel Numbers (APNs) owned by the County, City, state of California, U.S. federal government, and private landowners (Table 1, *Tijuana River Valley Regional Park Ownership Summary*, Figure 4, *Tijuana River Valley Regional Park Land Ownership*). The County owns the largest portion of the TRVRP, approximately 91 percent; this is the Project Area described in this plan. The City owns 10 parcels that total approximately seven percent of the area, the state of California owns one parcel, the U.S. federal government owns two parcels that each total approximately one-half percent of the area, and private landowners own six parcels that total approximately one percent of the area.

Table 1
TIJUANA RIVER VALLEY REGIONAL PARK OWNERSHIP SUMMARY

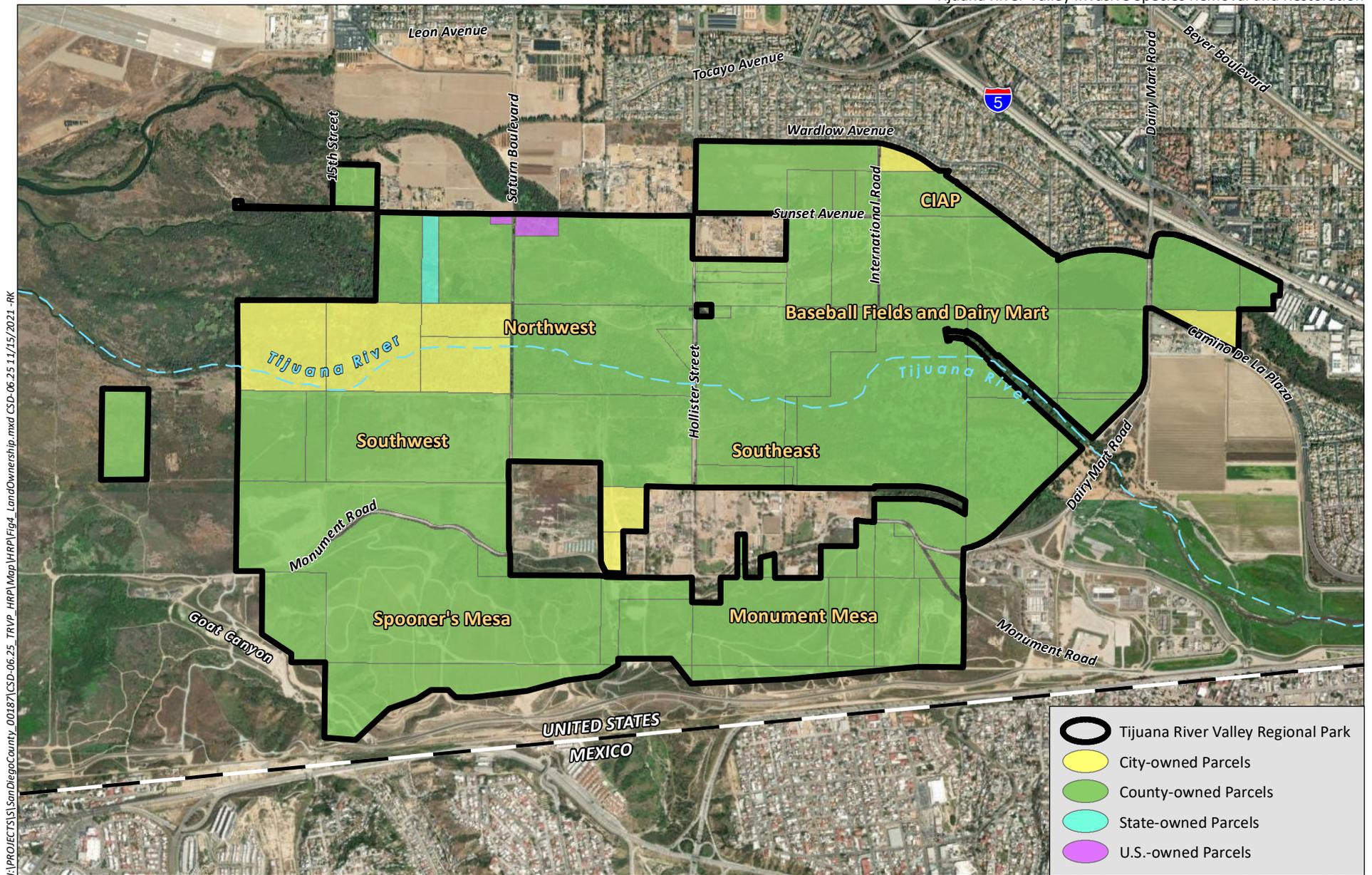
Landowner	Assessor’s Parcel Numbers (APNs)^{1, 2}
County of San Diego	63601010, 63602020, 63602048, 63602059, 63602105, 63701007, 63701008, 63701009, 63701010, 63701011, 63701034, 63701036, 63701037, 63701067, 63701072, 63701073, 63704103, 63704104, 63808041, 66202005, 66202006, 66202009, 66202012, 66202013, 66202025, 66301044, 66301045, 66301048, 66301049, 66301050, 66301051, 66301052, 66301054, 66301104, 66301106, 66301112, 66303006, 66303008, 66401021, 66401026, 66401032, 66401033, 66401036, 66401037, 66401038, 66401040, 66401044, 66401045, 66401047, 66401048, 66401049, 66401050, 66401053, 66401054, 66401055, 66401057, 66401102, 66401103, 66401104, 66401105, 66402004, 66501001, 66501002, 66501045, 76010799, 76024201, 76024220, 76024221, 76024223
City of San Diego	63701074, 66202004, 66301011, 66301038, 66301101, 66301102, 66301103, 66301105, 66401035, 66501003
State of California	63602019
U.S. Fish and Wildlife Service	63602049, 63602104
Private	76010795, 76010797, 76024222, 76010793, 76024236, 76010787

SOURCE: *San Diego Association of Governments [SANDAG] 2018*

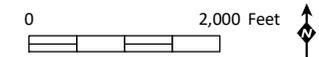
¹ APNs are provided as eight-digit numbers, the last two numbers of each APN being 00.

² Data provided in SanGIS includes multiple APNs for some parcel boundaries and recorded acreages that do not reflect Geographic Information System calculated acreages for an APN.

The Project Area occurs entirely within the City of San Diego Multiple Species Conservation Plan (MSCP) Subarea Plan (City 1997). Within the City’s MSCP Subregion, the Project Area was identified as a



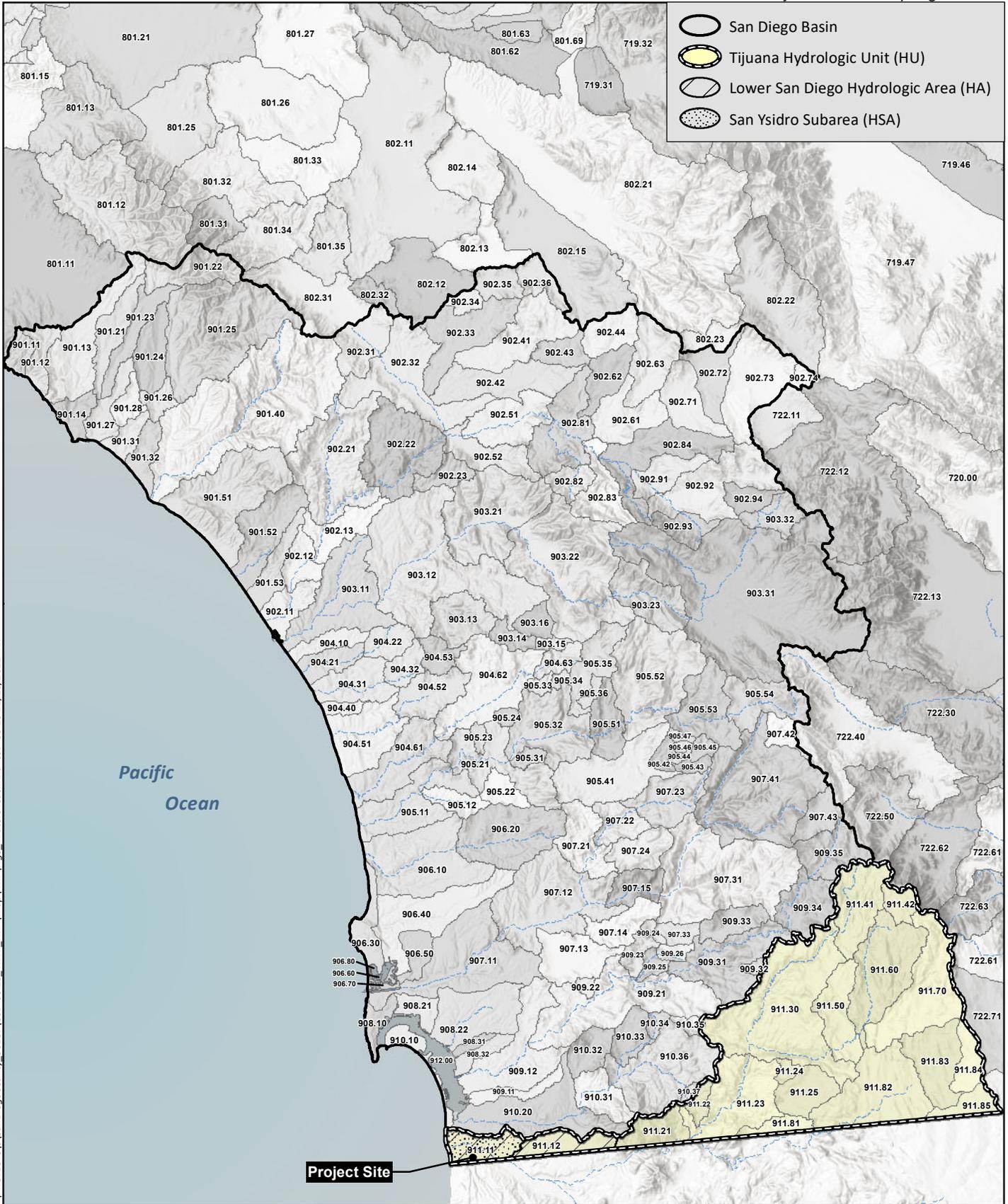
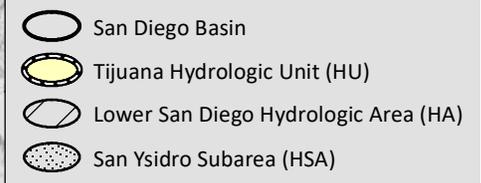
Source: Aerial Photo (Esri 2020)



Tijuana River Valley Regional Park Land Ownership

Figure 4

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Source: RWQCB (1999)



Watersheds/Hydrologic Designations

Figure 5

biological Core Resource Area in the Final MSCP Plan (County 1998). Within the City's MSCP Subregion, the City has delineated a 56,831-acre Multi-Habitat Planning Area (MHPA), which would serve to protect critical sensitive biological resources, and the City proposes to keep 94 percent of the Tijuana River Valley core area within the MHPA. As such, the Project Area lies almost entirely in the MHPA (Figure 3).

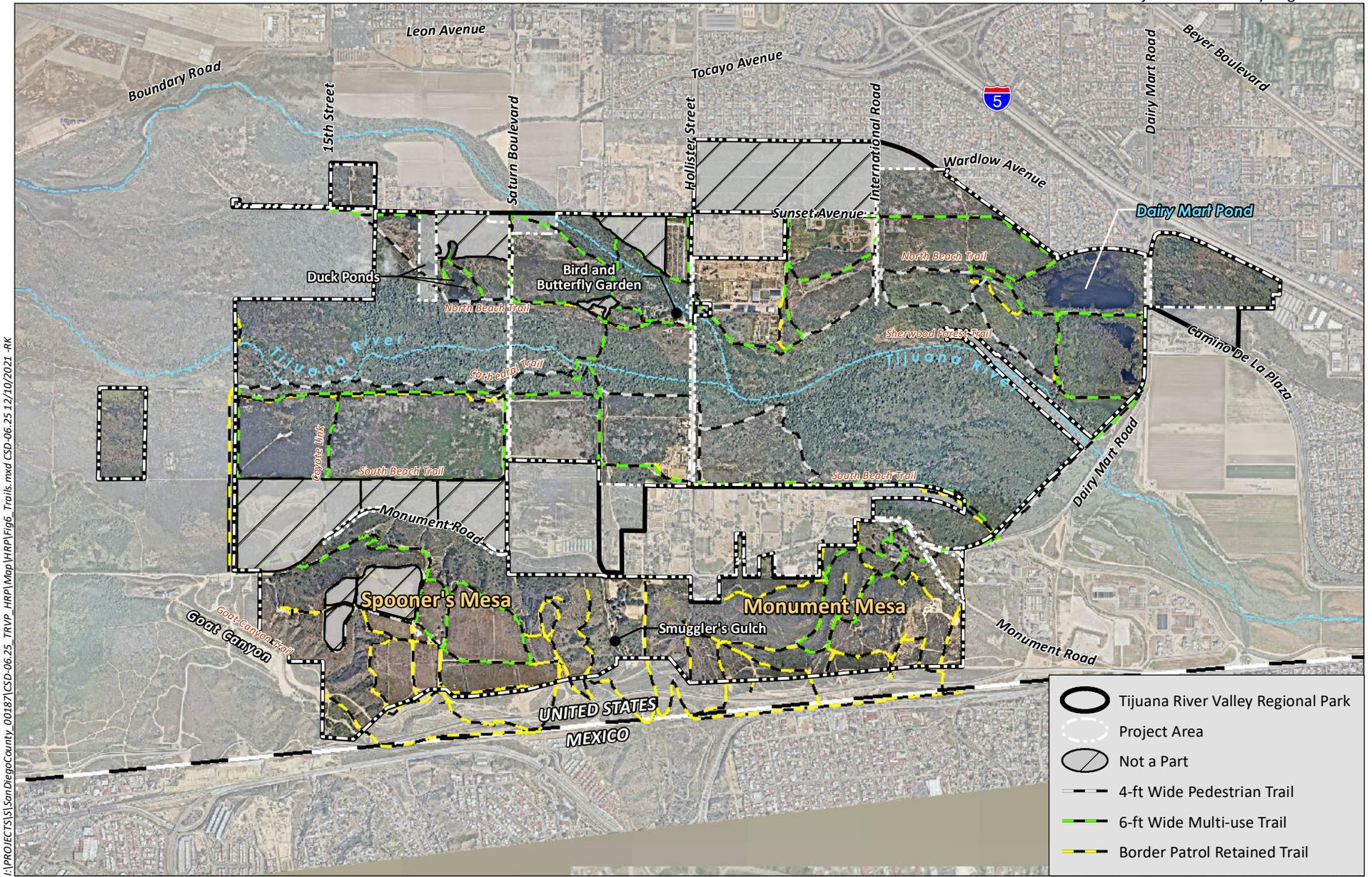
The topography of the Project Area is bisected by the Tijuana River. The Tijuana River flows in a northwesterly direction, originating in Mexico, flows through the TRVRP, continues west into the TRNERR, and drains into the Pacific Ocean just south of the TSNWR (Figure 5, *Hydrology Map*). The Brown Property was the site of unauthorized fill activities in the 1980s. The property was once privately owned, and over 16,000 cubic yards of fill was placed in a special flood hazard area (along the southern and western property boundaries) without a grading permit from the City. Following flooding events in the 1980s, the fill was used to create a berm to protect the property from future flooding. Introduction of the fill (estimated at between 10 to 12 feet in height) resulted in a large portion of the property becoming isolated from the Tijuana River floodplain, contributed to a 0.9-foot rise in water surface elevation (height) in the adjacent river for a 25-year or 100-year flood event, obstructed the river channel, and diverted the floodwaters in a more northerly direction eventually requiring the construction of a new bridge along Hollister Street. Upland areas within the Brown Property are targeted for upland restoration under a separate habitat restoration plan.

Formal areas within the TRVRP include the Coastal Impact Assistance Program (CIAP) area, the Baseball Fields, Dairy Mart, Spooner's Mesa, Monument Mesa, Duck Ponds, Bird and Butterfly Garden, and Smuggler's Gulch. The Duck Ponds and Bird and Butterfly Garden are located in the northwest, north of Tijuana River, south of Sunset Avenue, and west of Hollister Street. The CIAP area is located to the east of Sunset Avenue and north of North Beach Trail. The Baseball Fields and Dairy Mart occur to the south of Sunset Avenue, north of Tijuana River, and west of Dairy Mart Road and contain the Southwest Little League baseball fields and Dairy Mart Pond. Spooner's Mesa and Monument Mesa are located south of Monument Road and separated by Smuggler's Gulch. Goat Canyon is located directly west of Spooner's Mesa outside of the TRVRP.

The Project Area contains a formal 22.5-mile trail network, in addition to an existing informal network of unplanned and unauthorized dirt roads and pathways. The unplanned and unauthorized dirt roads and pathways total approximately 71.5 miles. The 22.5-mile formal trail network includes the following types of trails (Figure 6, *TRVRP Trails*):

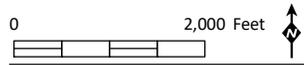
- 21.19 miles of multi-use trails (i.e., pedestrian/equestrian/bicycle) within existing dirt road and pathway alignments; and
- 1.31 miles of multi-use trails (i.e., pedestrian/equestrian) within existing dirt road and pathway alignments.

Revegetation of 40.9 miles of existing informal trails and dirt roads has been ongoing since December 2015 and is designed to allow and facilitate native habitat re-growth resulting in the active and passive restoration of approximately 34.11 acres of riparian and upland vegetation communities. The U.S. Customs and Border Protection will retain 8.1 miles of existing informal trails. Several designated and maintained trails between four to six feet wide run throughout the Project Area, which are frequently used by horseback riders, for recreational purposes, and may be used as access points by vehicles and Border Patrol agents.



Source: Aerial Photo (Nearmap 2021)

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TRVRP Trails

Figure 6

1.4 PLAN GOALS AND OBJECTIVES

The purpose of the plan is to outline the methods for habitat restoration and revegetation of County-owned portions of the TRVRP. Given the size and complexity of the Project Area, this plan strives to provide a framework for activities that would be applied in a phased manner, as funding becomes available. The methodologies described in this plan are applicable in a broad set of conditions; this document prescribes which methodologies are to be used in which conditions, to affect the desired outcome.

Given that phasing of plan implementation will be determined in the future, based on County priorities, site conditions, and funding, this plan is not intended to provide phase-specific details regarding the exact timing of implementation of each defined phase. As project phase parameters become known (site location, size, timing), and prior to the implementation of each phase, the County will prepare a brief Execution Plan for that specific phase of work, drawing upon the information provided in this plan and refining parameters. Additionally, the phases presented in this plan do not need to be implemented as an entire phase; rather, phases may be sub-divided into smaller sub-phases as funding allows. DPR will review the Execution Plans to confirm consistency with this HRP.

Restoration would be (a) consistent with the County's ASMDs for the TRVRP (County 2007), (b) consistent with the City's Specific Management Policies and Directives for the Tijuana River Valley (City 1997), (c) implemented in conformance with the City's MHPA Guidelines (City 1997), consistent with the ASMDs for the TRVRP (d) compatible with adjacent land uses and future uses in the TRVRP, and (e) preserved, managed, and maintained in perpetuity by County DPR, helping to ensure the long-term viability of the habitat restoration effort.

Successful implementation of this Plan will result in a net gain of native habitats within the Project Area and is expected to result in a greater diversity of native flora. This shift in habitat structure will then foster a greater diversity of native faunal species. The benefits of greater diversity within an ecosystem is well documented (Shah 2014, U.S. Environmental Protection Agency [USEPA] 2021, Benkwitt 2020). With greater biodiversity, the restored ecosystem will (1) gain a greater capacity for nutrient storage and recycling; (2) give added protection of water resources; (3) allow a greater ability to recover from unpredictable events; (4) provide population reservoirs for sensitive species; (5) contain greater genetic diversity; (6) yield higher biomass and productivity; (7) provide ecosystem balance and sustainability; (8) provide greater recreational benefits over what currently exists, among several other benefits.

The County has prepared a Resource Management Plan (RMP) for the TRVRP (County 2007) with ASMDs as a condition of the Trails and Habitat Enhancement Project (County 2006). These ASMDs provide the management framework for the monitoring and managing of the TRVRP's resources while balancing the need to provide appropriate passive recreation opportunities. The RMP includes ASMDs, including maintenance, monitoring, and reporting directives that will be implemented within the biological open space in perpetuity.

The proposed restoration sites are considered compatible with the adjacent land uses, which are predominantly undeveloped open space and agricultural lands. Uses within the actively managed portions of the TRVRP are primarily open space and recreation. As required for off-trail areas in the TRVRP, lands adjacent to the restoration site, recreational uses, and encroachment of any kind will be prohibited, unless for maintenance and management reasons. The location of the restoration within the

County TRVRP ensures the long-term preservation and management of the site by the County. Future access for maintenance and management activities will be facilitated by existing access roads/trails.

Additionally, the Project Area lies almost entirely in the MHPA. Restoration of the Tijuana River Valley and adjacent uplands to a natural floodplain, with upland buffers that contain appropriate habitats for endangered, threatened, and other special status species and vegetation communities, would help achieve and maintain the conservation goals of the City of San Diego Subarea Plan. Explicit management policies and directives have been outlined for the Project Area, where the primary concerns include maintenance of human use areas, non-sustainable agriculture, vandalism, illegal dumping, water quality, control of invasive species introduction, and management of land use adjacent to habitat for special status species. Specific management policies and directives that pertain to the MHPA within the TRVRP include:

- Maintain existing Reserve (estuary) and park uses;
- Maintain buffers around all wetland areas;
- Maintain existing agricultural uses on Spooner’s Mesa, with the long-term goal of phased restoration to coastal sage scrub, maritime succulent scrub, or native grassland habitat;
- Maintain agricultural use on County-owned lands, with the long-term goal of restoration to native vegetation where possible, consistent with the County’s Framework Management Plan (County 1998); and
- Retain and enhance, where possible, existing riparian habitat along the Tijuana River.

1.5 RESPONSIBILITIES

1.5.1 PROJECT OWNER/COUNTY OF SAN DIEGO

The Project Area, including the proposed restoration sites, is owned and/or managed by County DPR. County DPR is responsible for overseeing the installation, maintenance, and monitoring of the Project Area habitat restoration effort. Contact information for County DPR is provided below. As part of the monitoring program, annual reports prepared by the restoration specialist will be submitted to the County, CDFW, Regional Water Quality Control Board (RWQCB), and U.S. Army Corps of Engineers (USACE). The County will review these reports for completeness and will determine the success of the restoration effort together with the regulatory agencies with jurisdiction over this project.

Contact: Ms. Kiran Kaur, Land Use/Environmental Planner
County of San Diego
Department of Parks and Recreation
5500 Overland Avenue, Suite 410
San Diego, CA 92123
(619) 209-9922

1.5.2 PROJECT BIOLOGIST

The overall supervision of construction activities (prior to installation, maintenance, and monitoring of the restoration project) will be the responsibility of a qualified project biologist with at least five years of experience monitoring native habitat restoration projects. The project biologist will oversee the installation of environmental boundary markers at the edges of the impact limits prior to initiation of construction activities, monitor the fencing (or flagging/high visibility rope) wherever it would abut sensitive vegetation communities, jurisdictional waters or wetlands, open space, or areas that will not be impacted. The project biologist also will conduct a pre-construction environmental training session for construction personnel for each Phase to inform them of the sensitive biological resources on-site and avoidance measures to remain in compliance with project approvals. The biologist will conduct any environmental pre-construction surveys and will monitor vegetation clearing, grubbing, and grading activities, at least weekly, to help ensure compliance with project approvals.

1.5.3 CULTURAL RESOURCE SPECIALIST

The supervision of the cultural resources avoidance and monitoring programs will be the responsibility of the cultural resource specialist who is a qualified archaeologist(s) meeting the Secretary of the Interior's Professional Qualifications Standards, as promulgated in Code of Federal Regulations, Title 36, Section 61. In order to minimize impacts to known cultural resources and disturbance of subsurface archaeological deposits, the cultural resource specialist will mark areas for avoidance and provide oversight during the implementation of cultural resources monitoring as noted in Section 4.4.1. The cultural resource specialist also will conduct a pre-construction environmental training session for construction personnel for each Phase to inform them of the cultural resources sensitivity of the area and protocols to follow in the event inadvertent cultural resources are identified.

1.5.4 RESTORATION DESIGNER

Habitat restoration design is based on grant requirements, site visits conducted by HELIX biologists, and coordination with a senior restoration specialist. The habitat restoration designer should have at least five years of experience designing and implementing habitat restoration projects within upland and riparian habitats of Southern California and similar projects in size and scope. The restoration designer will be responsible for the preparation of Execution Plans that will be prepared as implementation documents for each of the twelve phases, or subphases, under the guidance of this HRP. The restoration designer will be responsible for applying selected methods described in this plan to each project phase, including phase-specific planting and seeding plant palettes, maintenance measures, and the detailed approach of how the Execution Plans will be implemented.

1.5.5 RESTORATION SPECIALIST

Overall supervision of the installation, maintenance, and monitoring of this restoration project will be the responsibility of a qualified restoration specialist with at least five years of experience with successful native upland native habitat restoration in southern California. The restoration specialist will oversee the efforts of the installation and maintenance contractor(s) for the duration of the restoration effort. Specific tasks of the restoration specialist include educating all participants about habitat restoration goals and requirements; directly overseeing the delineation of the restoration areas and installation of plants; and monitoring/providing guidance for maintenance activities. The restoration specialist will explain to the contractor(s) how to avoid impacts to existing sensitive habitat and sensitive

species. When necessary, to keep the restoration effort on track to meet final success criteria, the restoration specialist will email County DPR and the maintenance contractor recommendations for the restoration area. The restoration specialist will provide quarterly memos summarizing maintenance and monitoring conducted within the restoration areas, will conduct annual assessments of the restoration effort, and will prepare and submit an annual report to County DPR each year during the maintenance and monitoring period, which may last up to three years.

1.5.6 INSTALLATION CONTRACTOR

The installation contractor will have at least five years of experience in successful native riparian habitat restoration in Southern California and be under the direction of the restoration specialist, who will assist the contractor with project installation. Specific prior work experience must include the clearing and removal of invasive non-native plants within the restoration area, de-compacting soil, installation of temporary above-ground irrigation lines, installation of container plants and cuttings, and installation of seed material. Given the unique conditions potentially present in the Project Area, the installation contractor must have experience working in dynamic river systems where access may be seasonally limited. If the use of equipment is proposed as part of the work phase, the installation contractor must have experience using equipment in active streams or river systems.

1.5.7 MAINTENANCE CONTRACTOR

The maintenance contractor will have at least five years of experience in successful native habitat restoration in Southern California and be under the direction of the restoration specialist, who will assist the contractor with the maintenance of the target vegetation type. The contractor will service the entire restoration area as required, meet the restoration specialist at the site when requested, and perform all checklist items in a timely manner as directed by County DPR. The maintenance contractor will be knowledgeable regarding the maintenance of native habitat and the difference between native and non-native plants. Specific prior work experience must include: invasive non-native plant species control, trash removal, watering, and potentially re-planting/re-seeding. The maintenance contractor must have staff with Qualified Applicator Licenses, as all herbicide application work will be completed under the supervision of an individual with an active license.

1.5.8 NURSERY (SEED/PLANT PROCUREMENT)

Plants and seed may be contract grown or purchased from a nursery or supplier specializing in native plants. Plant material should be locally propagated (similar climatic conditions and elevation), and seed materials sourced from within 25 miles of the Project Area or within the Jepson Herbarium California Floristic Province South Coast ecoregion (SCo, Jepson 2023), if feasible. To the extent feasible, plants and seed, including source locations, will be approved by the restoration specialist prior to installation. The restoration specialist will additionally approve plant and seed substitutions if species are unable to be locally sourced within 25 miles of the Project Area or within the SCo ecoregion.

1.6 RELEVANT LAWS, REGULATIONS, AND MANAGEMENT POLICIES

The regulations applicable to the Plan are summarized in this section. The federal and state regulations provide the regulatory framework for the HRP and its implementation.

1.6.1 FEDERAL LAWS AND REGULATIONS

1.6.1.1 FEDERAL ENDANGERED SPECIES ACT

Administered by USFWS, the Federal Endangered Species Act (FESA) provides the legal framework for the listing and protection of species (and their habitats) that are identified as being endangered or threatened with extinction. Actions that jeopardize endangered or threatened species and the habitats upon which they rely are considered a “take” under the FESA. Section 9(a) of the FESA defines take as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.” “Harm” and “harass” are further defined in federal regulations and case law to include actions that adversely impair or disrupt a listed species’ behavioral patterns.

The USFWS designates critical habitat for endangered and threatened species. Critical habitat is a term defined and used in the FESA and refers to specific geographic areas that contain features considered necessary for endangered or threatened species to recover. Critical habitat designations can include areas that are not currently occupied by the species, as the ultimate goal is to restore healthy populations of listed species within their native habitats so they can be removed from the list of threatened or endangered species. Once an area is designated as critical habitat pursuant to the FESA, all federal agencies must consult with the USFWS to ensure that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of the critical habitat. Only activities that involve a federal permit, license, or funding require consultation with the USFWS.

Sections 7 and 10(a) of the FESA regulate actions that could jeopardize endangered or threatened species. Section 7 describes a process of federal interagency consultation for use when federal actions may adversely affect listed species. In this case, take can be authorized via a letter of biological opinion issued by the USFWS for non-marine related listed species issues. A Section 7 consultation (formal or informal) is required when there is a nexus between endangered species’ use of a site, and there is an associated federal action for a proposed impact (e.g., USACE would initiate a Section 7 consultation with the USFWS for impacts proposed to USACE jurisdictional areas that may also affect listed species or their critical habitat). Section 10(a) allows issuance of permits for incidental take of endangered or threatened species with the preparation of a Habitat Conservation Plan (HCP) when there is no federal nexus. The term “incidental” applies if the taking of a listed species is incidental to, and not the purpose of, an otherwise lawful activity. An HCP demonstrating how the taking would be minimized, and how the taken steps would ensure the species’ survival, must be submitted for issuance of Section 10(a) permits. The MSCP is a regional HCP that was developed pursuant to Section 10(a) of the ESA.

1.6.1.2 MIGRATORY BIRD TREATY ACT

All migratory bird species that are native to the United States or its territories are protected under the federal Migratory Bird Treaty Act (MBTA), as amended under the Migratory Bird Treaty Reform Act of 2004 (FR Doc. 05-5127). The MBTA is generally protective of migratory birds but does not actually stipulate the type of protection required. In common practice, the MBTA is used to place restrictions on the disturbance of active bird nests during the nesting season (generally February 1 to September 15; beginning January 15 for raptors).

1.6.1.3 CLEAN WATER ACT AND RIVERS AND HARBORS ACT

Federal wetland regulation (non-marine issues) is guided by Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act (CWA). The Rivers and Harbors Act deals primarily with

discharges into tidally influenced navigable waters, while the purpose of the CWA is to restore and maintain the chemical, physical, and biological integrity of non-tidally influenced waters. The USACE regulates activities that may result in temporary or permanent dredge, fill, or discharge into aquatic resources that qualify as waters of the U.S. Regulated activities are authorized by the USACE pursuant to several permitting instruments available to them under the Rivers and Harbors Act and CWA, including (Standard) Individual Permits, Nationwide Permit verifications, and Regional General Permit (RGP) verifications. Depending on the scope and size of the activities within waters of the U.S., habitat restoration projects may be authorized by the USACE under either an Individual Permit, Nationwide Permit verification, or RGP verification. This section will be updated following the initial permitting consultation with USACE.

1.6.1.4 COASTAL ZONE MANAGEMENT ACT

The federal Coastal Zone Management Act of 1972 (CZMA) is administered by the National Oceanic and Atmospheric Administration and provides for the management of the nation's coastal resources. Federal consistency with the CZMA is required when federal agency activities have reasonably foreseeable effects on any land or water use or natural resource of the coastal zone. Federal projects must be consistent to the maximum extent practicable with the enforceable policies of a coastal state's federally approved coastal management program. California's coastal management program is the California Coastal Management Program (CCMP), administered and enforced by the CCC. The enforceable policies of the CCMP are contained in Chapter 3 of the California Coastal Act (CCA).

1.6.2 STATE LAWS AND REGULATIONS

1.6.2.1 CALIFORNIA ENVIRONMENTAL QUALITY ACT

Primary environmental legislation in California is found in the California Environmental Quality Act (CEQA) and its implementing guidelines (State CEQA Guidelines), which require that projects with potential adverse effects (or impacts) on the environment undergo environmental review. Adverse environmental impacts are typically mitigated as a result of the environmental review process, in accordance with existing laws and regulations.

1.6.2.2 CALIFORNIA ENDANGERED SPECIES ACT

The California Endangered Species Act (CESA) established that it is state policy to conserve, protect, restore, and enhance state endangered species and their habitats. Under state law, plant and animal species may be formally designated rare, threatened, or endangered by official listing by the California Fish and Game (CFG) Commission. The CESA authorizes that private entities may "take" plant or wildlife species listed as endangered or threatened under the FESA and CESA, pursuant to a federal Incidental Take Permit if the CDFW certifies that the incidental take is consistent with CESA (CFG Code Section 2080.1[a]). For state-only listed species, Section 2081 of the CFG Code authorizes the CDFW to issue an Incidental Take Permit for state listed threatened and endangered species, if specific criteria are met. The MSCP is a regional Natural Communities Conservation Planning (NCCP) program that was granted take coverage under Section 2081 of the CESA for specific species.

1.6.2.3 NATIVE PLANT PROTECTION ACT

Sections 1900–1913 of the CFG Code (Native Plant Protection Act; NPPA) direct the CDFW to carry out the state legislature's intent to "...preserve, protect, and enhance endangered or rare native plants of

this state.” The NPPA gives the California Fish and Game Commission the power to designate native plants as “endangered” or “rare” and protect endangered and rare plants from take.

1.6.2.4 CALIFORNIA FISH AND GAME CODE

The CFG Code provides specific protection and listing for several types of biological resources. Section 1600 of CFG Code requires a Streambed Alteration Agreement (SAA) for any activity that would alter the flow, change, or use any material from the bed, channel, or bank of any perennial, intermittent, or ephemeral river, stream, and/or lake. Typical activities that require an SAA include excavation or fill placed within a channel, vegetation clearing, structures for diversion of water, installation of culverts and bridge supports, cofferdams for construction dewatering, and bank reinforcement. Notification is required prior to any such activities.

Pursuant to CFG Code Section 3503, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. Raptors and owls and their active nests are protected by CFG Code Section 3503.5, which states that it is unlawful to take, possess, or destroy any birds of prey or to take, possess, or destroy the nest or eggs of any such bird unless authorized by the CDFW. Section 3513 states that it is unlawful to take or possess any migratory non-game bird as designated in the MBTA. These regulations could require that construction activities (particularly vegetation removal or construction near nests) be reduced or eliminated during critical phases of the nesting cycle unless surveys by a qualified biologist demonstrate that nests, eggs, or nesting birds will not be disturbed, subject to approval by CDFW and/or USFWS.

1.6.2.5 PORTER-COLOGNE WATER QUALITY CONTROL ACT

This statute regulates surface waters and wetlands within the State and is governed by the RWQCB. Features that support aquatic resources (i.e., hydrophytic vegetation, hydric soils, and wetland hydrology), but are isolated (i.e., lack downstream connectivity to waters of the U.S.) could be subject to regulation pursuant to the State Porter-Cologne Water Quality Control Act (Porter-Cologne). Impacts to isolated wetlands and/or waters of the State require a Waste Discharge Requirement Permit from the RWQCB.

1.6.2.6 CALIFORNIA COASTAL ACT

The CCC, through provisions of the CCA, is authorized to issue a Coastal Development Permit (CDP) for projects located within the Coastal Zone. Projects proposed within the Coastal Zone may require the issuance of a CDP by the CCC depending on the specifics of the project proposal and location of the project with respect to coastal resources and any certified LCP boundaries.

Further, Section 30240 of the CCA includes policy for the protection of Environmentally Sensitive Habitat Areas (ESHAs). Section 30107.5 defines ESHA or Environmentally Sensitive Areas (ESAs) as “any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments”.

Vegetation communities that are isolated, small in size, subject to existing disturbances, do not support California Rare Plant Rank (CRPR) 1 or 2 plant species, do not support sensitive animal species, and/or have greater than 50 percent of the species composition made up of non-native plant species, may not meet the definition of ESHA if it is determined that such areas are not rare or especially valuable and do

not have a special nature or role in the ecosystem that could be easily disturbed or degraded by human activities and developments.

Potential wetland boundaries, as defined by the CCC for areas occurring within the Coastal Zone, including the Coastal Zone Appealable Area, are determined based on the “one-parameter” definition, which only requires evidence of a single parameter to establish wetland conditions: “Wetland shall be defined as land where the water table is at, near, or above the land surface long enough to promote the formation of hydric soils or to support the growth of hydrophytes, and shall also include those types of wetlands where vegetation is lacking and soil is poorly developed or absent as a result of frequent and drastic fluctuations of surface water levels, wave action, water flow, turbidity, or high concentrations of salts or other substances in the substrate” (California Code of Regulations, Title 14, Section 13577).

The Project Area is within the Coastal Zone, with portions of the Project Area within the Coastal Zone Appealable Area and portions within the Deferred Certification Area. Appealable area means the area, as defined by California Public Resources Code Section 30603, within the Coastal Zone that constitutes the appeal jurisdiction of the CCC. This area includes lands between the sea and the first public road paralleling the sea or within 300 feet of the inland extent of any beach or of the mean high tideline of the sea where there is no beach, whichever is the greater distance; or within 100 feet of any wetland, estuary, or stream, or within 300 feet of the top of the seaward face of any coastal bluff. Development within this zone is regulated under the City’s approved LCP, although the CCC retains appeal authority. Developments in deferred certification areas designated by the certified LCP require a permit or exemption issued by the CCC in accordance with the procedure as specified by the Coastal Act.

1.6.2.7 NATURAL COMMUNITIES CONSERVATION PLANNING ACT

The NCCP program is a cooperative effort to protect habitats and species. It began under the state's NCCP Act of 1991, legislation broader in its orientation and objectives than the CESA or FESA. These laws are designed to identify and protect individual species that have already declined significantly in number. The NCCP Act of 1991 and the associated Southern California Coastal Sage Scrub NCCP Process Guidelines (1993), Southern California Coastal Sage Scrub NCCP Conservation Guidelines (1993), and NCCP General Process Guidelines (1998) have been superseded by the NCCP Act of 2003.

The primary objective of the NCCP program is to conserve natural communities at the ecosystem level while accommodating compatible land use. The program seeks to anticipate and prevent the controversies and gridlock caused by a species' listings by focusing on the long-term stability of wildlife and plant communities and including key interests in the process.

This voluntary program allows the state to enter into planning agreements with landowners, local governments, and other stakeholders to prepare plans that identify the most important areas for a threatened or endangered species, and the areas that may be less important. These NCCP plans may become the basis for a state permit to take threatened and endangered species in exchange for conserving their habitat. The CDFW and USFWS worked to combine the NCCP program with the federal HCP process to provide take permits for state and federal listed species. Under the NCCP, local governments, such as the County, can take the lead in developing these NCCP plans and become the recipients of state and federal take permits.

1.6.3 LOCAL

The County regulates natural resources (among other resources) via the MSCP, Biological Mitigation Ordinance (BMO), and Resource Protection Ordinance (RPO), as discussed below.

1.6.3.1 COUNTY OF SAN DIEGO

Multiple Species Conservation Program

The California NCCP Act of 1991 (Section 2835) allows the CDFW to authorize take of species covered by plans in agreement with NCCP guidelines. An NCCP initiated by the State of California focuses on conserving coastal sage scrub, and in concert with the USFWS and the FESA, is intended to avoid the need for future federal and state listing of coastal sage scrub-dependent species.

The San Diego Multiple Species Conservation Program (MSCP) Plan for the southwestern portion of San Diego County was approved in August 1998 and covers 85 species (County 1998). The City of San Diego, portions of the unincorporated County, and 10 additional City jurisdictions make up the San Diego MSCP Plan area. It is a comprehensive, long-term HCP that addresses the needs of multiple species by identifying key areas for preservation as open space in order to link core biological areas into a regional wildlife preserve.

Biological Mitigation Ordinance

The BMO is the ordinance by which the County implements the MSCP at the project level in order to attain the goals set forth in the County's MSCP Subarea Plan. The BMO contains design criteria and mitigation standards that, when applied to projects requiring discretionary permits, protect habitats and species and ensure that a project does not preclude the viability of the MSCP Preserve System. In this way, the BMO promotes the preservation of lands that contribute to contiguous habitat core areas or linkages.

While DPR is exempt from the BMO, pursuant to Section 86.503(a)(8) of the BMO, the proposed project would additionally be exempt from the BMO:

Section 86.503(a)(8): A public facility or public project, determined to be essential by the County, including but not limited to a County Park or County recreational facility, provided that the County decision making body considering an application for such a project makes the following findings:

- (a) The facility or project is consistent with the County General Plan, the MSCP Plan, and the Subarea Plan, as approved by the Board of Supervisors;
- (b) All feasible mitigation measures have been incorporated into the facility or project, and there are no feasible, less environmentally damaging locations, alignments, or non-structural alternatives that would meet project objectives;
- (c) Where the facility or project encroaches into a wetland or floodplain, mitigation measures are required that result in a net gain in wetland and/or riparian habitat;
- (d) Where the facility or project encroaches into steep slopes, native vegetation will be used to revegetate and landscape cut and fill areas;

- (e) No mature riparian woodland is destroyed or reduced in size due to otherwise allowed encroachments; and
- (f) All Critical Populations of Sensitive Plant Species Within the MSCP Subarea, (Attachment C of Document No. 0769999 on file with the Clerk of the Board); Rare, Narrow Endemic Animal Species Within the MSCP Subarea, (Attachment D of Document No. 0769999 on file with the Clerk of the Board); Narrow, Endemic Plant Species Within the MSCP subarea, (Attachment E of Document No. 0769999 on file with the Clerk of the Board); and San Diego County Sensitive Plant Species, as defined herein will be avoided as required by, and consistent with, the terms of the Subarea Plan

Resource Protection Ordinance

The County regulates sensitive biological resources (among other resources) via the RPO (County 2011). The RPO covers wetlands, wetland buffers, special status plant and animal species, sensitive vegetation communities/habitat types, and habitats containing special status animals or plants. Sensitive habitat lands are identified by the RPO as lands that “support unique vegetation communities, or habitats of rare or endangered species or sub-species of animals or plants as defined by Section 15380 of the CEQA Guidelines.” It is the intent of the RPO to increase the preservation and protection of the County’s unique topography, natural beauty, biological diversity, and natural and cultural resources. Pursuant to Section 86.603(a) of the RPO, where any portion of a parcel contains Environmentally Sensitive Lands (ESL), this section would be applicable to the portions of the parcel containing the sensitive lands, and to the remainder of the parcel, only to the extent necessary, to achieve the purpose and intent of the RPO.

Pursuant to Section 86.604(a), the proposed project would be consistent with the RPO:

SEC. 86.604. PERMITTED USES AND DEVELOPMENT CRITERIA. Within the following categories of sensitive lands, only the following uses shall be permitted and the following development standards and criteria shall be met provided, however, that where the extent of environmentally sensitive lands on a particular legal lot is such that no reasonable economic use of such lot would be permitted by these regulations, then an encroachment into such environmentally sensitive lands to the minimum extent necessary to provide for such reasonable use may be allowed:

(a) Wetlands. The following permitted uses shall be allowed:

(3) Removal of diseased or invasive exotic plant species as identified and quantified in writing by a qualified biologist and approved in writing by the Director of Planning and Development Services, and removal of dead or detached plant material.

(4) Wetland creation and habitat restoration, revegetation, and management projects where the primary goal is to restore or enhance biological values of the habitat, and the activities are carried out pursuant to a written management/enhancement plan approved by the Director of Planning and Development Services.

Pursuant to Section 86.605(c) of the RPO, the proposed project would additionally be exempt from RPO:

SEC. 86.605. EXEMPTIONS. This Chapter shall not apply to the following:

(c) Any essential public facility or project, or recreational facility which includes public use when the authority considering an application listed at Section 86.603(a) above makes the following findings:

- (1) The facility or project is consistent with adopted community or subregional plans;
- (2) All possible mitigation measures have been incorporated into the facility or project, and there are no feasible less environmentally damaging location, alignment, or non-structural alternatives that would meet project objectives;
- (3) Where the facility or project encroaches into a wetland or floodplain, mitigation measures are required that result in any net gain in the wetland and/or riparian habitat;
- (4) Where the facility or project encroaches into steep slopes, native vegetation will be used to revegetate and landscape cut and fill areas; and
- (5) No mature riparian woodland is destroyed or reduced in size due to otherwise allowed encroachments.

The project is a habitat restoration project within a recreational facility that includes public use and meets the above findings for exemption from RPO requirements.

1.6.3.2 CITY OF SAN DIEGO

Multiple Species Conservation Program Subarea Plan

The City's MSCP Subarea Plan was prepared to protect sensitive species and habitats within the County and to meet the requirements of the California NCCP Act of 1992. The MSCP Subarea Plan describes the implementation of the City's program, including how preserve areas (i.e., MHPA), including 85 covered species, will be conserved and how the final MSCP Preserve will be assembled within the MHPA. Adopted by the City in March 1997, the Subarea Plan provides the framework for the MSCP Implementing Agreement. The Implementing Agreement is the contract between the City, USFWS, and CDFW to ensure implementation of the Subarea Plan and allow the City to issue "take" permits under the federal and State ESAs to address impacts at the local level.

Environmentally Sensitive Lands

The City's Land Development Code includes regulation of ESL (Chapter 14, Division 1, Section 143.0101 et seq.). The ESL ordinance defines sensitive biological resources as those lands included in the MHPA as identified in the City's MSCP Subarea plan, and other lands outside of the MHPA that contain wetlands, vegetation communities classified as Tier I, II, IIIA, or IIIB, habitat for rare, endangered or threatened species, or narrow endemic species.

Wetlands are differentiated in the ESL regulation from uplands and further differentiated between naturally occurring wetland areas and those created by humans. According to the City Municipal Code, Chapter 11, Section 113.0103:

"Wetlands are defined as areas which are characterized by any of the following conditions:

- (1) All areas persistently or periodically containing naturally occurring wetland vegetation communities characteristically dominated by hydrophytic vegetation, including but not limited to salt marsh, brackish marsh, freshwater marsh, riparian forest, oak riparian forest, riparian woodlands, riparian scrub, and vernal pools;

- (2) Areas that have hydric soils or wetland hydrology and lack naturally occurring wetland vegetation communities because human activities have removed the historic wetland vegetation or catastrophic or recurring natural events or processes have acted to preclude the establishment of wetland vegetation as in the case of salt pannes and mudflats;
- (3) Areas lacking wetland vegetation communities, hydric soils, and wetland hydrology due to non-permitted filling of previously existing wetlands;
- (4) Areas mapped as wetlands on Map C-713 as shown in Chapter 13, Article 2, Division 6 (Sensitive Coastal Overlay Zone)."

It is intended for this definition to differentiate for the purposes of delineating wetlands, between naturally occurring wetlands and wetlands intentionally created by human actions, from areas with wetlands characteristics unintentionally resulting from human activities in historically non-wetland areas. With the exception of wetlands created for the purpose of providing wetland habitat or resulting from human actions to create open waters or from the alteration of natural stream courses, areas demonstrating wetland characteristics, which are artificially created, are not considered wetlands by this definition. Taking into account regional precipitation cycles, all adopted scientific, regulator, and technological information available from the State and Federal resource agencies shall be used for guidance on the identification of hydrophytic vegetation, hydric soils and wetland hydrology."

The City's Land Development Code Biology Guidelines (City 2018) describe wetlands as:

"Wetlands support many of the species included in the MSCP (i.e., Covered Species). The definition of wetlands in ESL is intended to differentiate uplands (terrestrial areas) from wetlands and, furthermore, to differentiate naturally occurring wetland areas from those created by human activities. Naturally occurring wetland vegetation communities are typically characteristic of wetland areas. Examples of wetland vegetation communities include saltmarsh, brackish marsh, freshwater marsh, riparian forest, oak riparian forest, riparian woodland, riparian scrub, and vernal pools. Common to all wetland vegetation communities is the predominance of hydrophytic plant species (plants adapted for life in anaerobic soils).

Seasonal drainage patterns that are sufficient enough to etch the landscape (i.e., ephemeral/ intermittent drainages) may not be sufficient enough to support wetland dependent vegetation. These types of drainages would not satisfy the City's wetland definition unless wetland dependent vegetation is either present in the drainage or lacking due to past human activities. Seasonal drainage patterns may constitute 'waters of the U.S.', which are regulated by the USACE and/or the CDFW."

Local Coastal Program and Land Use Plan

The CCC and the local governments along the coast share responsibility for managing the State's coastal resources mandated by the CCA. Through coordination with the CCC, coastal cities and counties develop LCPs. These programs are the primary means for carrying out the policies of the CCA at the local level. Following approval by the CCC, the LCP is certified, and the local governments implement the programs. LCPs include two main components, a Land Use Plan and an Implementation Plan. The City's LCP Amendment #2-90 (certified in September 1990) included all of the Tijuana River Valley rezoning needed to make the zoning consistent with the certified Land Use Plan. Once these rezoning were certified by the CCC, CDP authority was delegated to the City.

1.7 RESPONSIBLE AGENCIES

Biological resources in the Project Area are subject to regulatory review by federal, state, and local agencies. Under CEQA, impacts associated with a proposed project or program are assessed with regard to significance criteria determined by the CEQA Lead Agency (in this case, the County) pursuant to CEQA Guidelines. Biological resources-related laws and regulations that apply include FESA, MBTA, CWA, CEQA, CESA, and CFG Code.

With respect to the proposed project, the USFWS will be responsible for reviewing issues related to migratory birds pursuant to the MBTA and project consistency with the adopted City's MSCP Subarea Plan. The USACE and RWQCB will be responsible for reviewing issues related to Waters of the U.S./State pursuant to the CWA. The CDFW will be responsible for reviewing issues related to riparian habitat and streambeds pursuant to the CFG Code, nesting birds and raptors pursuant to CFG Code, and project consistency with the adopted City's MSCP Subarea Plan. The CCC, through provisions of the CCA, is authorized to issue a CDP for projects located within the Coastal Zone.

The County is the lead agency for the CEQA environmental review process, in accordance with state law and local ordinances. During CEQA review, the County is responsible for reviewing the project, per the Guidelines for Determining Significance for Biological Resources (County 2010b). The County will also be responsible for reviewing the project with respect to consistency with the County BMO (County 2010c) and adopted City of San Diego MSCP Subarea Plan.

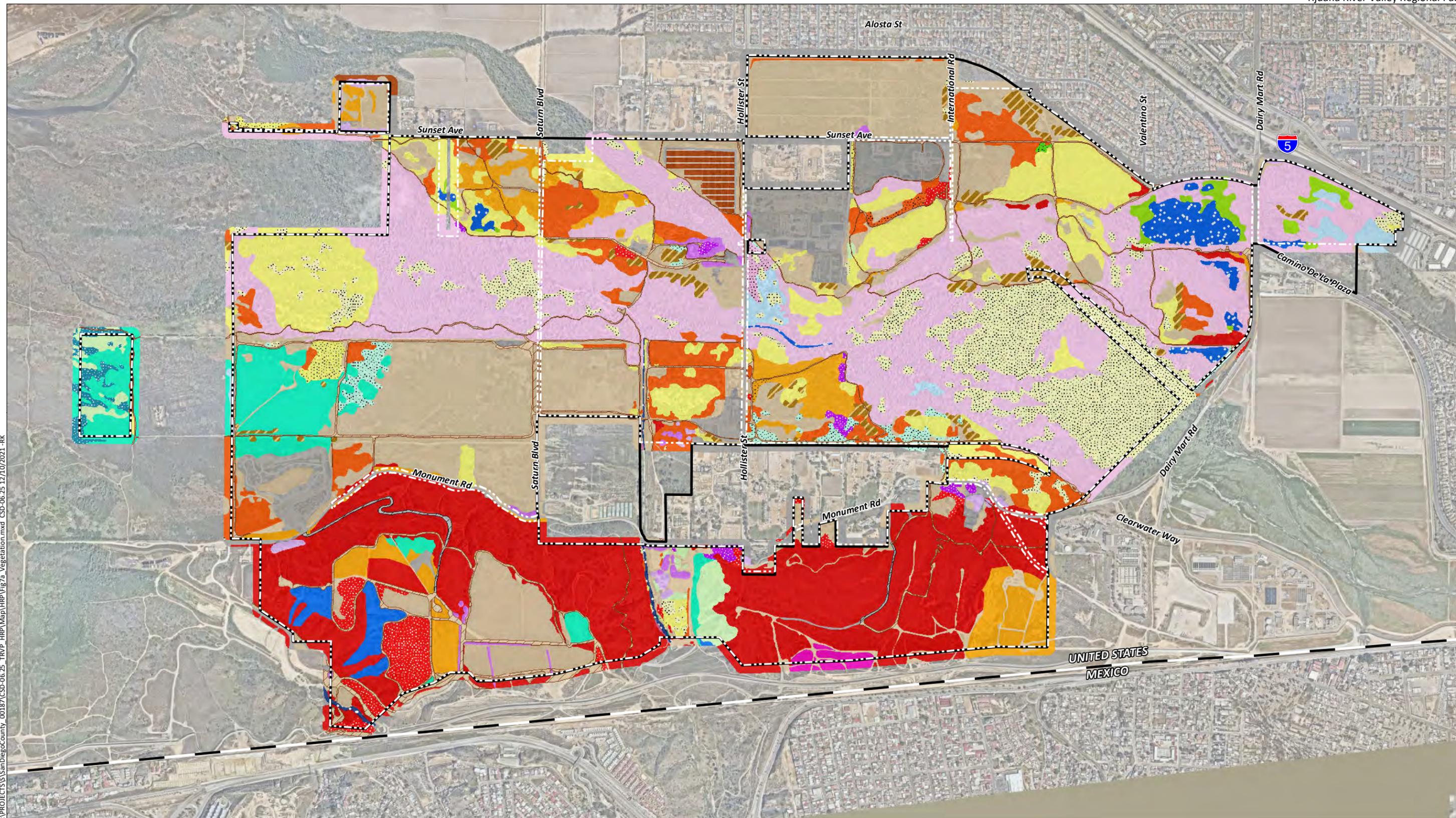
This HRP is intended to provide the federal and/or state Resource Agencies (USFWS, CDFW, RWQCB, and CCC) with information relative to the project and the proposed mitigation relative to any project impacts. As the intent of this project is habitat restoration, impacts incurred during project implementation are considered temporary and would be self-mitigated through the completion of the project itself. This Draft HRP will be used during the submittal process relative to agency permitting, updated as necessary, and incorporated into final project permit conditions.

2.0 EXISTING PLANT COMMUNITIES, SPECIAL-STATUS SPECIES, AND JURISDICTIONAL RESOURCES

2.1 EXISTING VEGETATION COMMUNITIES AND LAND COVER TYPES

HELIX conducted baseline biological resources surveys for DPR to identify and map existing biological resources within the TRVRP in spring, summer, and fall of 2018 (HELIX 2019). Baseline surveys conducted in 2018 included habitat/vegetation mapping. A general biological survey of the Project Area was conducted by HELIX biologists according to County requirements (2010a) on March 4 and 5, 2021 to verify and update the previous vegetation mapping effort completed in 2018. Additionally, vegetation mapping within the Project Area was verified and updated following focused species surveys conducted in 2021 (HELIX 2023).

Thirty-five vegetation communities/land use types occur in the Project Area (Table 2, *Vegetation Communities and Land Covers within the Project Area*); Figures 7a-7f, *Vegetation Communities/Habitats [Holland/Oberbauer]*). The numeric codes in parentheses following each community/land use type name



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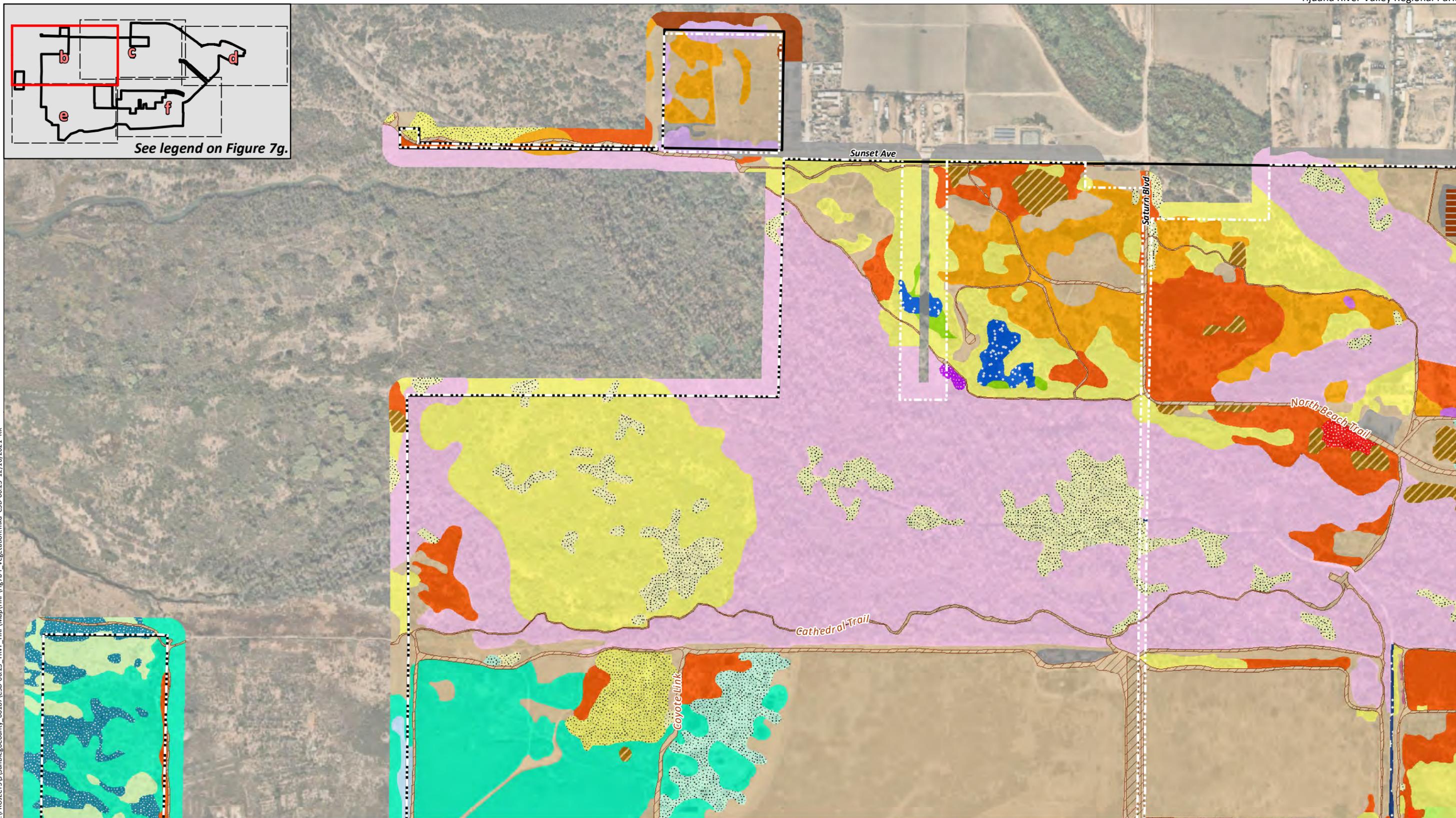
See Figure 7g for Legend.

Aerial Photo: Nearmap (2021)



Vegetation Communities/Habitats (Holland Oberbauer)

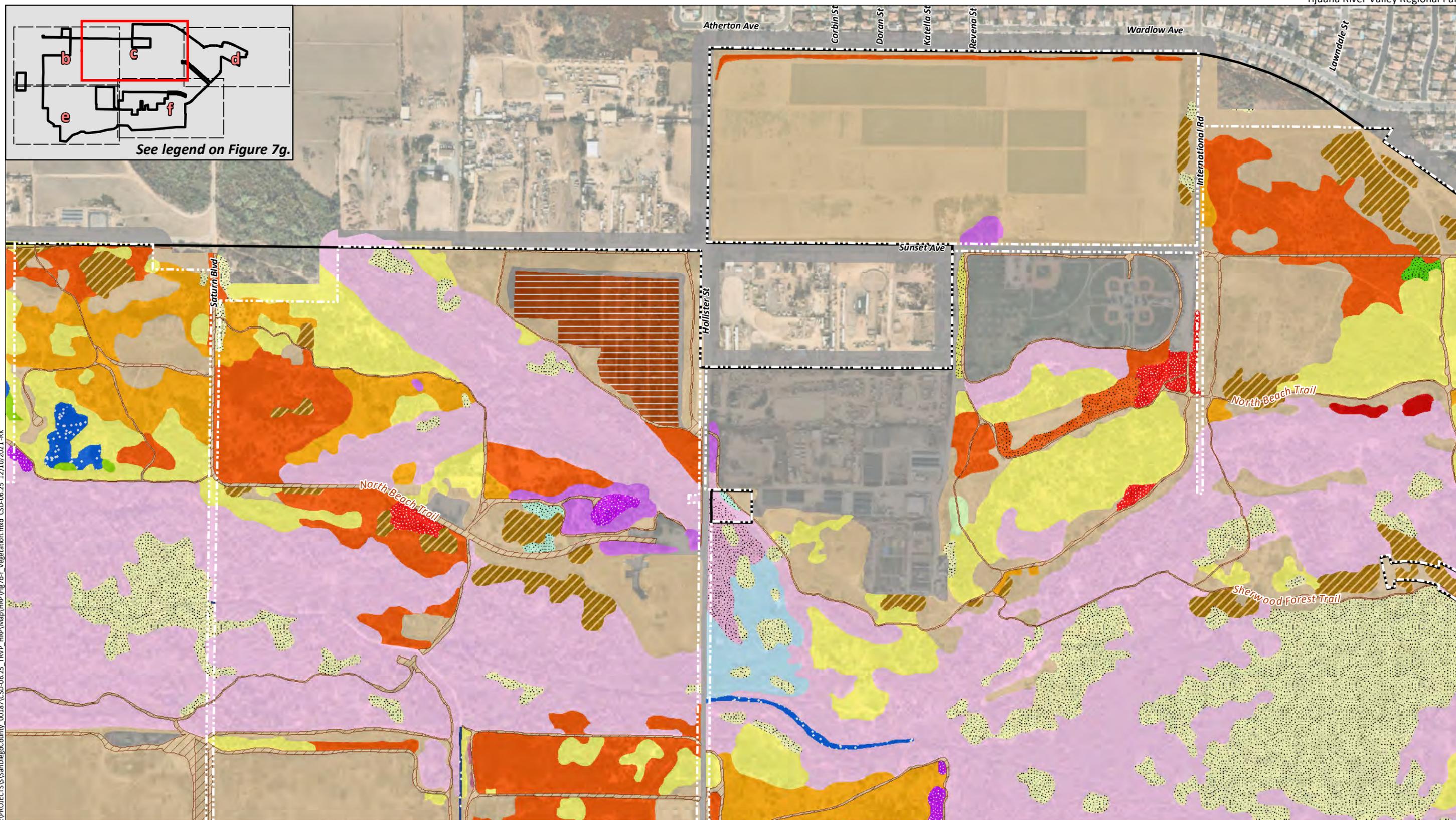
Figure 7a



Aerial Photo: Nearmap 2021

Vegetation Communities/Habitats (Holland Oberbauer)

Figure 7b



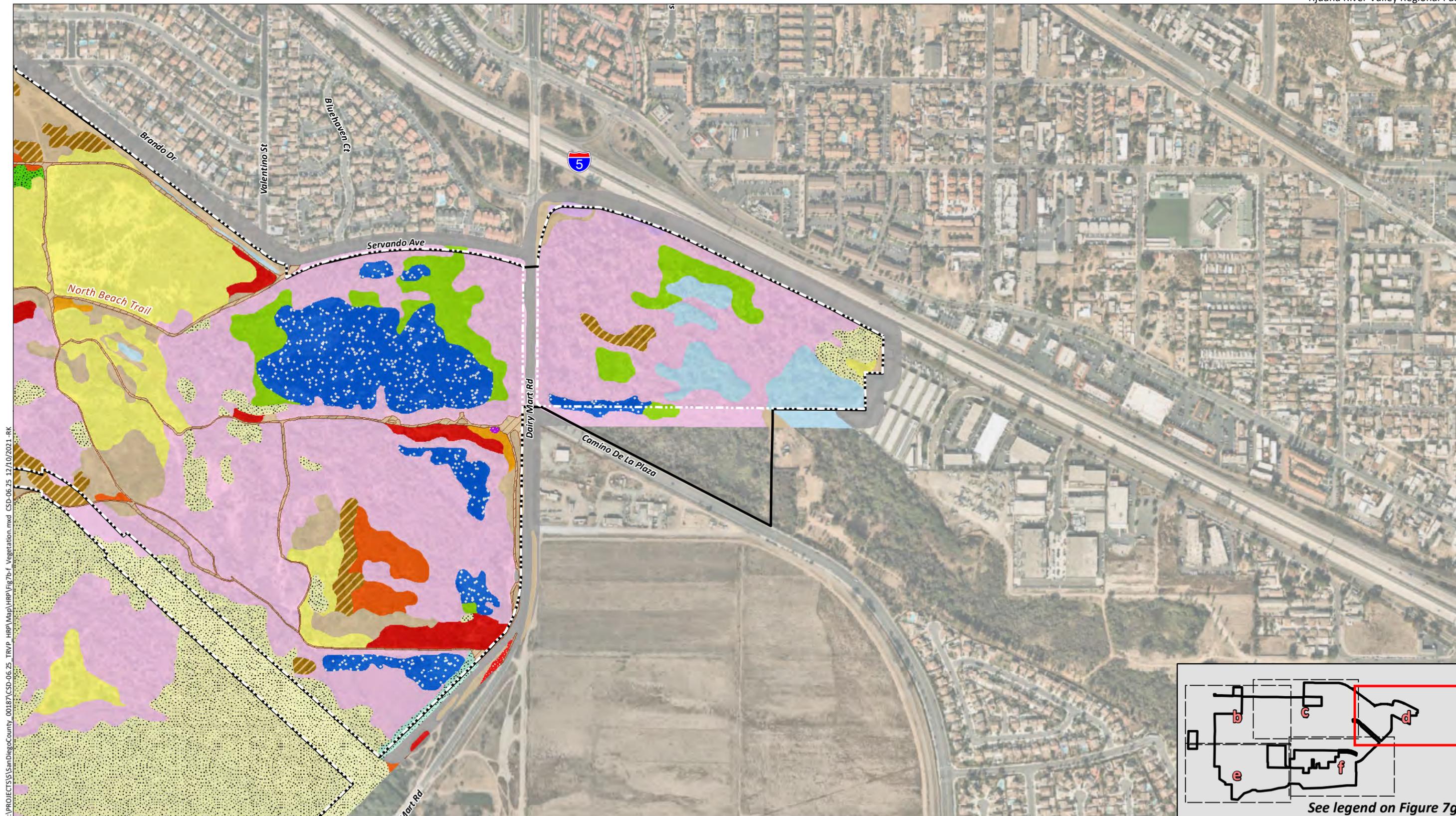
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Aerial Photo: Nearmap 2021

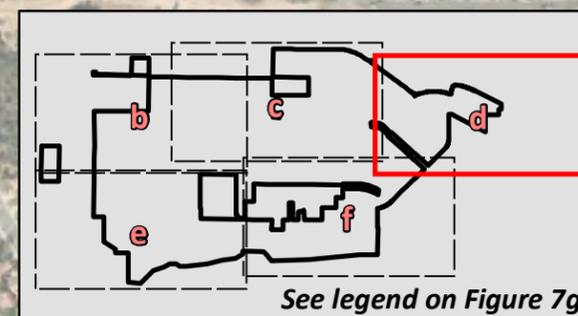


Vegetation Communities/Habitats (Holland Oberbauer)

Figure 7c



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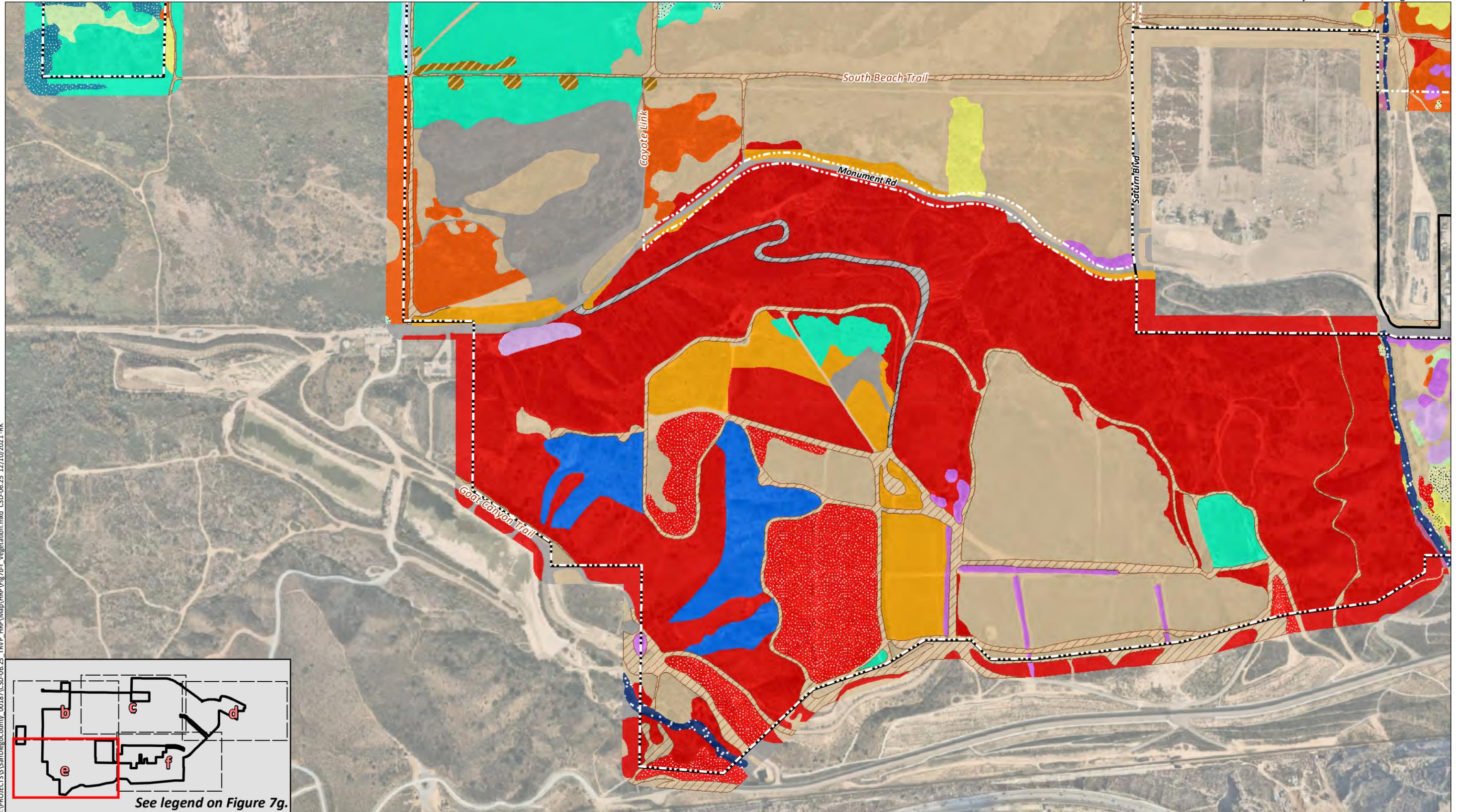
See legend on Figure 7g.

Aerial Photo: Nearmap 2021



Vegetation Communities/Habitats (Holland Oberbauer)

Figure 7d



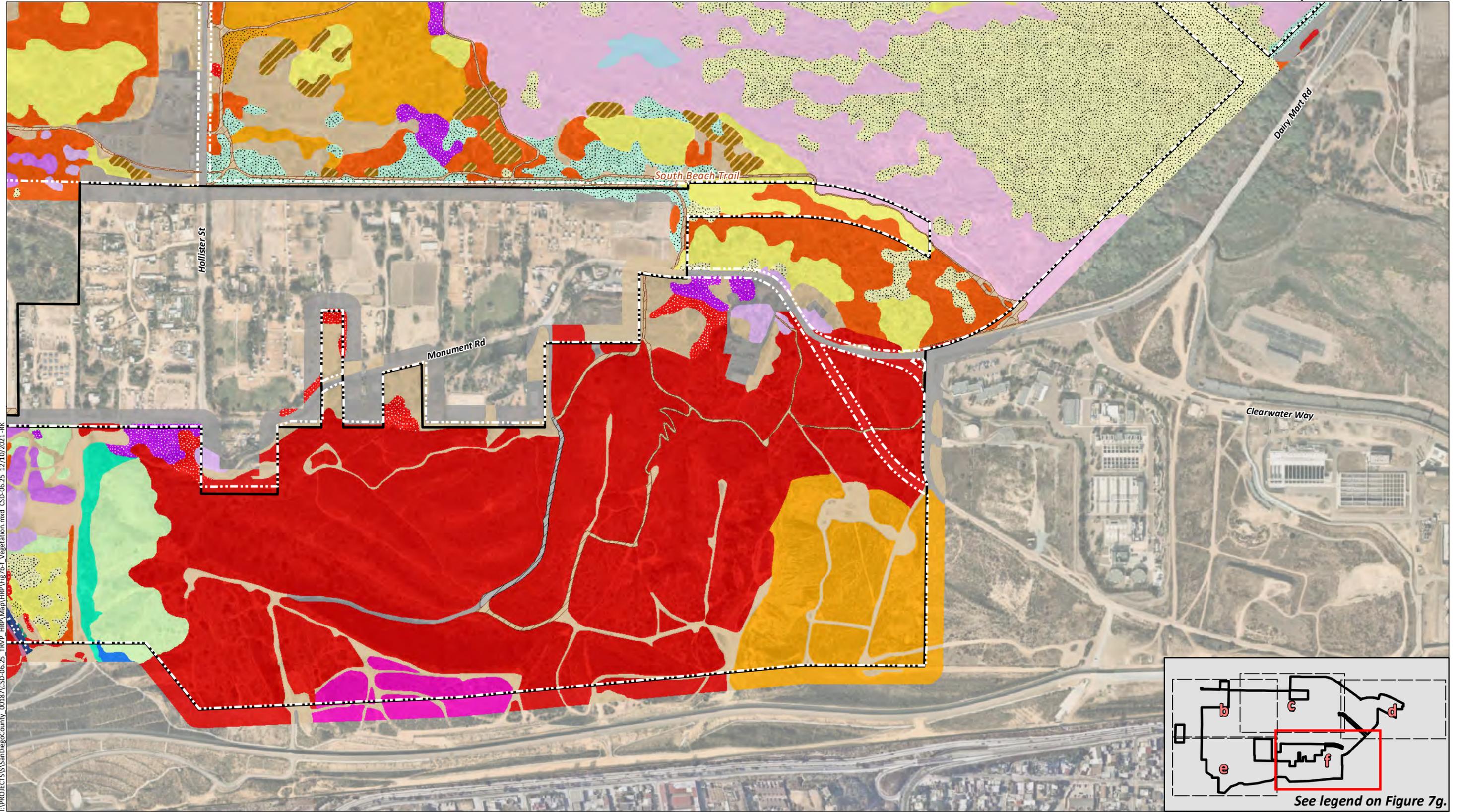
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Aerial Photo: Nearmap 2021



Vegetation Communities/Habitats (Holland Oberbauer)

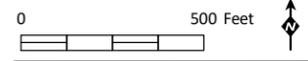
Figure 7e



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See legend on Figure 7g.

Aerial Photo: Nearmap 2021



Vegetation Communities/Habitats (Holland Oberbauer)

Figure 7f

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-  Tijuana River Valley Regional Park
-  Project Area

Holland/Oberbauer Classification

Riparian Forests and Woodlands

-  (61300) Southern Riparian Forest*
-  (61300) Southern Riparian Forest (Disturbed)*
-  (62500) Southern Riparian Woodland*
-  (65000) Non-native Riparian*

Riparian Shrublands

-  (63320) Southern Willow Scrub*
-  (63320) Southern Willow Scrub (Disturbed)*
-  (63310) Mule Fat Scrub*
-  (63310) Mule Fat Scrub (Disturbed)*
-  (63810) Tamarisk Scrub*
-  (63000) Riparian Scrub (Disturbed)*

Hydrophytic Herbaceous Vegetation

-  (52410) Coastal and Valley Freshwater Marsh*
-  (52120) Southern Coastal Salt Marsh*
-  (42130) Saltgrass Grassland*
-  (52440) Emergent Wetland*
-  (65110) Arundo-Dominated Riparian*

Upland Forests and Woodlands

-  (79000) Non-native Woodland
-  (79100) Eucalyptus Woodland

Sclerophyllous, Evergreen Shrubs

-  (37C30) Southern Maritime Chaparral*

Soft-Leaved, Drought-Deciduous Shrublands

-  (36000) Chenopod Scrub*
-  (32000) Coastal Scrub*
-  (32400) Maritime Succulent Scrub*
-  (32530) Diegan Coastal Sage Scrub: Baccharis-dominated*
-  (32530) Diegan Coastal Sage Scrub: Baccharis-dominated (Disturbed)*
-  (32500) Diegan Coastal Sage Scrub*
-  (32500) Diegan Coastal Sage Scrub (Disturbed)*

Upland Herbaceous Vegetation

-  (11300) Disturbed Habitat
-  (42200) Non-native Grassland*
-  (N/A) Non-native Vegetation

General Agriculture

-  (18000) Agriculture
-  (18320) Row Crops

Unvegetated

-  (11300) Disturbed Habitat - Trail
-  (12000) Developed
-  (12000) Developed - Trail
-  (64000) Unvegetated Habitat (Streambed)*
-  (64100) Open Water*

*Sensitive vegetation communities per Attachment K of the BMO.

Legend
Figure 7g

are from the Holland classification system (Holland 1986), as added to by Oberbauer (2008) and as presented in the County’s Biology Guidelines (County 2010b). The Project Area supports lands within the Coastal Zone that may be considered ESHA by the CCC; however, some areas of sensitive vegetation communities may not meet the definition of ESHA based on a variety of factors, including small size, lack of connectivity to other habitats, lack of sensitive species, a high percentage of invasive non-native plant species, existing disturbances, or a combination thereof.

**Table 2
VEGETATION COMMUNITIES AND LAND COVERS WITHIN THE PROJECT AREA**

Vegetation Community¹	Acres²
Tier I	
Maritime Succulent Scrub (32400)	12.3
Southern Maritime Chaparral (37C30)	3.2
Saltgrass Grassland (42130)	0.39
Southern Coastal Salt Marsh (52120)	4.35
Coastal and Valley Freshwater Marsh (52410)	9.37
Emergent Wetland (52440)	0.25
Southern Riparian Forest (61300)	355.58
Southern Riparian Forest – Disturbed (61300)	2.65
Southern Riparian Woodland (62500)	0.23
Southern Willow Scrub (63320)	142.18
Southern Willow Scrub – Disturbed (63320)	5.68
Mule Fat Scrub (63310)	84.67
Mule Fat Scrub - disturbed (63310)	1.88
Tamarisk Scrub (63810)	24.32
Riparian Scrub – Disturbed (63000)	0.06
Non-native Riparian (65000)	12.85
Unvegetated Habitat – Streambed (64000)	2.27
Open Water (64100)	20.71
Arundo-Dominated Riparian (65100)	122.79
Tier II	
Coastal Scrub (32000)	55.3
Diegan Coastal Sage Scrub (32500)	255.6
Diegan Coastal Sage Scrub – disturbed (32500)	24.1
Diegan Coastal Sage Scrub - Baccharis dominated (32530)	68.7
Diegan Coastal Sage Scrub – Baccharis dominated, disturbed (32530)	0.6
Chenopod Scrub (36000)	14.6
Tier III	
Non-native Grassland (42200)	14.8
Tier IV	
Non-Native Vegetation (11000)	4.8
Disturbed Habitat (11300)	350.9
Disturbed Habitat – Trail (11300)	43.12
Agriculture (18000)	<0.1 (0.03)
Row Crops (18320)	10.3
Non-Native Woodland (79000)	8.2
Eucalyptus Woodland (79100)	5.9

Vegetation Community ¹	Acres ²
N/A	
Developed Land (12000)	75.6
Developed Land – Trail (12000)	2.9
TOTAL	1740.75

¹ Vegetation categories and numerical codes are from Holland (1986) and Oberbauer (2008) and are listed by Habitats and Tiers within Attachment K of the BMO.

² Upland habitats are rounded to the nearest 0.1 acre, while wetland habitats are rounded to the nearest 0.01; thus, total reflects rounding.

Maritime Succulent Scrub (32400, Tier I)

Maritime succulent scrub is a low open scrub community that is dominated by a mixture of stem and leaf succulent species and drought-deciduous species that also occur within sage scrub communities. This vegetation community occurs on thin, rocky or sandy soils, on steep slopes of coastal headlands and bluffs. The dominant species typically found within this vegetation community include coast barrel cactus (*Ferocactus viridescens*), prickly pear cactus (*Opuntia littoralis*), cliff spurge (*Euphorbia misera*), dudleya (*Dudleya* spp.), California box-thorn (*Lycium californicum*), and California encelia (*Encelia californica*; Beauchamp 1986).

There are 12.3 acres of Maritime succulent scrub mapped within Treatment Area 12. It is found on Spooner’s and Monument Mesa (Figures 7a and 7e-7g). Maritime succulent scrub makes up less than one percent of the Project Area.

Southern Maritime Chaparral (37C30, Tier I)

Southern maritime chaparral is restricted to the weathered sands within the coastal fog belt in the County from La Jolla to Carlsbad, with some scattered patches to the south; Point Loma, Spooner’s Mesa, and Peñasquitos Canyon. This low, fairly open, chaparral is dominated by wart-stemmed ceanothus (*Ceanothus verrucosus*) and thick-leaved Eastwood’s manzanita (*Arctostaphylos glandulosa* ssp.) Additional species include mission manzanita (*Xylococcus bicolor*), chamise (*Adenostoma fasciculatum*), Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*), scrub oak (*Quercus dumosa*), and summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*). Similar to other chaparral communities, fire is necessary for the reproduction of many of the constituent species which generally resprout from underground root crowns (Conrad 1987).

There are 3.2 acres of southern maritime chaparral mapped within Treatment Area 12. It is found on the southern edge of Monument Mesa (Figures 7a and 7f-7g). Southern maritime chaparral makes up less than one percent of the Project Area.

Saltgrass Grassland (42130, Tier I)

Saltgrass grassland may be composed of low (less than 20 centimeters in height) grassland dominated by saltgrass (*Distichlis spicata*). It is usually found on fine-textured, alkaline soils that are also often poorly drained. Saltgrass grassland may co-occur and intergrade with alkali meadow and various riparian habitats.

A total of 0.39-acre of saltgrass grassland is mapped within Treatment Area 2. It occurs as a single stand of habitat in the northeast portion of the Project Area (Figures 7a, 7c-7d, and 7g). Saltgrass grassland makes up less than one percent of the Project Area.

Southern Coastal Salt Marsh (52120, Tier I)

Southern coastal salt marsh is a highly productive community composed of herbaceous and suffrutescent, salt-tolerant hydrophytes that form a dense cover of up to one meter tall. This plant community is found along sheltered inland margins of bays, lagoons, and estuaries where the hydric soils are subjected to regular tidal inundation by salt water (Holland 1986). Dominant species include alkali-heath (*Frankenia salina*) and pickleweed (*Salicornia* sp.).

A total of 4.35 acres of southern coastal salt marsh is mapped within Treatment Area 11. Within the Project Area, southern coastal salt marsh is limited to portions of the disjunct western parcel. Characteristic species observed include alkali-heath, pickleweed, and saltgrass (*Distichlis spicata*; Figures 7a-7b, 7e, and 7g). Southern coastal salt marsh makes up less than one percent of the Project Area.

Coastal Valley and Freshwater Marsh (52410, Tier I)

Coastal and valley freshwater marsh is dominated by perennial, emergent monocots, five to 13 feet tall, forming incomplete to completely closed canopies. This vegetation type occurs along the coast and in coastal valleys near river mouths and around the margins of lakes and springs, freshwater or brackish marshes. These areas are semi- or permanently flooded yet lack a significant current (Holland 1986). Dominant species include cattails (*Typha* spp.) and bulrushes (*Scirpus* spp.), along with umbrella sedges (*Cyperus* spp.), rushes (*Juncus* spp.), and spike-sedge (*Eleocharis* spp.).

A total of 9.37 acres of coastal and valley freshwater marsh is mapped within Treatment Areas 1, 2, and 8. It is found around the edges of Dairy Mart Pond and Duck Ponds in the northwest and northeast portions of the study area and just west of the intersection of Dairy Mart Road and Camino de la Plaza (Figures 7a-7d and 7g). Coastal valley and freshwater marsh make up less than one percent of the Project Area.

Emergent Wetland (52440, Tier I)

Emergent wetland is a low-growing, herbaceous community that is dominated by a variety of native wetland species. It typically occurs in seasonally wet areas with heavy soils. These can be found in channels, seeps and springs, floodplains, margins of lakes and rivers, and various basins such as pools and ponds. In San Diego County, these are often in previously disturbed areas where wetlands are emerging, but have not yet established a full suite of species; however, disturbance is not a necessary element of this vegetation community.

A total of 0.25-acre of emergent wetland is mapped within Treatment Area 2. Emergent wetland in the study area is characterized by cattail, yerba mansa (*Anemopsis californica*), and annual beardgrass (*Polypogon monspeliensis*). It occurs as a small, linear area at the toe of a manufactured slope along the park boundary in the northeast portion of the study area (Figures 7a, 7d, and 7g). Emergent wetland makes up less than one percent of the Project Area.

Southern Riparian Forests – including disturbed (61300, Tier I)

Southern riparian woodlands and forests are composed of winter-deciduous trees that require water near the soil surface. Willow (*Salix* spp.), cottonwood (*Populus* spp.), and western sycamore (*Platanus racemosa*) form a dense medium height woodland or forest in moist canyons and drainage bottoms. Associated understory species include mule fat (*Baccharis salicifolia*), stinging nettle (*Urtica dioica* ssp.).

holosericea), and wild grape (*Vitis girdiana*; Beauchamp 1986). Disturbed southern riparian forest contains many of the same shrub species as undisturbed southern riparian forest but is sparser and has a higher proportion of non-native perennial and annual species.

A total of 355.58 acres of southern riparian forest is mapped within Treatment Areas 1-2 and 4-11. A total of 2.65 acres of disturbed southern riparian forest is mapped within Treatment Areas 4 and 9. Southern riparian forest is found along the Tijuana River, and characteristic species in this habitat within the study area include black willow (*Salix gooddingii*), red willow (*Salix laevigata*), arroyo willow (*Salix lasiolepis*), and mule fat (*Baccharis salicifolia*). Riparian forest comprises large stands of contiguous habitat associated with the Tijuana River (Figures 7a-7d and 7f). Disturbed southern riparian forest is found bordering the eastern edge of Hollister Street, between Sunset Avenue and Saturn Avenue (Figures 7a and 7c). Southern riparian forest makes up 20 percent of the Project Area. Disturbed southern riparian forest makes up less than one percent of the Project Area.

Southern Riparian Woodland (62500, Tier I)

Southern riparian woodlands are composed of winter-deciduous trees that require water near the soil surface. Willows, cottonwood (*Populus* spp.), and western sycamore form a dense medium height woodland or forest in moist canyons and drainage bottoms. Associated understory species include mule fat (*Baccharis salicifolia*), stinging nettle (*Urtica dioica* ssp. *holosericea*), and wild grape (*Vitis girdiana*; Beauchamp 1986).

A total of 0.23-acre of southern riparian woodland is mapped within Treatment Area 6 and 12. Within the Project Area, southern riparian woodland is made up of small stands of black willow scattered along the banks of the Smuggler's Gulch channel (Figures 7a-7c). Southern riparian woodland forest makes up less than one percent of the Project Area.

Riparian Scrub - Disturbed (63000, Tier I)

Riparian scrub is a generic term for several shrub-dominated communities that occur along drainages and/or riparian corridors, including components of southern willow scrub, mule fat scrub, and tamarisk scrub.

There are 0.06-acre of disturbed riparian scrub in Treatment Area 12. Within the Project Area, disturbed riparian scrub contains a mixture of arroyo willow, mule fat, single-whorl burrobush (*Ambrosia monogyra*), and sandbar willow, with a high percentage of castor-bean (*Ricinus communis*). It occurs as three small stands along the southern reach of Smuggler's Gulch channel (Figures 7a, 7e, and 7g). Riparian scrub – disturbed makes up less than one percent of the Project Area.

Mule Fat Scrub – Including Disturbed (63310, Tier I)

Mule fat scrub is a depauperate, shrubby riparian scrub community dominated by mule fat and interspersed with small willows. This vegetation community occurs along intermittent stream channels with a fairly coarse substrate and moderate depth to the water table. This early seral community is maintained by frequent flooding, the absence of which would lead to a cottonwood or sycamore dominated riparian woodland or forest (Holland 1986). In some environments, limited hydrology may favor the persistence of mule fat.

There are 84.67 acres of mule fat scrub in Treatment Areas 2-12. There are 1.88 acres of disturbed mule fat scrub in Treatment Area 9. Numerous stands of mule fat occur in the Project Area along the Tijuana River corridor as well as in other locations on the valley floor (e.g., adjacent to the campground; Figures 7a-7g). Mule fat scrub makes up approximately 4.8 percent of the Project Area. Disturbed mule fat makes up less than one percent of the Study Area.

Southern Willow Scrub – Including Disturbed (63320, Tier I)

Southern willow scrub consists of dense, broad-leaved, winter-deciduous stands of trees dominated by shrubby willows in association with mule fat, and with scattered emergent cottonwood and western sycamores. This vegetation community occurs on loose, sandy, or fine gravelly alluvium deposited near stream channels during flood flows. Frequent flooding maintains this early seral community, preventing succession to a riparian woodland or forest (Holland 1986). In the absence of periodic flooding, this early seral type would be succeeded by southern cottonwood or western sycamore riparian forest.

There are 142.18 acres of southern willow scrub within Treatment Areas 1-12. There are 5.68 acres of disturbed southern willow scrub mapped within Treatment Areas 9-12. Characteristic species in southern willow scrub in the study area include arroyo willow, mule fat, and sandbar willow (*Salix exigua*). This habitat occurs in a scattered distribution along the Tijuana River, as well as in smaller, disjunct stands near Smuggler’s Gulch and Monument Road (Figures 7a-7f). Southern willow scrub makes up 8.2 percent of the Project Area. Disturbed southern willow scrub makes up less than one percent of the Project Area.

Tamarisk Scrub (63810, Tier I)

Tamarisk scrub is typically comprised of shrubs and/or small trees of exotic tamarisk species (*Tamarix* spp.) but may also contain willows (*Salix* spp.), salt bushes (*Atriplex* spp.), catclaw acacia (*Acacia greggii*), and salt grass (*Distichlis spicata*). This habitat occurs along intermittent streams in areas where high evaporation rates increase the salinity level of the soil. Tamarisk is a phreatophyte, a plant that can obtain water from an underground water table. Because of its deep root system and high transpiration rates, tamarisk can substantially lower the water table to below the root zone of native species, thereby competitively excluding them. As a prolific seeder, it may rapidly displace native species within a drainage (Holland 1986).

There are 24.32 acres of tamarisk scrub in Treatment Areas 1-4 and 6-11. It occurs as several small stands spread throughout the river valley (Figures 7a-7g). Tamarisk scrub makes up 1.3 percent of the Project Area.

Unvegetated Habitat – Streambed (64000, Tier I)

Unvegetated habitat (streambed) includes areas that are unvegetated and within the corridor of a stream or river. The stream or river may be ephemeral or intermittent, making open water an inappropriate name for this habitat type at the time vegetation mapping was conducted; however, these areas may contain water depending on the time of year.

A total of 1.80 acres of streambed were mapped within the Project Area. The drainage that flows north from Smuggler’s Gulch was mapped as unvegetated habitat (streambed). Unvegetated habitat (streambed) makes up less than one percent of the Project Area.

Open Water (64100, Tier I)

Open water is an unvegetated habitat. It is made up of year-round bodies of saline or fresh water. Fresh water bodies include lakes, streams, ponds, or rivers.

There are 20.71 acres of open water in Treatment Areas 1-2, 4, and 8. Open water in the Project Area consists of several ponds in the northeastern and northwestern portions of the Project Area, including Dairy Mart Pond and the Duck Ponds. (Figures 7a-7d and 7g). Open water makes up 1.2 percent of the Project Area.

Non-Native Riparian (65000, Tier I)

Non-native riparian habitats are densely vegetated and dominated by invasive non-native plant species. Invasive non-native plant species must make up 50 percent cover or greater. This community is often found in areas that have experienced disturbance. It is common in many of the river channels in the County. Species often encountered include tamarisk (*Tamarix* spp.), giant reed (*Arundo donax*), eucalyptus (*Eucalyptus* spp.), palms (*Washingtonia* spp., *Phoenix* spp.), Bermuda grass (*Cynodon dactylon*), and castor bean (*Ricinus communis*). Associated native plant species include arrow weed (*Pluchea sericea*), cottonwoods (*Populus* spp.), and willows (*Salix* spp.).

A total of 12.85 acres of non-native riparian is mapped within Treatment Areas 1 and 4. It is found along the Tijuana River east of Hollister Road, as well as in riparian habitat east of Dairy Mart Road (Figures 7a-7d and 7f). Non-native riparian habitat makes up less than one percent of the Project Area.

Arundo-dominated Riparian (65100, Tier I)

The arundo-dominated riparian stands contain densely vegetated riparian thickets dominated almost exclusively by giant reed. This designation is used where giant reed accounts for greater than 50 percent of the total vegetative cover within a mapping unit. This plant may form dense floating mats in riparian areas, streams, ditches, and coastal marshes. Propagation occurs when the rhizomes and culms detach from the plant and are carried downstream. Fragmented stem nodes and rhizomes can take root and establish as new plant clones (Bell, *no date*). Stands may be up to eight meters in height and will exclude many native trees, especially willows. This community is less dominant in drier riparian systems that may be dominated by mule fat or arrow weed.

A total of 122.79 acres of arundo-dominated riparian occurs within Treatment Areas 1-2 and 4-12. This community is found in many areas of the Tijuana River corridor and in the vicinity of Smuggler's Gulch; however, the largest stands are found in the eastern portion of the Project Area. (Figures 7a-7g). Arundo dominated riparian makes up approximately seven percent of the Project Area.

Coastal Scrub (32000, Tier II)

Coastal scrub is one of the two major shrub types that occur in southern California, occupying xeric sites characterized by shallow soils (the other is chaparral). Coastal scrub may be dominated by a variety of species depending upon soil type, slope, and aspect. Typical species found within coastal scrub include goldenbush and deerweed (*Acmispon glaber*).

A total of 55.3 acres of coastal scrub occurs within Treatment Areas 11-12. It is found north of Monument Road, to the north and south of the Tijuana River, Spooner's Mesa, Monument Mesa, and in

the western portion of the Project Area (Figures 7a-7b and 7e-7g). Coastal scrub makes up approximately 3.2 percent of the Project Area.

Diegan Coastal Sage Scrub – Including Disturbed (32500, Tier II)

Diegan coastal sage scrub (including disturbed) is one of the two major shrub types that occur in southern California, occupying xeric sites characterized by shallow soils (the other is chaparral). Diegan coastal sage scrub may be dominated by a variety of species depending upon soil type, slope, and aspect. Typical species found within Diegan coastal sage scrub include California sagebrush, California buckwheat, laurel sumac (*Malosma laurina*), lemonadeberry (*Rhus integrifolia*), white sage (*Salvia apiana*), and black sage (*Salvia mellifera*).

There are 255.6 acres of Diegan coastal sage scrub within Treatment Areas 2, 5-6, 9, and 11-12. There are 24.1 acres of disturbed Diegan coastal sage scrub mapped within Treatment Areas 4-5, 7, 9, and 12. Diegan coastal sage scrub (including disturbed) is found on the slopes of Spooner’s Mesa and Monument Mesa and upland areas in the southern portion of the study area (Figures 7a and 7c-7g). Diegan coastal sage scrub makes up approximately 14.7 percent of the Project Area. Disturbed Diegan coastal sage scrub makes up approximately 1.4 percent of the Project Area.

Diegan Coastal Sage Scrub: Baccharis Dominated – Including Disturbed (32530, Tier II)

Within Diegan coastal sage scrub: baccharis dominated, coyote brush is the dominant species in the shrub canopy. Associated species include California sagebrush (*Artemisia californica*), California buckwheat, and goldenbush. The herbaceous layer contains codominant species, which include bromes (*Bromus* spp.), barleys (*Hordeum* spp.), Bermuda grass, giant wild rye (*Elymus condensatus*), purple needlegrass (*Stipa pulchra*), and deergrass (*Muhlenbergia rigens*). Diegan coastal sage scrub: baccharis dominated is usually open and often occurs on floodplains as a transition between riparian and upland habitat types. Disturbed Diegan coastal sage scrub: baccharis dominated contains many of the same shrub species as undisturbed Diegan coastal sage scrub: baccharis dominated but is sparser and has a higher proportion of non-native perennial and annual species.

There are 68.7 acres of Diegan coastal sage scrub: baccharis dominated within Treatment Areas 2-4 and 8-12. There are 0.6-acre of disturbed Diegan coastal sage scrub: baccharis dominated mapped within Treatment Area 4. Diegan coastal sage scrub: baccharis dominated is found throughout the Project Area in upland areas that have revegetated with baccharis scrub following past disturbances (Figures 7a-7g). Disturbed Diegan coastal sage scrub: baccharis dominated is found on the east side of Hollister Road along to the north of South Beach trail (Figures 7a and 7f-7g). Diegan coastal sage scrub: baccharis dominated makes up approximately 3.9 percent of the Project Area. Disturbed Diegan coastal sage scrub: baccharis dominated makes up less than one percent of the Project Area.

Chenopod Scrub (36000; Tier II)

Chenopod scrub describes a shrub-dominated community that occurs with low, grayish microphyllous shrubs with some succulent species. Stands are typically dominated by saltbush species (*Atriplex* spp.) but site factors and characteristic species that would further classify the area as desert salt scrub or desert sink are absent.

There are 14.6 acres of chenopod scrub within Treatment Areas 2, 4, 7-8, and 11. It is found north of Monument Road, to the north and south of the Tijuana River, Spooner’s Mesa, Monument Mesa, and in

the western portion of the study area (Figures 7a-7b and 7e-7g). Chenopod scrub makes up less than one percent of the Project Area.

Non-Native Grassland (42200, Tier III)

Non-native grassland may be composed of dense to sparse cover of annual grasses. It is 0.2 to one meter tall. In years of high rainfall, it can be associated with native wildflowers. In the County, associated species include oats (*Avena* spp.), bromes (*Bromus* spp.), filaree (*Erodium* spp.), mustards (*Brassica* spp.), tocalote (*Centaurea melitensis*), California poppy (*Eschscholzia californica*), lupines (*Lupinus* spp.), and plantain (*Plantago* spp.), among others. In some areas, depending on rainfall, forbs can be dominant. Germination often occurs with the onset of fall rains and occurs through the spring. Grass species are often dead in the summer and fall. It is usually found on fine-textured to clay soils.

There are 14.8 acres of non-native grassland within Treatment Areas 9, 11, and 12, and 0.5-acre occurs within the survey buffer. Non-native grassland occurs in the western and southern portion of the study area, south of the Tijuana River, on the west facing slope of Monument Mesa and to the north of Monument Road, north of Spooner's Mesa (Figures 7a-7b and 7e-7f). Non-native grassland makes up less than one percent of the Project Area.

Non-Native Vegetation (11000, Tier IV)

Non-native vegetation is a category describing stands of naturalized trees and shrubs (e.g., acacia [*Acacia* sp.] and peppertree [*Schinus* sp.]), many of which are also used in landscaping.

There are 4.8 acres of non-native vegetation within Treatment Areas 2, 4-5, 8, and 12. This habitat type occurs throughout the study area (Figures 7a-7g). Non-native vegetation makes up less than one percent of the Project Area. .

Disturbed Habitat – Including Trail (11300, Tier IV)

Disturbed habitat includes those areas that have been disturbed and are no longer considered native habitat, but still have a soil substrate. Vegetation is usually made up of invasive non-native species and ornamentals, and in particular, those species that take advantage of disturbed areas. Commonly associated species include thistles (*Sonchus* spp.), Russian thistle (*Salsola tragus*), mustards (*Brassica* spp.), pampas grass (*Cortaderia selloana*), and fountain grass (*Pennisetum setaceum*). The habitat no longer provides animal species with any beneficial uses, other than for dispersal. Examples of areas that are considered disturbed habitat include graded pads, areas actively managed for fuels, dirt parking lots, firebreaks, off-road vehicle trails, and home sites.

There are 350.9 acres of disturbed habitat within Treatment Areas 1-12. There are 43.1 acres of disturbed habitat – trail mapped within Treatment Areas 2-12. This habitat type occurs throughout the study area (Figures 7a-7g). Disturbed habitat makes up approximately 20.2 percent of the Project Area. Disturbed habitat – trail makes up approximately 2.5 percent of the Project Area.

Agriculture (Holland Code 18000, Tier IV)

Agricultural is defined broadly as land used primarily for the production of food and fiber. On satellite imagery, the chief indications of agricultural activity are distinctive geometric field and road patterns on the landscape and the traces produced by livestock or mechanized equipment. However, pasture and

other lands where such equipment is used infrequently may not show as well-defined shapes as other areas. The number of building complexes is smaller, and the density of the road and highway network is much lower in Agriculture than in developed land.

There is 0.03-acre of agriculture within Treatment Area 10. This habitat type occurs in the northern portion of the Project Area, east of Hollister Street and south of Sunset Avenue (Figures 7a-7b and 7g). Agriculture makes up less than one percent of the Project Area.

Row Crops (18320, Tier IV)

Row crops include annual and perennial crops grown in rows with open space between the rows. The species composition within the row crops frequently changes by season and year. Row crops often occur in floodplains or upland areas with high soil quality. Row crops are nearly always artificially irrigated.

There are 10.3 acres of row crops within Treatment Area 10. This habitat type occurs in the northern portion of the study area, east of Hollister Street and south of Sunset Avenue (Figures 7a-7c and 7g). Row crops make up less than one percent of the Project Area.

Non-Native Woodland (79000, Tier IV)

Non-native woodland includes woodland of exotic trees, usually intentionally planted, which are not maintained or artificially irrigated. This habitat does not usually apply where these trees have naturalized or occur in riparian woodlands.

There are 8.2 acres of non-native woodland within Treatment Areas 6-12, and 0.4-acre occurs within the survey buffer. This habitat type occurs throughout the study area, mainly as planted windrows of athel tamarisk (*Tamarix aphylla*; Figures 7a-7g). Non-native woodland makes up less than one percent of the Project Area.

Eucalyptus Woodland (79100, Tier IV)

Eucalyptus woodland is dominated by eucalyptus, an introduced species that has often been planted purposely for wind-blocking, ornamental, and hardwood production purposes. Most groves are monotypic, with the most common species being either the blue gum (*Eucalyptus gunnii*) or red gum (*E. camaldulensis* ssp. *obtusata*). The understory within well-established groves is usually very sparse due to the closed canopy and allelopathic nature of the abundant leaf and bark litter.

There are 5.9 acres of eucalyptus woodlands within Treatment Areas 1, 5-6, 10, and 12, and 2.4 acres occur within the survey buffer. It is found throughout the study area (Figures 7a and 7g). Eucalyptus woodland makes up less than one percent of the Project Area.

Developed Land – including Trail (12000, Tier IV)

Developed areas are those that have been built on or physically altered to the extent that native vegetation is not supported. Developed land is often characterized by permanent or semi-permanent structures, pavement, hardscape, or landscaped areas that require irrigation. Areas where no natural land is evident due to large quantities of debris, or other material being placed upon it, are also considered developed. Usually, plants in these areas are invasive non-native plants or ornamental.

Developed (Trail) indicates trails that are established and open to the public as part of the formal trail network within the park (Figure 6). These trails are maintained by the County DPR.

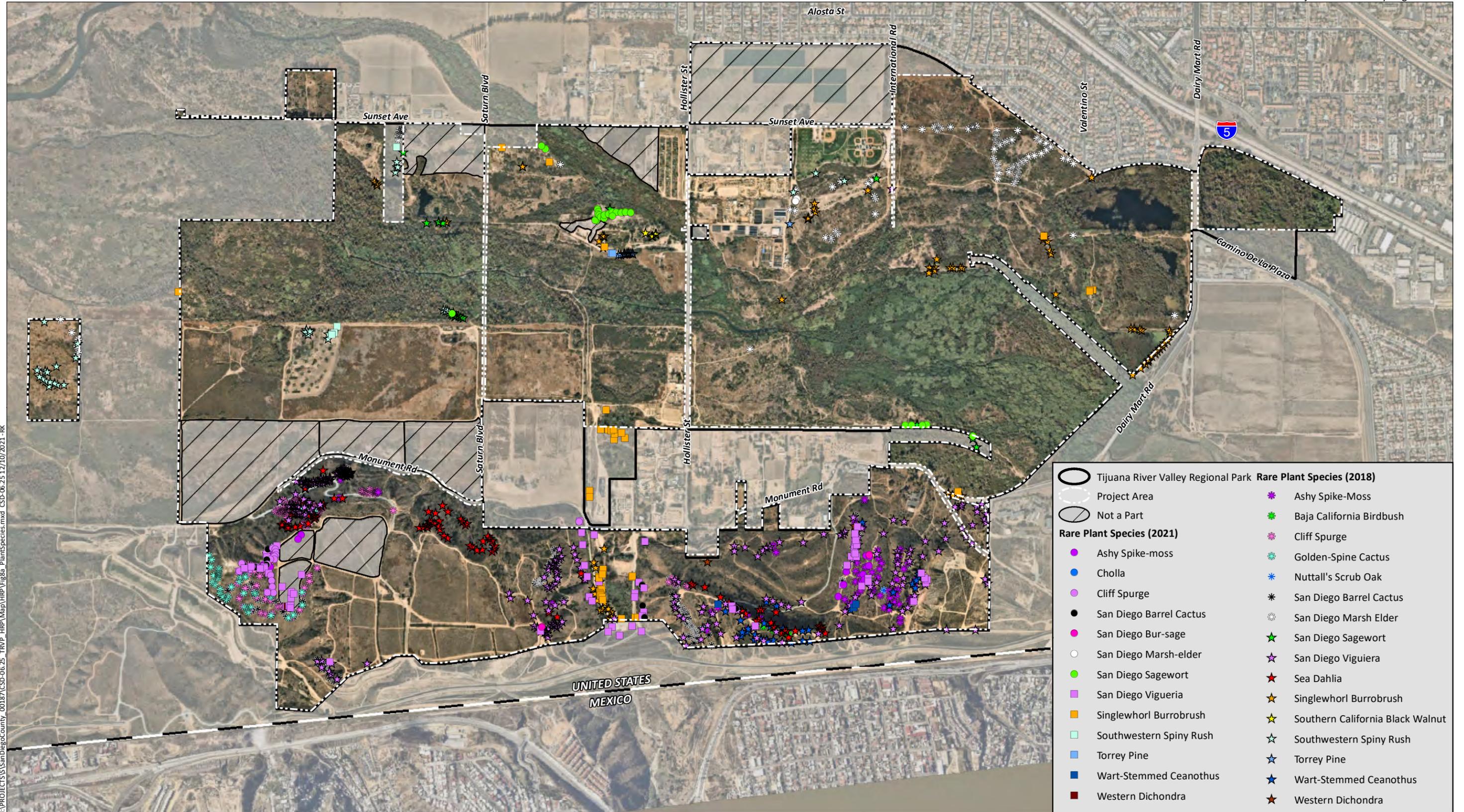
There are 75.6 acres of developed lands within Treatment Areas 2-12. There are 2.9 acres of developed lands – trail mapped within Treatment Area 12. This habitat type occurs throughout the Project Area (Figures 7a-7g). Developed land makes up approximately 4.3 percent of the Project Area. Developed land – trail makes up less than one percent of the Project Area.

2.2 SPECIAL-STATUS SPECIES

2.2.1 PLANTS

Special status plant species include species that are listed as threatened or endangered, proposed for listing, or are candidate species by the federal (USFWS) or state (CDFW) governments; those with CRPR 1 through 4 as designated by the California Native Plant Society (CNPS) (CNPS 2020); those that are listed as sensitive by the County (2010a); and those covered by the City’s MSCP Subarea Plan (City 1997, Figure 3). In total, 17 special status plant species were identified within the Project Area during 2018 baseline biological surveys and focused surveys conducted in 2021 (HELIX 2019; HELIX 2023; Figures 8a-8f, *Special Status Plant Species*), including three species covered under the City’s MSCP Subarea Plan (City 1997). Special status plant species observed were San Diego bur-sage (*Ambrosia chenopodiifolia*; CRPR 2.1, County List B), singlewhorl burrobrush (*Ambrosia monogyra*; CRPR 2B.2), San Diego sagewort (*Artemisia palmeri*; CRPR 4.2, County List D), San Diego County viguiera (CRPR 4.3, County List D), golden-spined cereus (*Bergerocactus emoryi*; CRPR 2B.2, County List B), wart-stemmed ceanothus (*Ceanothus verrucosus*; CRPR 2B.2, County List B, MSCP covered), western dichondra (*Dichondra occidentalis*; CRPR 4.2, County List D), cliff spurge (*Euphorbia misera*; CRPR 2B.2, County List B), San Diego barrel cactus (*Ferocactus viridescens*; CRPR 2B.1, County List B, MSCP Covered), San Diego marsh-elder (*Iva hayesiana*; CRPR 2B.2, County List B), Southern California black walnut (*Juglans californica*; CRPR 4.2, County List D), southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*; CRPR 4.2, County List D), sea dahlia (*Leptosyne maritima*; CRPR 2B.2, County List B), Baja California birdbush (*Ornithostaphylos oppositifolia*; SE, CRPR 2B.1, County List B), Torrey pine (*Pinus torreyana* ssp. *torreyana*; CRPR 1B.2, County List A, MSCP Covered), Nuttall’s scrub oak (*Quercus dumosa*; CRPR 1B.1, County List A), and ashy spike-moss (*Selaginella cinerascens*; CRPR 4.1, County List D). Plant descriptions are from the Jepson eFlora (Jepson 2021), Rare Plants of San Diego County (Reiser 2001), and Calflora (2021).

Based on an analysis of elevation, soils, vegetation communities, previous rare plant surveys conducted within the Project Area, and recorded observations of special status plant species in and near the Project Area, 22 special status plant species have a high potential to occur in the Project Area: Nuttall’s acmispon (*Acmispon prostratus*), aphanisma (*Aphanisma blitoides*), Coulter’s saltbush (*Atriplex coulteri*), south coast saltscale (*Atriplex pacifica*), San Diego goldenstar (*Bloomeria [Muilla] clevelandii*), Lewis’ evening-primrose (*Camissoniopsis lewisii*), Orcutt’s pincushion (*Chaenactis glabriuscula* var. *orcuttiana*), salt marsh bird’s-beak (*Chloropyron maritimum* ssp. *maritimum*), seaside calandrinia (*Cistanthe maritima*), Orcutt’s bird’s-beak (*Dicranostegia orcuttiana*), Orcutt’s dudleya (*Dudleya attenuata* ssp. *attenuata*), Blochman’s dudleya (*Dudleya blochmaniae* ssp. *blochmaniae*), variegated dudleya (*Dudleya variegata*), Palmer’s frankenia (*Frankenia palmeri*), California box-thorn (*Lycium californicum*), spreading navarretia (*Navarretia fossalis*), Brand’s star phacelia (*Phacelia stellaris*), Santa Catalina Island currant (*Ribes viburnifolium*), chaparral ragwort (*Senecio aphanactis*), estuary seablite (*Suaeda esteroa*), woolly seablite (*Suaeda taxifolia*), and California screw moss (*Tortula californica*).



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|--------------------------------------|------------------------------------|
| ○ Tijuana River Valley Regional Park | Rare Plant Species (2018) |
| ○ Project Area | ● Ashy Spike-Moss |
| ○ Not a Part | ● Baja California Birdbush |
| | ● Cliff Spurge |
| Rare Plant Species (2021) | ● Golden-Spine Cactus |
| ● Ashy Spike-moss | ● Nuttall's Scrub Oak |
| ● Cholla | ● San Diego Barrel Cactus |
| ● Cliff Spurge | ● San Diego Marsh Elder |
| ● San Diego Barrel Cactus | ● San Diego Sagewort |
| ● San Diego Bur-sage | ● San Diego Vigueria |
| ● San Diego Marsh-elder | ● Sea Dahlia |
| ● San Diego Sagewort | ● Singlewhorl Burrobrush |
| ● San Diego Vigueria | ● Southern California Black Walnut |
| ● Singlewhorl Burrobrush | ● Southwestern Spiny Rush |
| ● Southwestern Spiny Rush | ● Torrey Pine |
| ● Torrey Pine | ● Wart-Stemmed Ceanothus |
| ● Wart-Stemmed Ceanothus | ● Western Dichondra |
| ● Western Dichondra | ● Western Dichondra |

Aerial Photo: Nearmap (2021)



Special Status Plant Species

Figure 8a

Tijuana River Valley Regional Park

 Project Area

 Not a Part

Rare Plant Species (2021)

 San Diego Sagewort

 Singlewhorl Burrobrush

 Southwestern Spiny Rush

 Torrey Pine

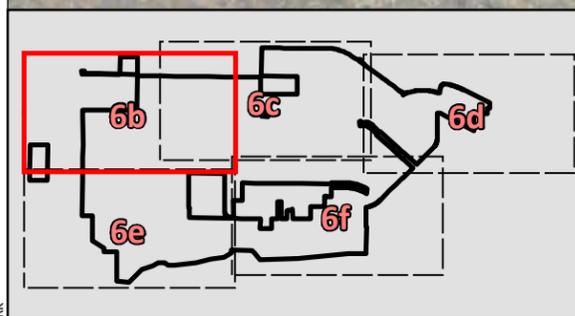
Rare Plant Species (2018)

 San Diego Marsh Elder

 San Diego Sagewort

 Singlewhorl Burrobrush

 Southwestern Spiny Rush



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Aerial Photo: Nearmap 2021



Special Status Plant Species

Figure 8b

Rare Plant Species (2018)

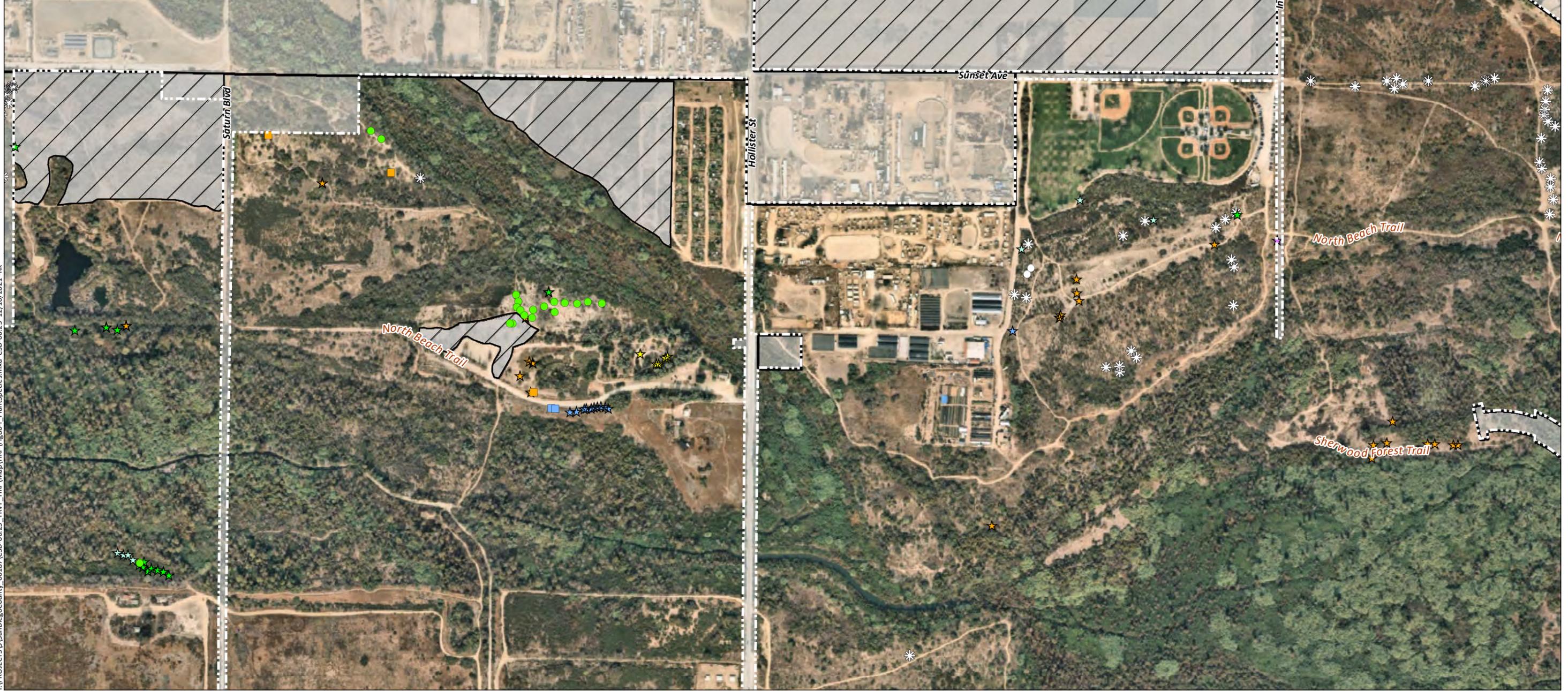
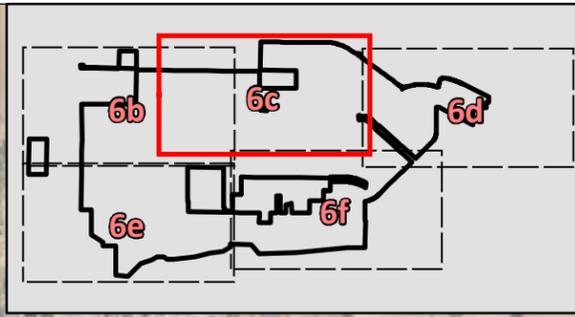
- Tijuana River Valley Regional Park
- Project Area
- Not a Part

Rare Plant Species (2021)

- San Diego Marsh-elder
- San Diego Sagewort
- Singlewhorl Burrobrush
- Torrey Pine

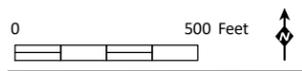
Rare Plant Species (2018) (continued)

- San Diego Marsh Elder
- San Diego Sagewort
- San Diego Viguiera
- Singlewhorl Burrobrush
- Southern California Black Walnut
- Southwestern Spiny Rush
- Torrey Pine



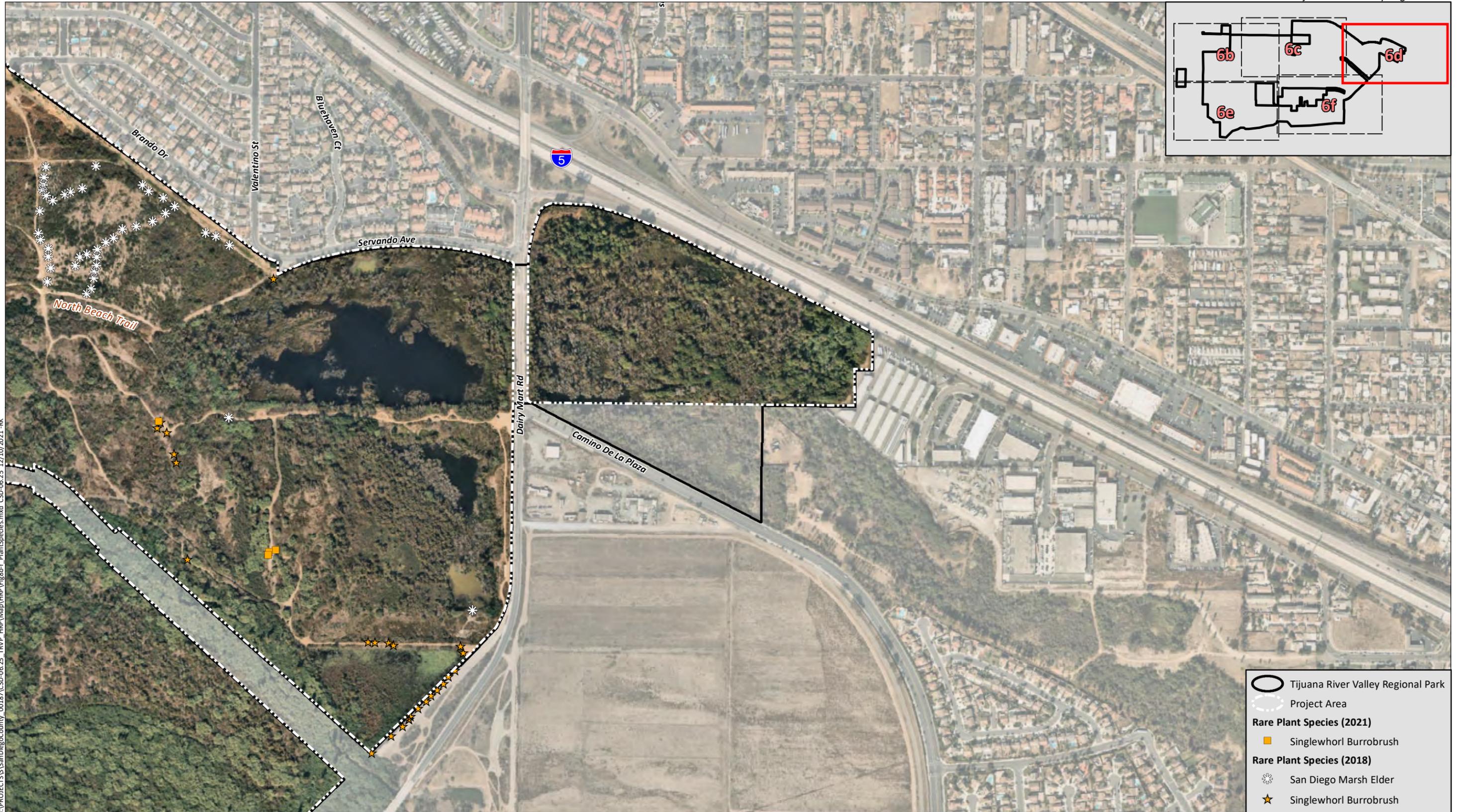
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Aerial Photo: Nearmap 2021



Special Status Plant Species

Figure 8c



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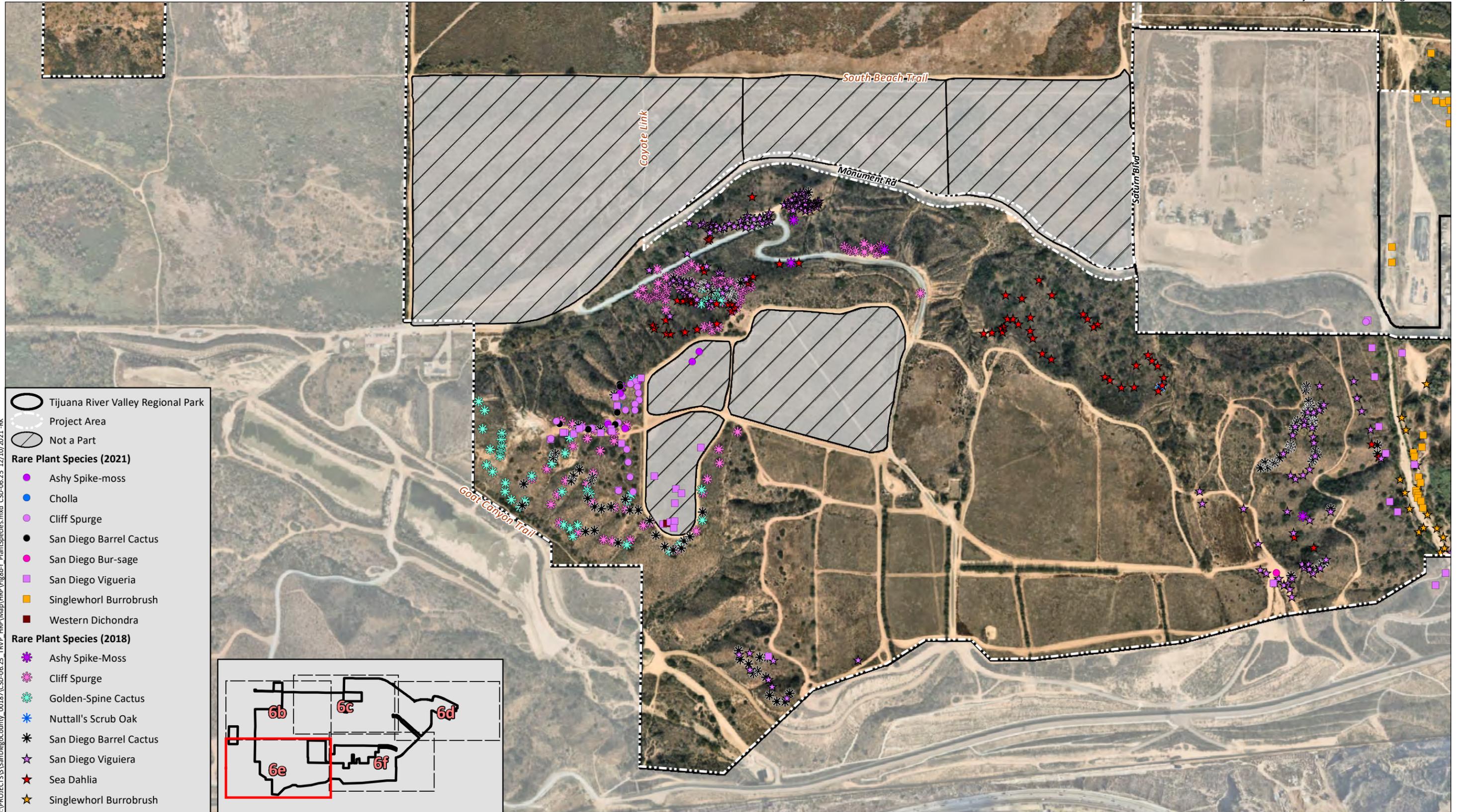
- Tijuana River Valley Regional Park
- Project Area
- Rare Plant Species (2021)**
- Singlewhorl Burrobrush
- Rare Plant Species (2018)**
- San Diego Marsh Elder
- Singlewhorl Burrobrush

Aerial Photo: Nearmap 2021



Special Status Plant Species

Figure 8d

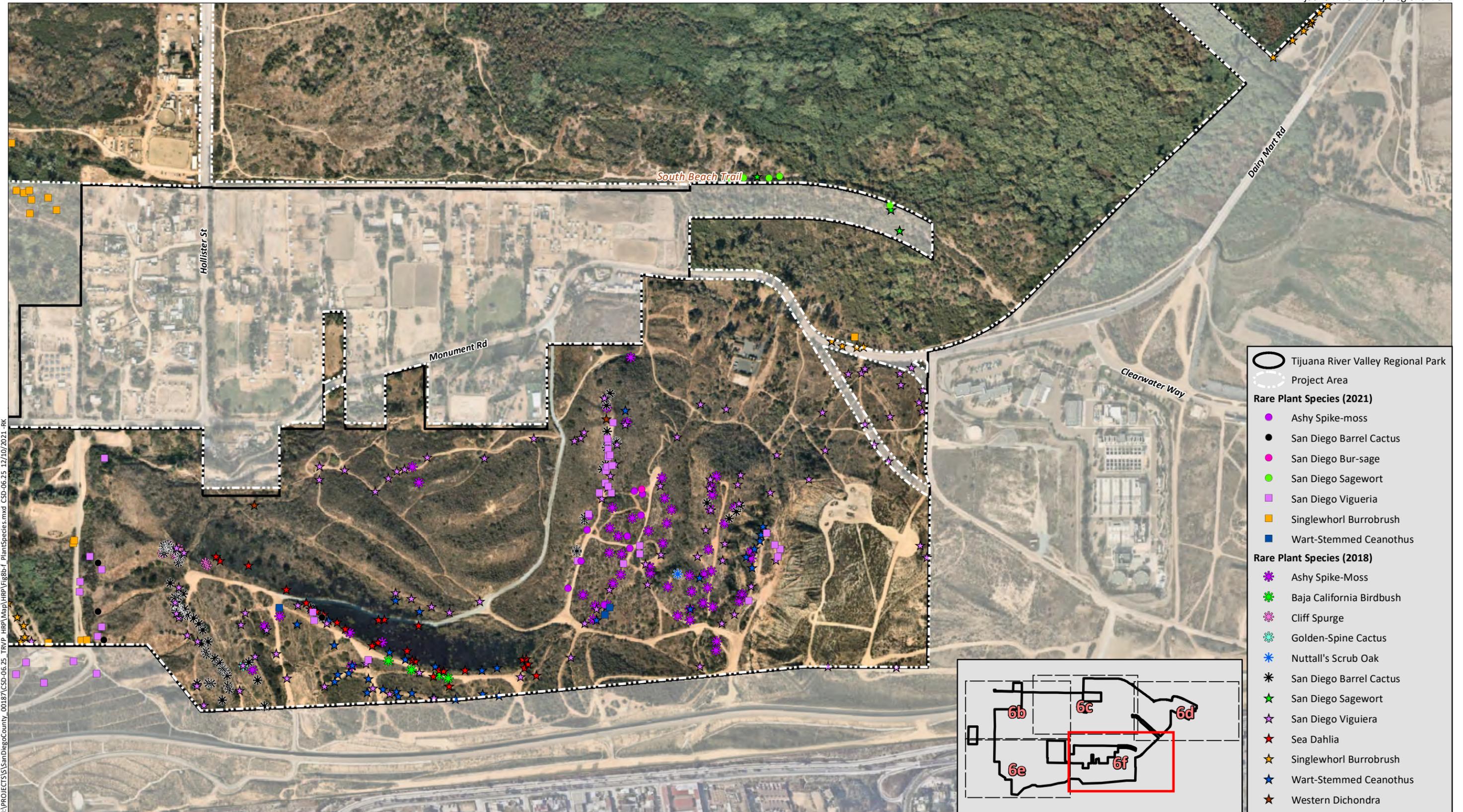


Aerial Photo: Nearmap 2021



Special Status Plant Species

Figure 8e

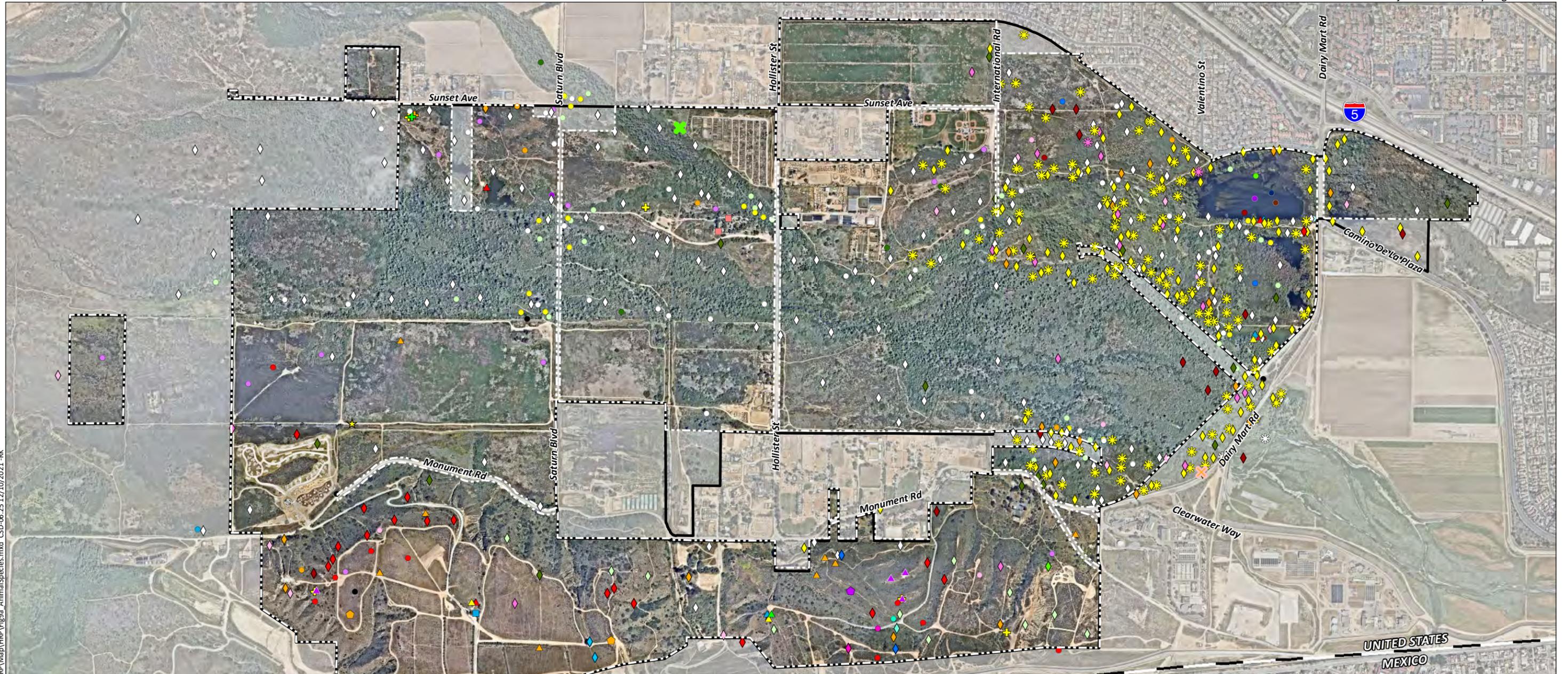


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Special Status Plant Species

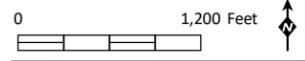
Figure 8f



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Tijuana River Valley Regional Park	Cooper's Hawk	Southern California Rufous-crowned Sparrow	Special Status Animal Species (2018)	Belding's Orange-throated Whiptail	Double-crested Cormorant	Sharp-shinned Hawk	San Diego Black-tailed Jackrabbit
Project Area	Costa's Hummingbird	Turkey Vulture	Amphibians	Blainville's Horned Lizard	Gadwall	Turkey Vulture	San Diego Desert Woodrat
Special Status Animal Species (2021)	Least Bell's Vireo	White-faced Ibis	Western Spadefoot	Birds	Great Blue Heron	Western Bluebird	Western Mastiff Bat
Reptiles	Merlin	White-tailed Kite	Invertebrates	American White Pelican	Green Heron	White-tailed Kite	Western Red Bat
Belding's Orange-throated Whiptail	Northern Cardinal	Yellow-breasted Chat	Quino Checkerspot Butterfly	Barn Owl	California Horned Lark	Yellow Warbler	Yuma Myotis
Coast Horned Lizard	Northern Harrier	Yellow Warbler	Monarch	Coastal California Gnatcatcher	Least Bell's Vireo	Yellow-breasted Chat	
Birds	Peregrine Falcon	Mammal	Reptiles	Cooper's Hawk	Northern Harrier	Mammals	
California Horned Lark	Red-shouldered Hawk	San Diego Black-tailed Jackrabbit	Baja California Coachwhip	Costa's Hummingbird	Red-shouldered Hawk	Pocketed Free-tailed Bat	
Coastal California Gnatcatcher	Sharp-shinned Hawk	Wood Rat Nest					

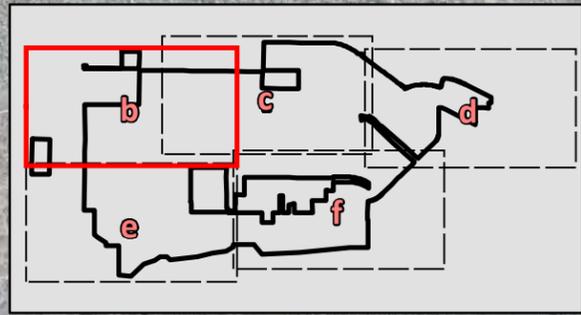
Aerial Photo: Nearmap (2021)



Special Status Animal Species

Figure 9a

-  Tijuana River Valley Regional Park
-  Project Area
- Special Status Animal Species (2021)**
- Reptiles**
-  Coast Horned Lizard
- Birds**
-  Cooper's Hawk
-  Least Bell's Vireo
-  Turkey Vulture
- Special Status Animal Species (2018)**
- Reptiles**
-  Baja California Coachwhip
-  Belding's Orange-throated Whiptail
-  Blainville's Horned Lizard
- Birds**
-  Barn Owl
-  Coastal California Gnatcatcher
-  Cooper's Hawk
-  Double-crested Cormorant
-  Least Bell's Vireo
-  Northern Harrier
-  Red-shouldered Hawk
-  Yellow Warbler
-  Yellow-breasted Chat
- Mammals**
-  San Diego Black-tailed Jackrabbit
-  Western Red Bat
-  Yuma Myotis



Aerial Photo: Nearmap 2021

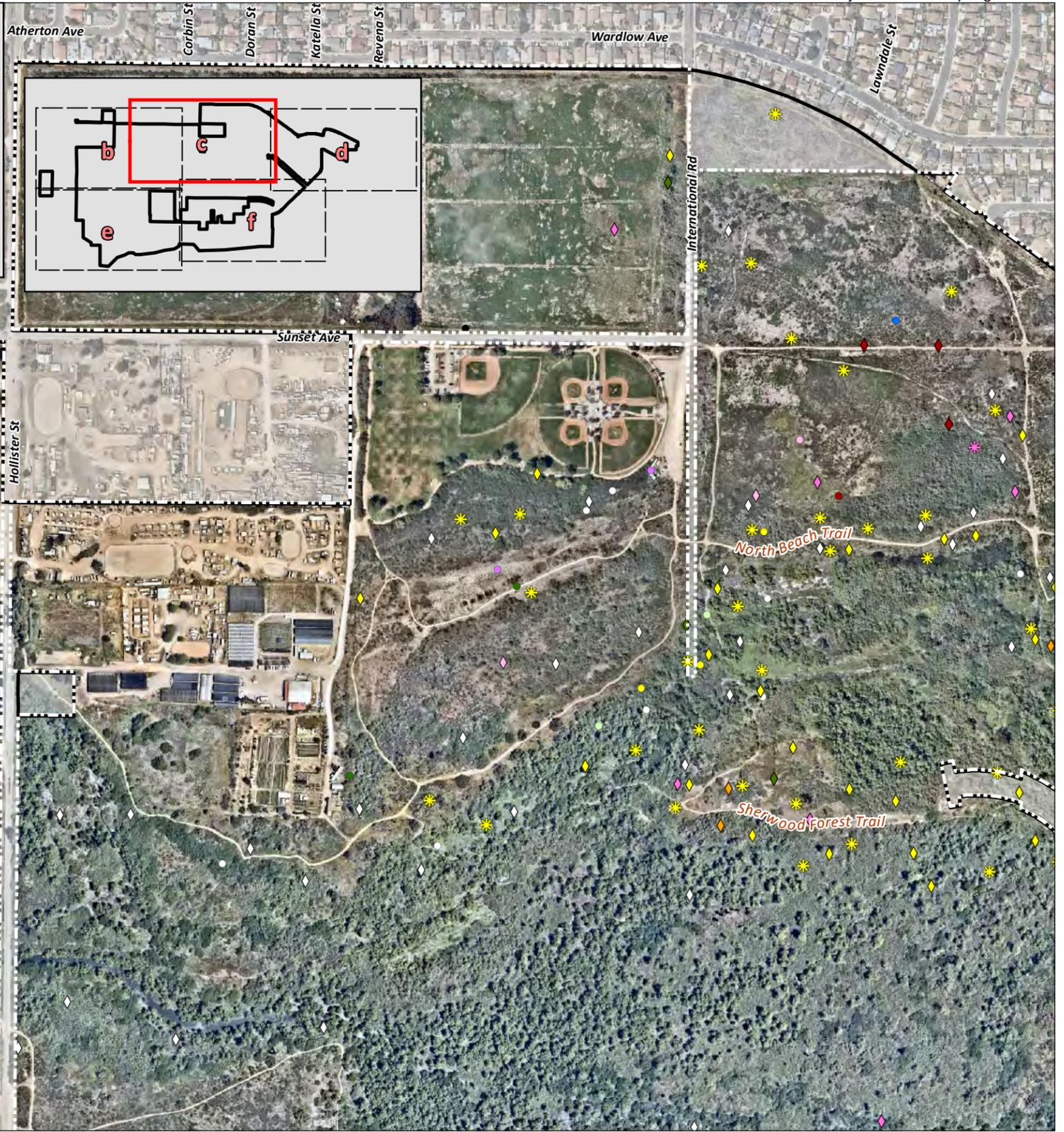


Special Status Animals Species

Figure 9b

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	Tijuana River Valley Regional Park		Northern Cardinal	Special Status Animal Species (2018)		Least Bell's Vireo
	Project Area		Northern Harrier	Invertebrates		Northern Harrier
Special Status Animal Species (2021)			Red-shouldered Hawk			Red-shouldered Hawk
Reptiles			Turkey Vulture			Turkey Vulture
	Coast Horned Lizard		White-tailed Kite			White-tailed Kite
Birds			Yellow-breasted Chat			Yellow Warbler
	Cooper's Hawk		Yellow Warbler			Yellow-breasted Chat
	Least Bell's Vireo			Mammals		Western Red Bat
						Yuma Myotis



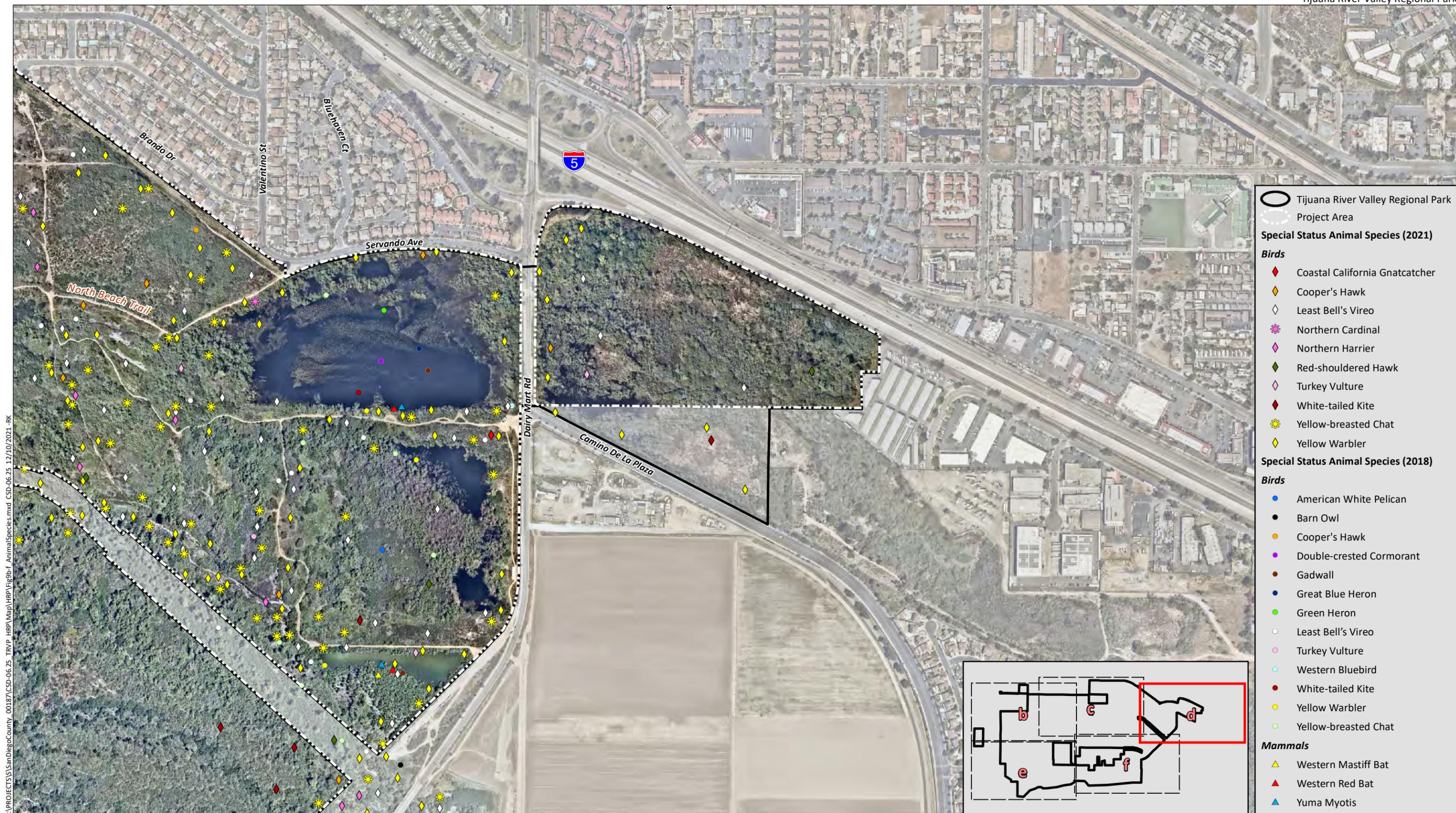
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Aerial Photo: Nearmap 2021



Special Status Animals Species

Figure 9c



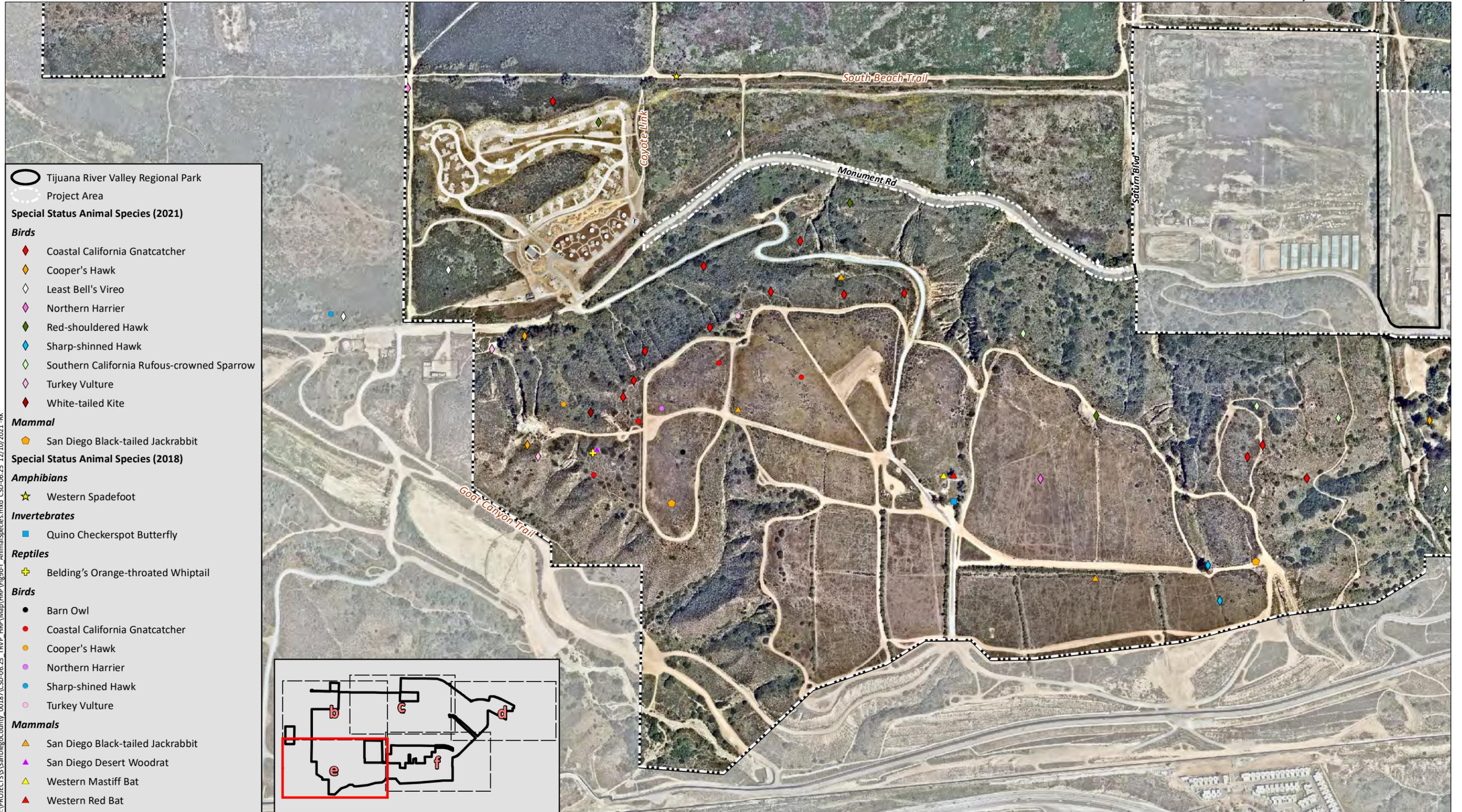
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Aerial Photo: Nearmap 2021

Special Status Animals Species

Figure 9d



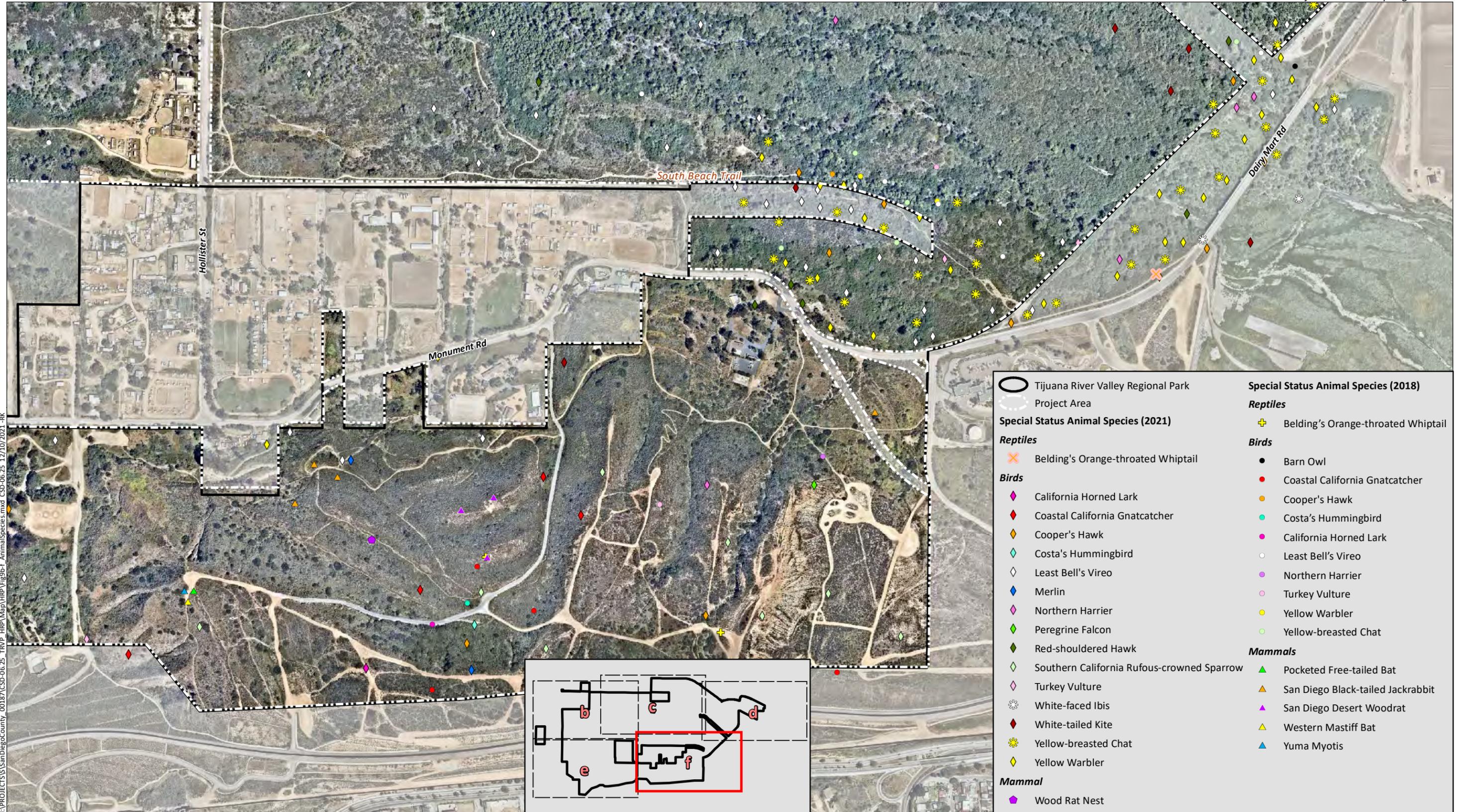
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Aerial Photo: Nearmap 2021

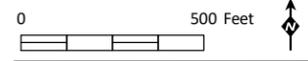


Special Status Animals Species

Figure 9e



Aerial Photo: Nearmap 2021



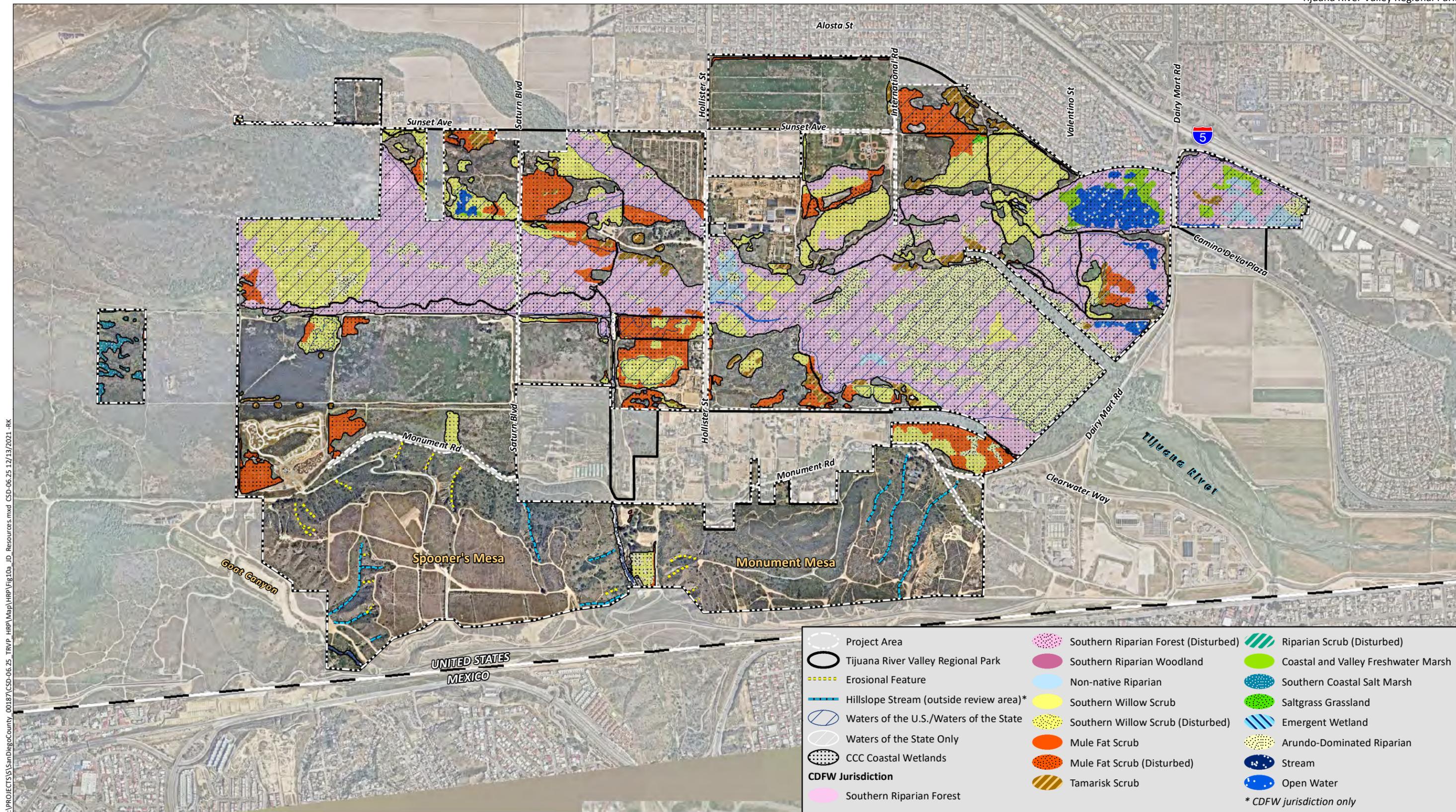
Special Status Animals Species

2.2.2 WILDLIFE

Special status wildlife species are those listed as endangered, threatened, or rare, or a candidate for those listings by the federal government (USFWS) or State of California (CDFW); included on the County's Sensitive Animal List (County 2010a); or covered by the City's MSCP Subarea Plan (City 1997). In total, 31 special status wildlife species were identified within the Project Area during 2018 baseline biological surveys and focused surveys conducted in 2021 (HELIX 2019; HELIX 2023; Figures 9a-f, *Special Status Wildlife Species*), including seven species covered under the City's MSCP Subarea Plan (City 1997). Special status wildlife species observed were monarch (*Danaus plexippus*; County Group 2), Quino checkerspot butterfly (*Euphydryas editha quino*; Federally Endangered [FE], County Group 1, western spadefoot toad (State Species of Special Concern [SSC], County Group 2), Belding's orange-throated whiptail (*Aspidoscelis hyperythrus beldingi*; WL, County Group 2, MSCP Covered), Baja California coachwhip (*Coluber fuliginosus*; SSC), Blainville's horned lizard (*Phrynosoma blainvillii*; SSC, County Group 2, MSCP Covered), Cooper's hawk (*Accipiter cooperii*; State Watch List [WL], County Group 1, MSCP Covered), Sharp-shinned hawk (*Accipiter striatus*; WL, County Group 1), Great blue heron (*Ardea herodias*; County Group 2), Red-shouldered hawk (*Buteo lineatus*; County Group 1), green heron (*Butorides virescens*; County Group 2), Costa's hummingbird (*Calypte costae*; Federal Bird of Conservation Concern [BCC]), turkey vulture (*Cathartes aura*; County Group 1), northern harrier (*Circus hudsonius*; SSC, County Group 1, MSCP Covered), white-tailed kite (Federal Fully Protected [FP], County Group 1), California horned lark (*Eremophila alpestris actia*; WL, County Group 2), yellow-breasted chat (*Icteria virens*; SSC, County Group 1), gadwall (*Mareca strepera*; County Group 2), American white pelican (*Pelecanus erythrorhynchos*; SSC, County Group 2), double-crested cormorant (*Phalacrocorax auritus*; WL, County Group 2), coastal California gnatcatcher (*Poliophtila californica californica*; Federally Threatened [FT], SSC, County Group 1, MSCP Covered), yellow warbler (*Setophaga petechia*; BCC, SSC, County Group 2), western bluebird (*Sialia mexicana*; County Group 2, MSCP Covered), barn owl (*Tyto alba*; County Group 2), least Bell's vireo (FE, State Endangered [SE], County Group 1, MSCP Covered), western mastiff bat (*Eumops perotis*; SSC, County Group 2), western red bat (*Lasiurus blossevillii*; SSC, County Group 2), San Diego black-tailed jackrabbit (*Lepus californicus bennettii*; SSC, County Group 2), Yuma myotis (*Myotis yumanensis*; County Group 2), San Diego desert woodrat (*Neotoma lepida intermedia*; SSC, County Group 2), and pocketed free-tailed bat (*Nyctinomops femorosaccus*; SSC, County Group 2).

2.3 JURISDICTIONAL RESOURCES

Potential jurisdictional resources within the Project Area include wetlands and waters of the U.S. subject to the regulatory jurisdiction of the USACE pursuant to Section 404 of the CWA, waters subject to regulation by the RWQCB pursuant to Section 401 of the CWA, and waters of the state pursuant to the Porter-Cologne Act, streambed and associated riparian habitats subject to the regulatory jurisdiction of the CDFW pursuant to Section 1600 of the California Fish and Game Code (CFGC), riparian habitat subject to the regulatory jurisdiction of the CCC, and wetlands pursuant to the City's ESL regulations (Attachment A, *Aquatic Resources Delineation Report*). The extent of aquatic resources jurisdiction within the Project Area varies by agency and is provided in Table 3, *Potential Jurisdictional Resources within the Project Area*, and depicted in Figure 10a-f. *Jurisdictional Resources within Tijuana River Valley Regional Park*. Only jurisdictional resources within the valley floodplain have been assessed as part of this HRP, while drainages that occur within uplands are omitted from this document and will be completely avoided (see Section 4.7). The USACE review area excludes the Spooner's Mesa and Monument Mesa areas in the southern part of the Project Area. These areas do not support wetland or



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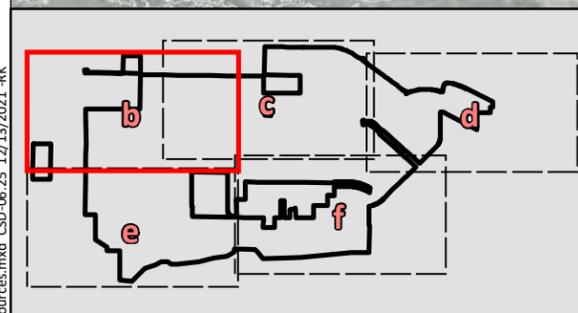
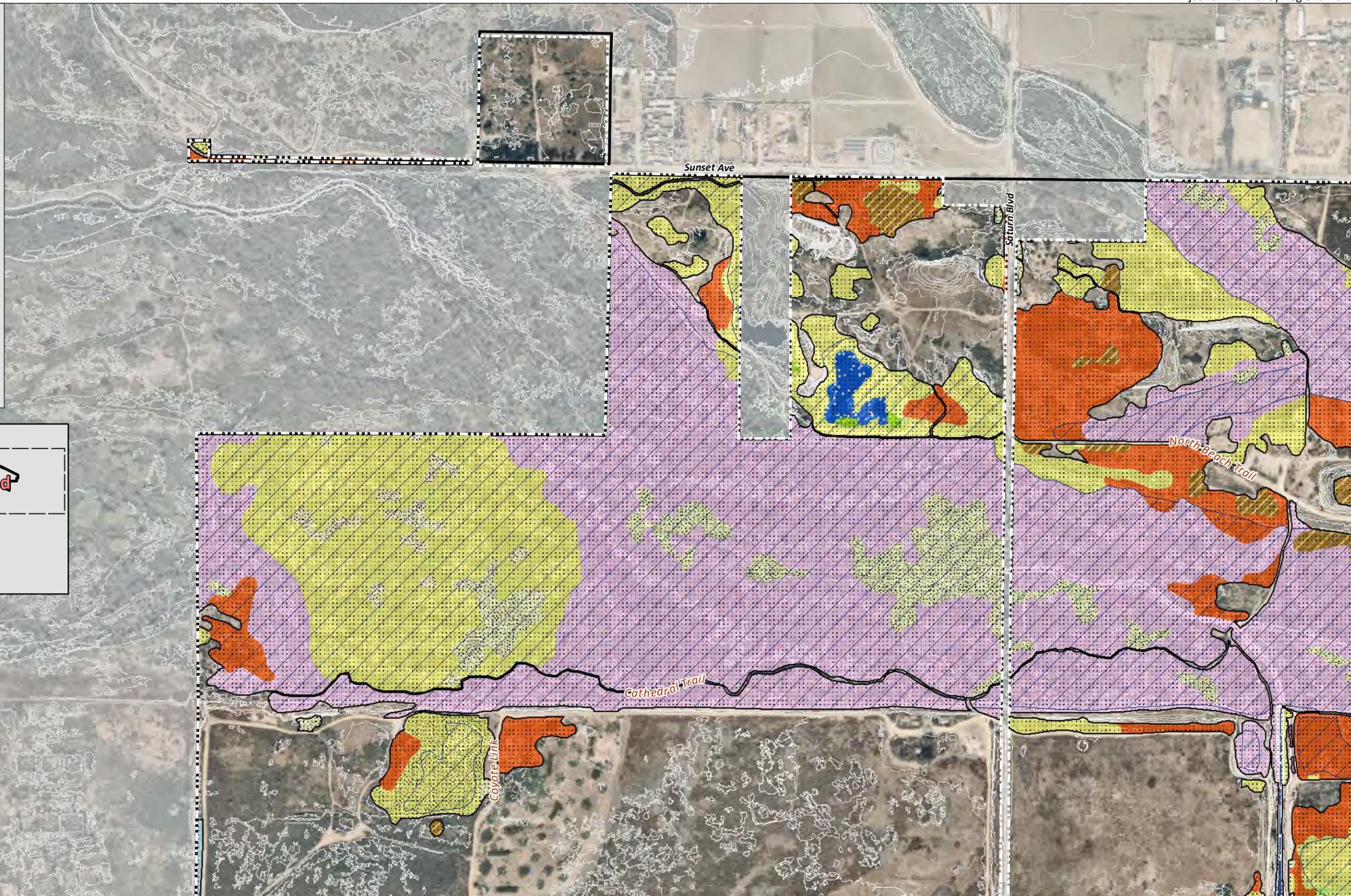
Aerial Photo: Nearmap (2021)



Jurisdictional Resources within Tijuana River Valley Regional Park

Figure 10a

- Project Area
- Tijuana River Valley Regional Park
- Waters of the U.S./Waters of the State
- Waters of the State Only
- CCC Coastal Wetlands
- CDFW Jurisdiction**
- Southern Riparian Forest
- Southern Riparian Woodland
- Non-native Riparian
- Southern Willow Scrub
- Southern Willow Scrub (Disturbed)
- Mule Fat Scrub
- Tamarisk Scrub
- Coastal and Valley Freshwater Marsh
- Southern Coastal Salt Marsh
- Arundo-Dominated Riparian
- Stream
- Open Water



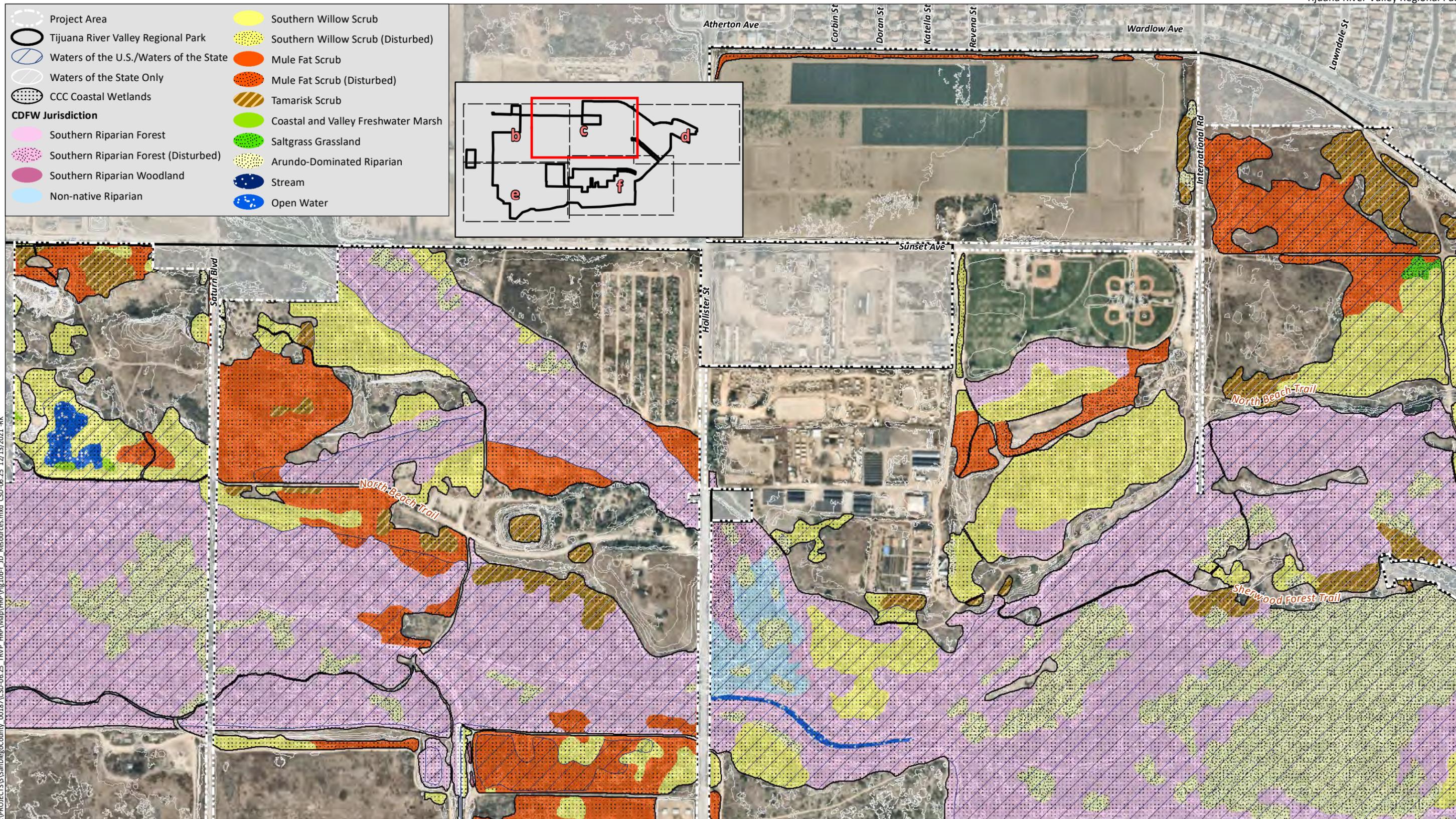
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Aerial Photo: Nearmap 2021



Jurisdictional Resources within Tijuana River Valley Regional Park

Figure 10b



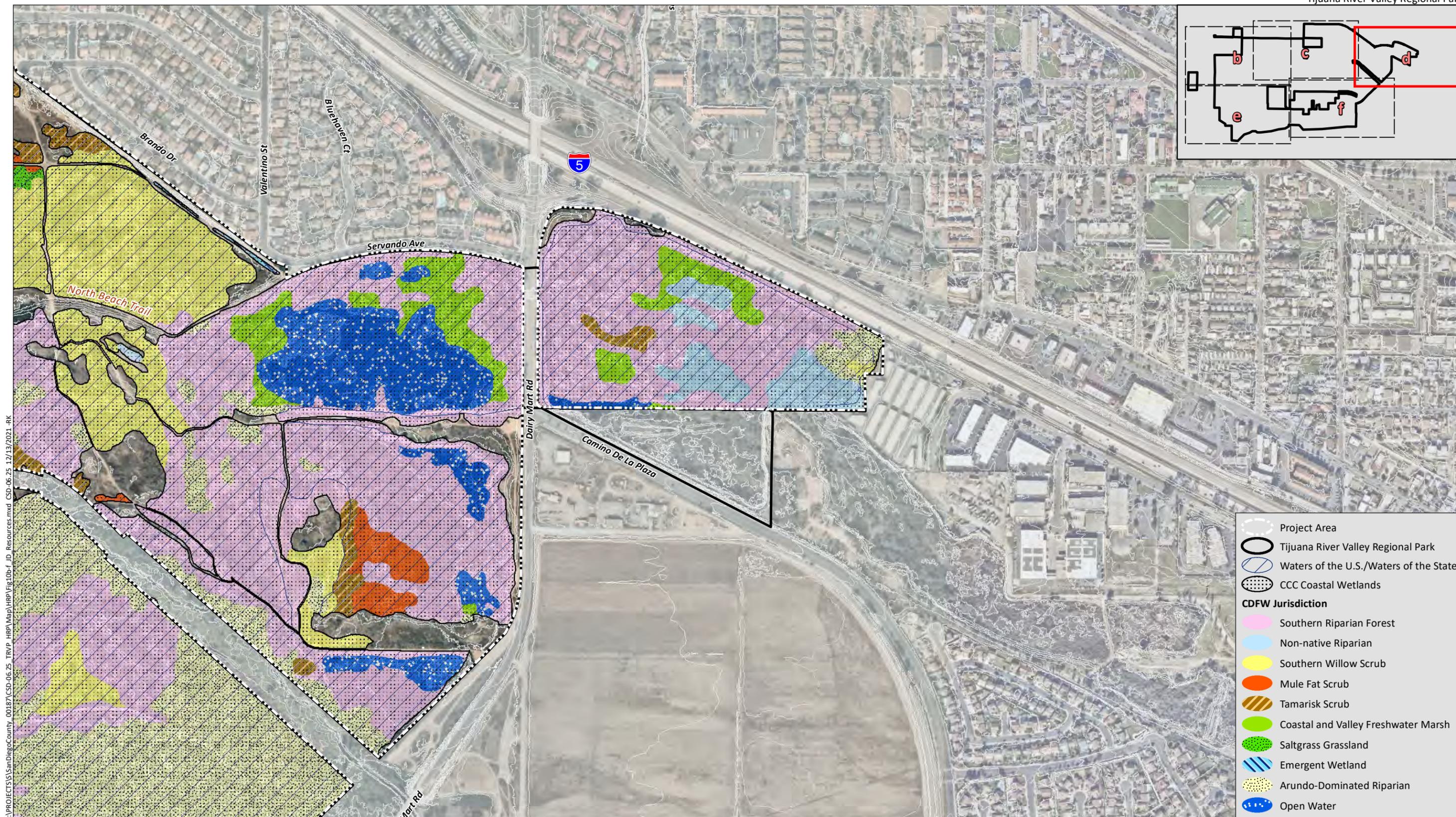
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Aerial Photo: Nearmap 2021



Jurisdictional Resources within Tijuana River Valley Regional Park

Figure 10c



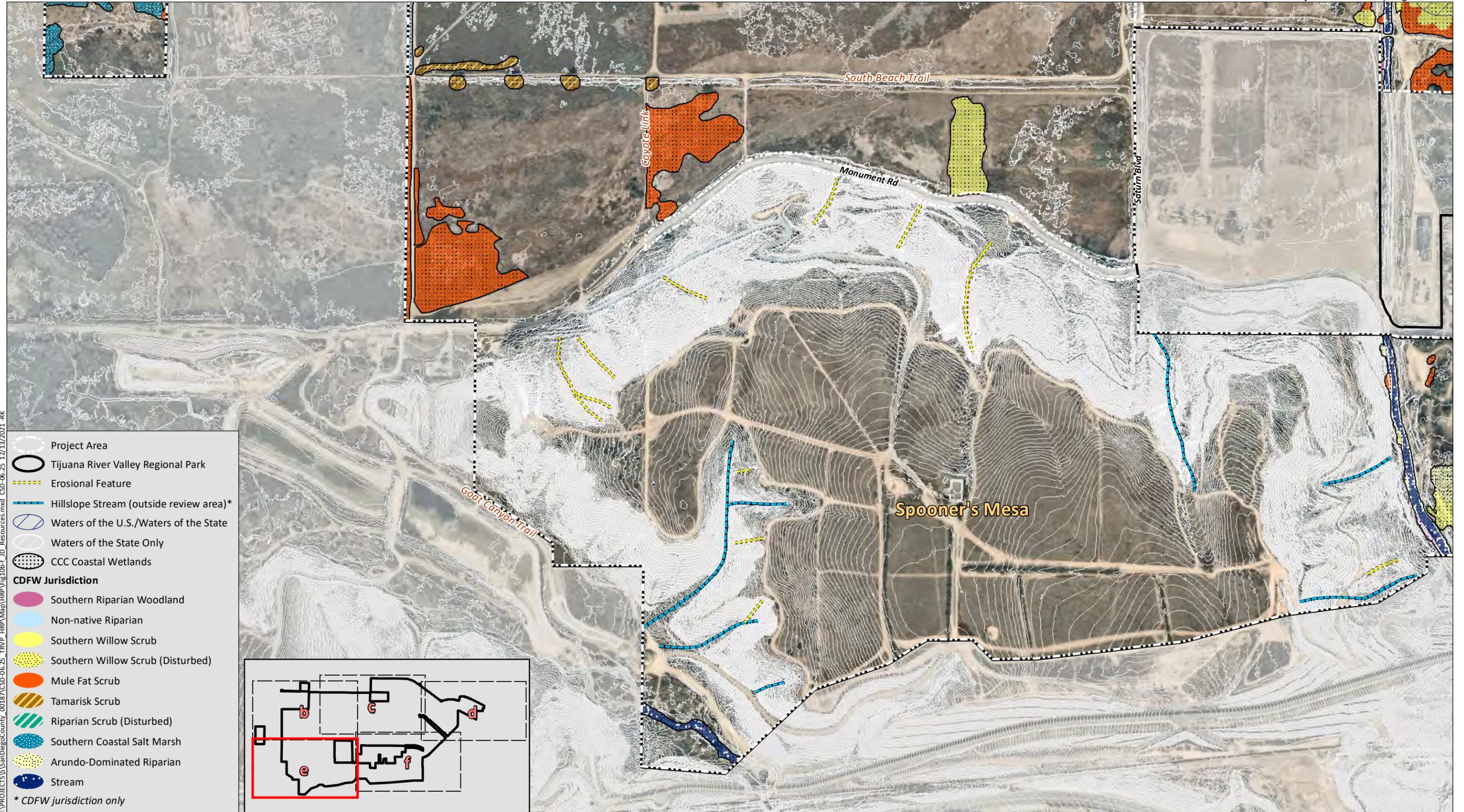
Aerial Photo: Nearmap 2021



Jurisdictional Resources within Tijuana River Valley Regional Park

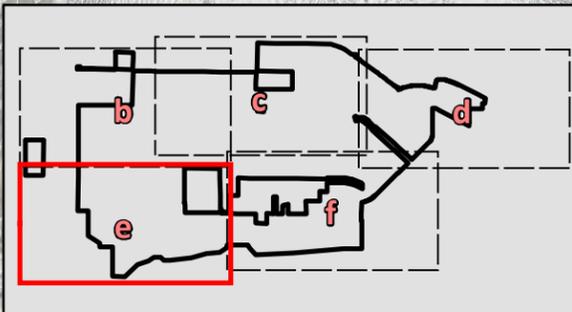
Figure 10d

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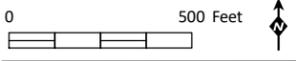


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- Project Area
 - Tijuana River Valley Regional Park
 - Erosional Feature
 - Hillslope Stream (outside review area)*
 - Waters of the U.S./Waters of the State
 - Waters of the State Only
 - CCC Coastal Wetlands
 - CDFW Jurisdiction**
 - Southern Riparian Woodland
 - Non-native Riparian
 - Southern Willow Scrub
 - Southern Willow Scrub (Disturbed)
 - Mule Fat Scrub
 - Tamarisk Scrub
 - Riparian Scrub (Disturbed)
 - Southern Coastal Salt Marsh
 - Arundo-Dominated Riparian
 - Stream
- * CDFW jurisdiction only

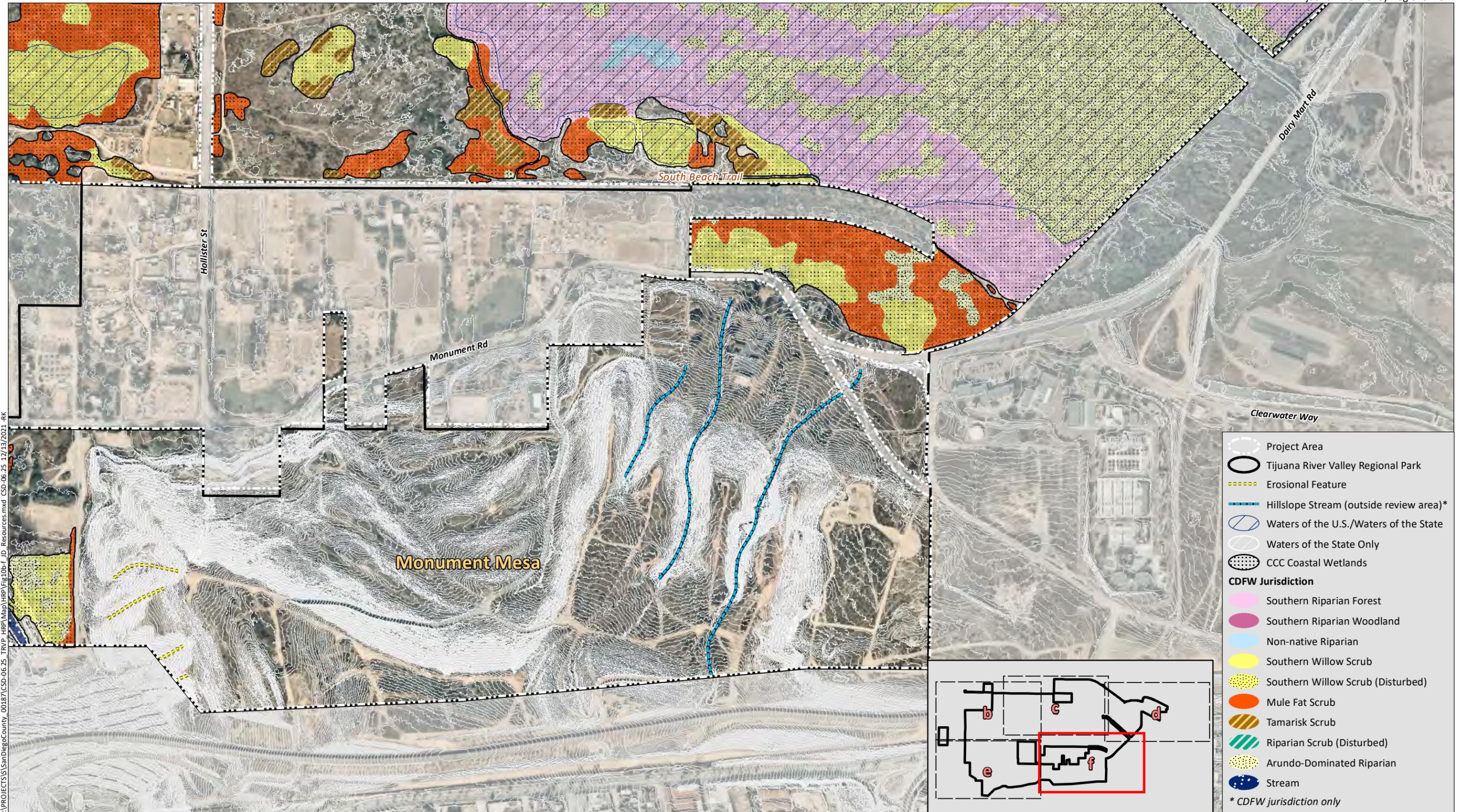


Aerial Photo: Nearmap 2021



Jurisdictional Resources within Tijuana River Valley Regional Park

Figure 10e



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Aerial Photo: Nearmap 2021



Jurisdictional Resources within Tijuana River Valley Regional Park

riparian vegetation communities but may contain ephemeral waters on steep hillslopes coming off the mesas.

Table 3
POTENTIAL JURISDICTIONAL RESOURCES WITHIN THE PROJECT AREA¹

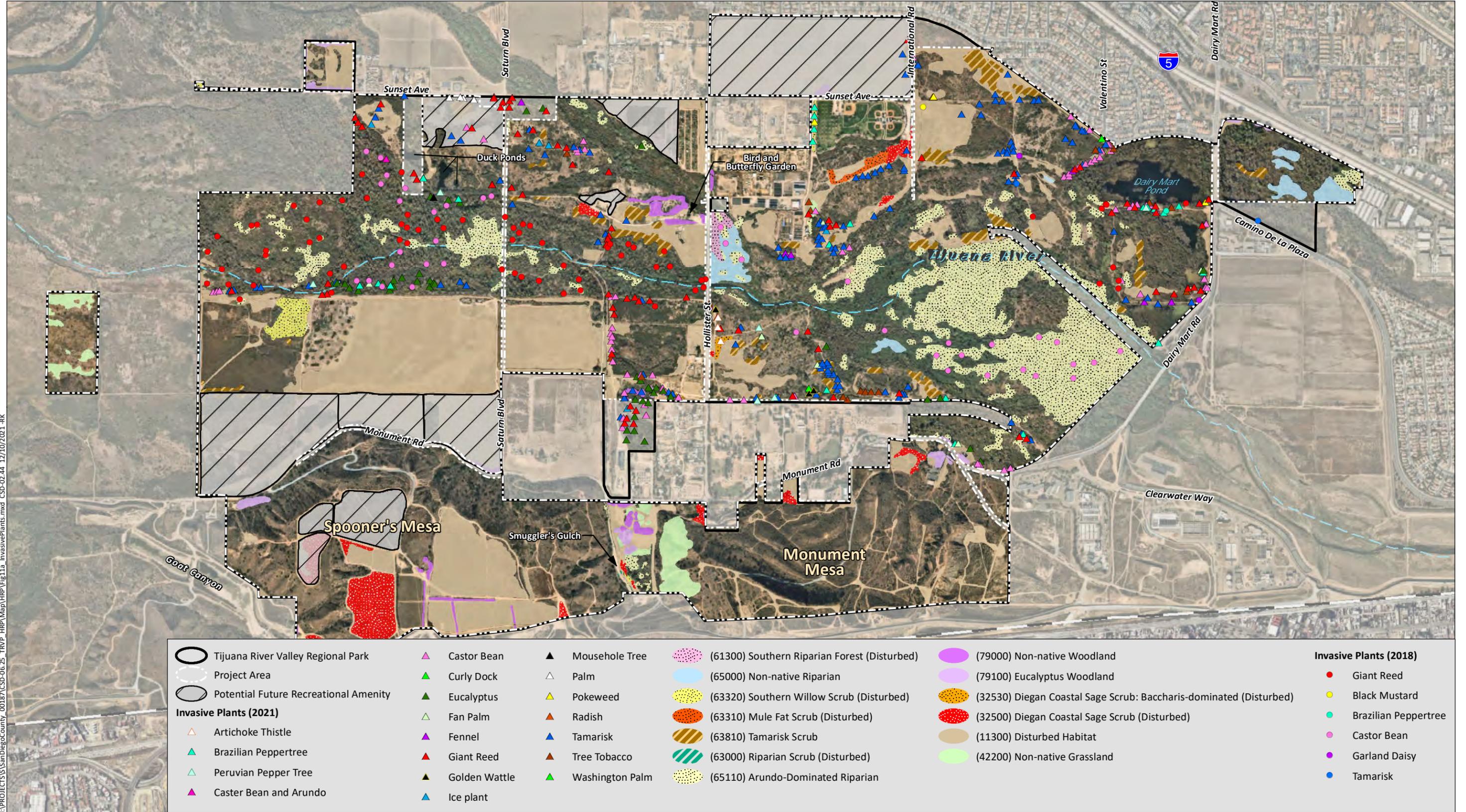
Vegetation Community	Resource Agency Jurisdiction			
	USACE	RWQCB	CDFW	CCC
Wetland				
Southern Riparian Forest (including disturbed)	332.83	332.83	357.81	357.81
Southern Riparian Woodland	--	--	0.22	0.22
Southern Willow Scrub (including disturbed)	96.15	96.15	147.96	147.96
Mule Fat Scrub (including disturbed)	24.13	24.13	86.65	86.65
Coastal and Valley Freshwater Marsh	9.34	9.34	9.37	9.37
Emergent Wetland	0.25	0.25	0.25	0.25
Southern Coastal Salt Marsh	4.35	4.35	4.35	4.35
Saltgrass Grassland	0.39	0.39	0.39	0.39
Arundo-dominated Riparian	117.35	117.35	122.82	122.82
Non-native Riparian	12.16	12.16	12.85	12.85
Tamarisk Scrub	13.65	13.65	23.33	23.33
<i>Subtotal</i>	<i>610.60</i>	<i>610.60</i>	<i>766.06</i>	<i>766.06</i>
Non-Wetland				
Open Water	20.71	20.71	20.71	20.71
Stream Channel	2.39	3.18	2.77	2.77
<i>Subtotal</i>	<i>23.10</i>	<i>23.89</i>	<i>23.48</i>	<i>23.48</i>
TOTAL	633.70	634.49	789.54	789.54

¹ Areas are presented in acre(s) rounded to the nearest 0.01.

USACE = U.S. Army Corps of Engineers; RWQCB = Regional Water Quality Control Board; CDFW = California Department of Fish and Wildlife; CCC = California Coastal Commission.

2.4 INVASIVE NON-NATIVE PLANT SPECIES

A total of 106 invasive non-native plant species were identified in the Project Area during the 2018 baseline botanical surveys and 2021 focused surveys (HELIX 2019; HELIX 2023; Figures 11a-f, *Invasive Plant Species*). Of the 106 invasive non-native plant species, 22 of those species were identified and mapped as invasive non-native plant target species of concern in need of removal and control. While multiple species of invasive non-native plants were observed in the Project Area, most were sporadically observed and not prevalent throughout the Project Area. Invasive non-native plant species that were observed sporadically are not considered target species of concern in need of removal and control. Additionally, many of these species are considered to have become “naturalized” in southern California.



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Aerial Photo: Nearmap 2021



Invasive Plant Species

Figure 11a

Tijuana River Valley Regional Park

 Project Area

 Potential Future Recreational Amenity

Invasive Plants (2021)

- Brazilian Peppertree
- Peruvian Pepper Tree
- Caster Bean and Arundo
- Castor Bean
- Eucalyptus
- Fan Palm
- Fennel
- Giant Reed
- Ice plant
- Mousehole Tree
- Palm
- Tamarisk
- Tree Tobacco

(65000) Non-native Riparian

 (63320) Southern Willow Scrub (Disturbed)

 (63810) Tamarisk Scrub

 (65110) Arundo-Dominated Riparian

 (79000) Non-native Woodland

 (79100) Eucalyptus Woodland

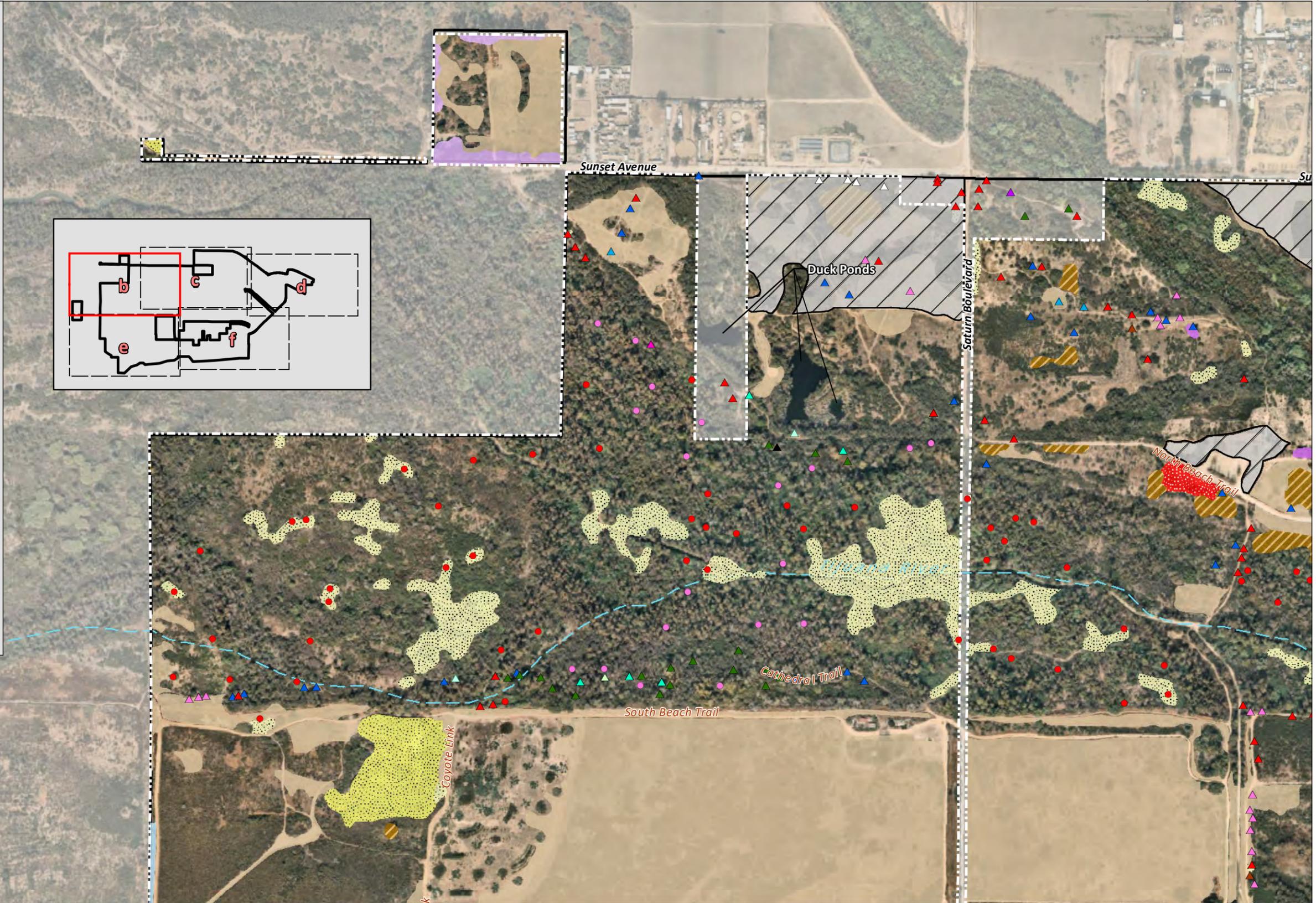
 (32500) Diegan Coastal Sage Scrub (Disturbed)

 (11300) Disturbed Habitat

 (42200) Non-native Grassland

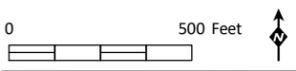
Invasive Plants (2018)

- Giant Reed
- Castor Bean



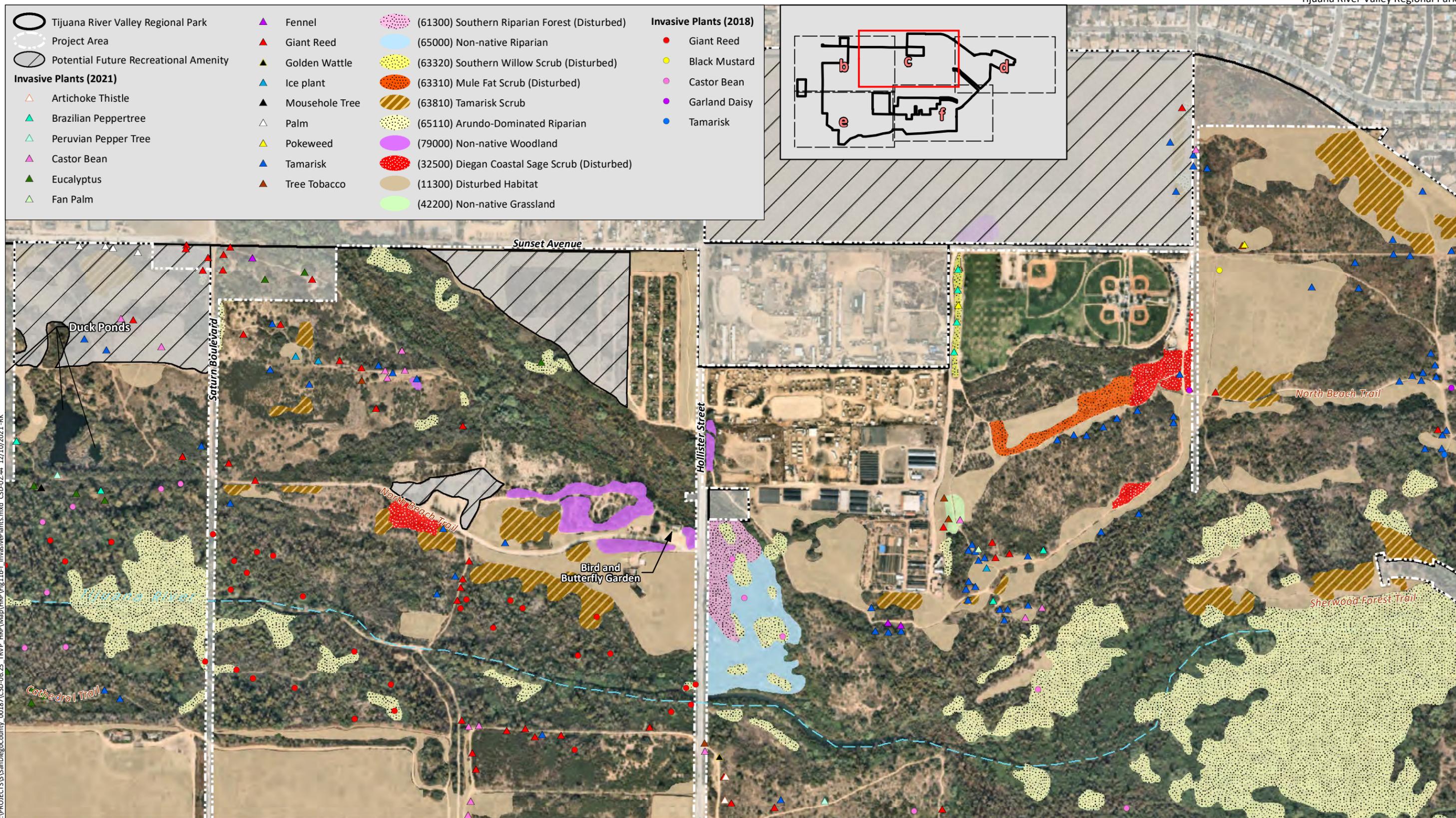
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Aerial Photo: Nearmap 2021



Invasive Plant Species

Figure 11b



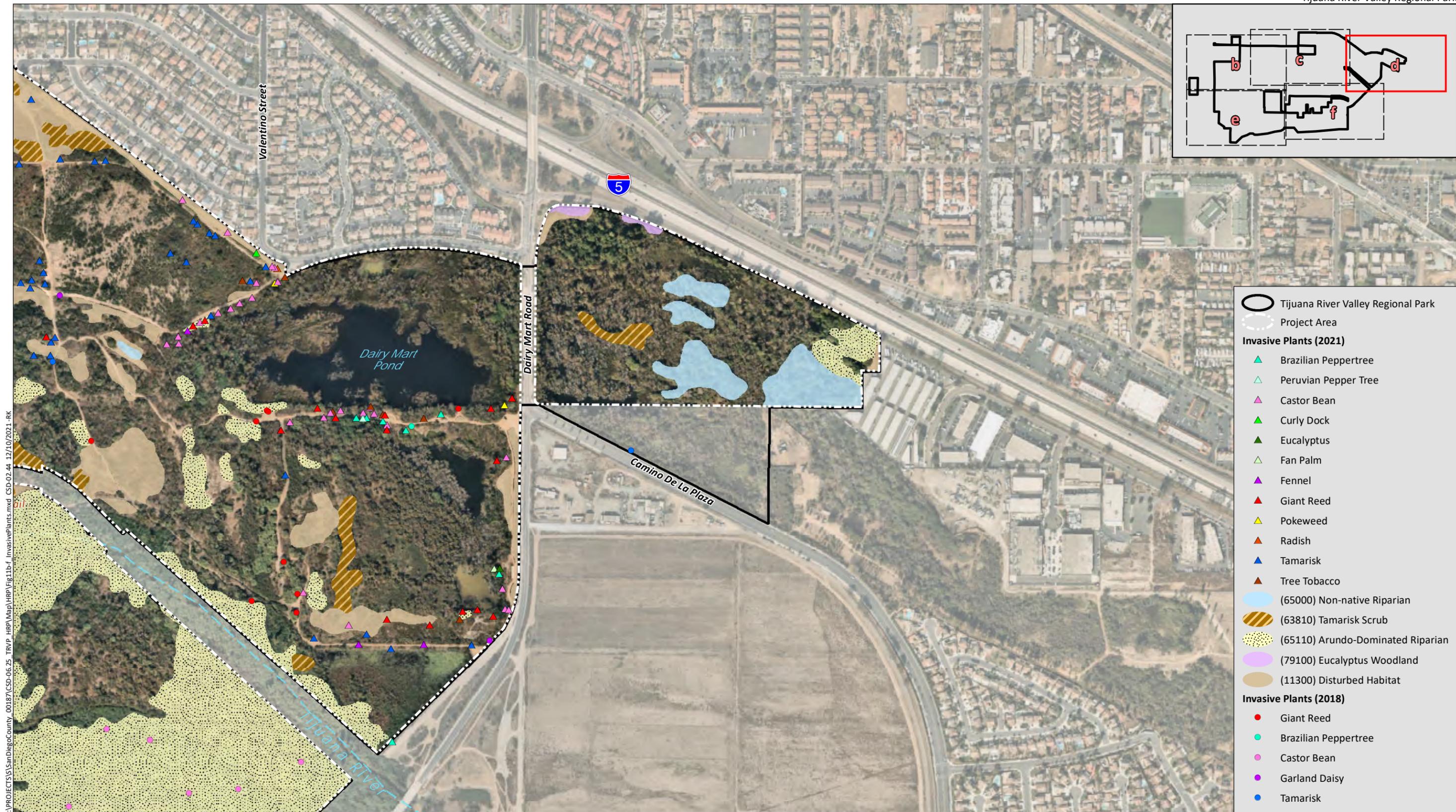
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Aerial Photo: Nearmap 2021



Invasive Plant Species

Figure 11c



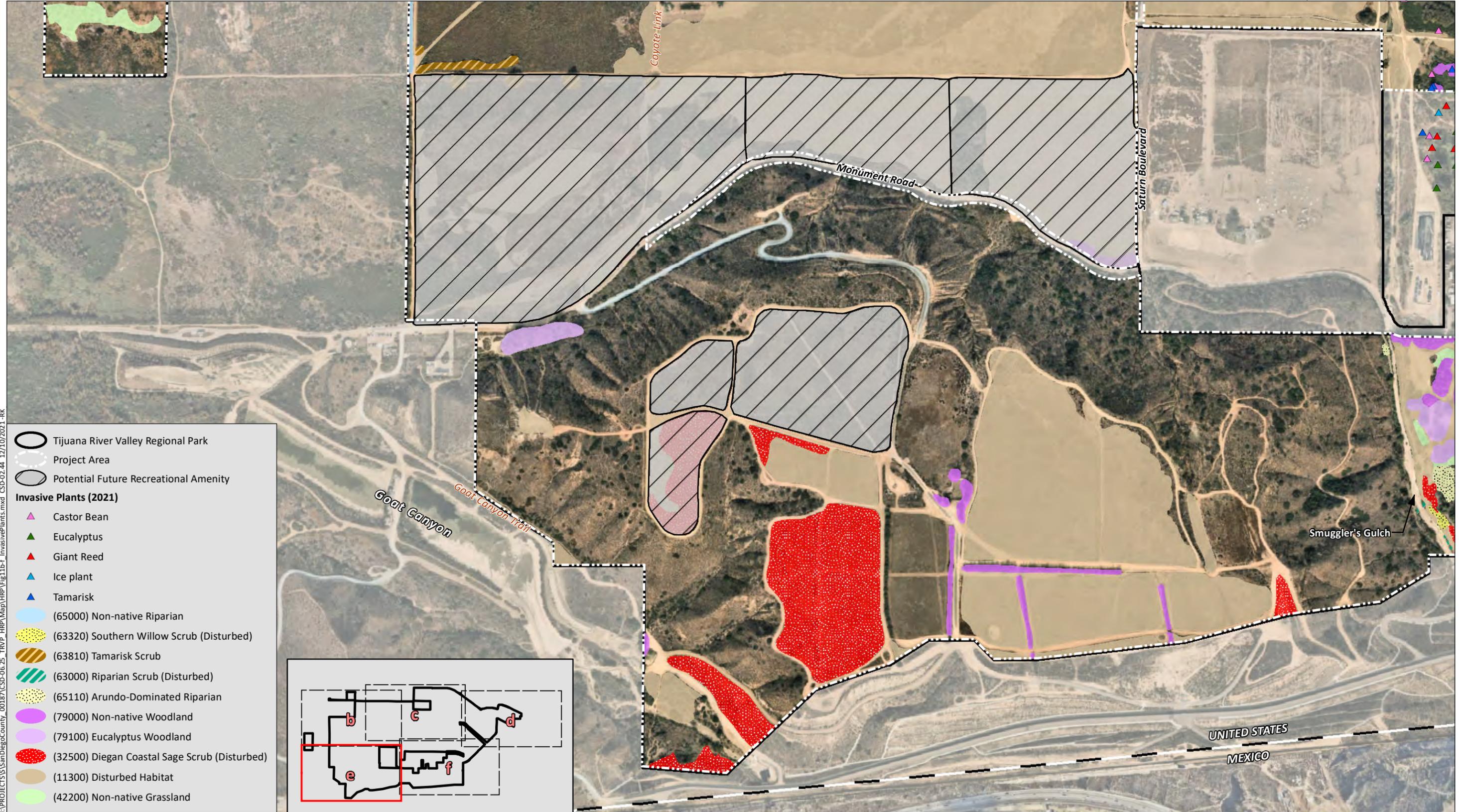
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Aerial Photo: Nearmap 2021



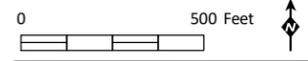
Invasive Plant Species

Figure 11d



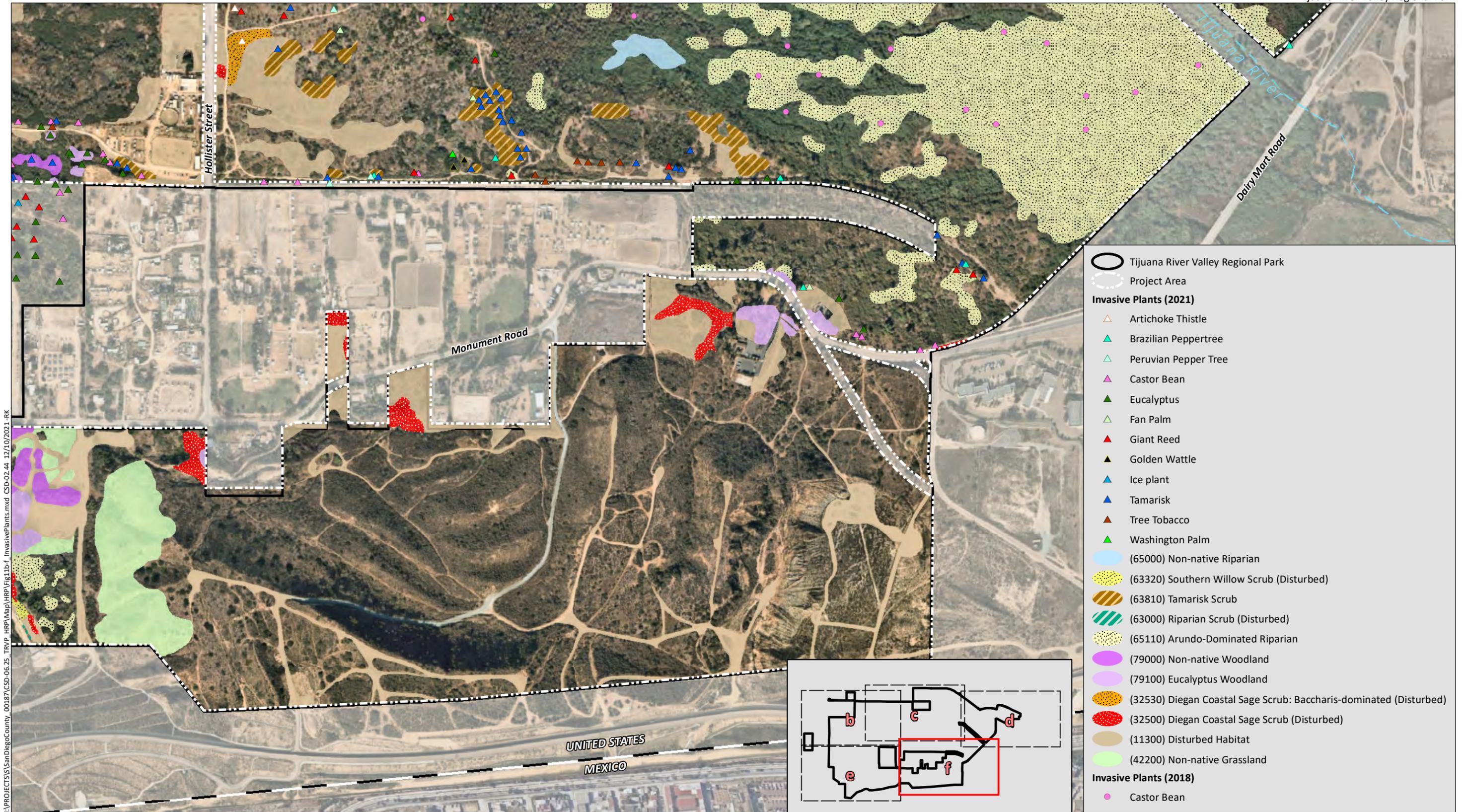
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Aerial Photo: Nearmap 2021



Invasive Plant Species

Figure 11e



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Aerial Photo: Nearmap 2021



Invasive Plant Species

Figure 11f

Of the 106 invasive non-native plant species observed in the Project Area in 2018 and 2021, 22 target invasive non-native plant species were selected as a high priority for removal based on their invasive potential, prevalence throughout the Project Area, and the ability for management (Table 4, *Invasive Non-Native Plant Species of Concern Within the Project Area*). Non-native grasses were not included as target invasive non-native plant species because they are abundant both within the Project Area and in the surrounding habitat and remain between six to 12 inches in height such that they do not pose a risk to native vegetation. Invasive non-native plant species occur throughout the Project Area, with the highest concentration in the eastern portion along the Tijuana River and in the southeastern portion including, Spooner’s Mesa (Figure 11a-f). The source populations for the invasive non-native plants that have been identified should also be controlled, as eradication of these plants from the Project Area would only be temporary. Invasive non-native plants that were mapped within the Project Area and determined as target species of concern in need of removal are presented below with their associated California Invasive Plant Council (Cal-IPC) Inventory Ranking (Table 4). The definitions for the Cal-IPC ratings are as follows:

- **High:** Species have severe ecological impacts, are conducive to moderate to high rates of dispersal/establishment, and most are widespread;
- **Moderate:** Species have substantial and apparent, but not severe, ecological impacts; are conducive to moderate to high rates of dispersal, though the establishment is dependent on ecological disturbance; and distribution may range from limited to widespread;
- **Limited:** Species are invasive, but their ecological impacts are minor on a State-wide level, or there was not enough information to justify a higher score; have low to moderate rates of invasiveness; and are limited but may be locally persistent and problematic; and
- **None:** Species have not been listed by Cal-IPC.

A comprehensive list of all invasive non-native plants observed, and their removal/management priority is also located in Section 5.1.1 (Invasive Non-Native Plant Control).

Table 4
INVASIVE NON-NATIVE PLANT SPECIES OF CONCERN
WITHIN THE PROJECT AREA¹

Common Name	Scientific Name
Cal-IPC Ranking High²	
giant reed	<i>Arundo donax</i>
hottentot fig/iceplant	<i>Carpobrotus edulis</i>
poison hemlock	<i>Conium maculatum</i>
Fennel	<i>Foeniculum vulgare</i>
perennial pepperweed	<i>Lepidium latifolium</i>
Tamarisk	<i>Tamarix ramosissima</i>
Cal-IPC Ranking Moderate¹	
Italian thistle	<i>Carduus pycnocephalus</i>
tochalote / star thistle	<i>Centaurea melitensis</i>
Stinkwort	<i>Dittrichia graveolens</i>
garland daisy	<i>Glebionis coronaria</i>
short pod mustard	<i>Hirschfeldia incana</i>

Common Name	Scientific Name
crystalline ice plant	<i>Mesembryanthemum crystallinum</i>
London rocket	<i>Sisymbrium irio</i>
Mexican fan palm	<i>Washingtonia robusta</i>
Cal-IPC Ranking Limited¹	
five-hook bassia	<i>Bassia hyssopifolia</i>
Canary island date palm	<i>Phoenix canariensis</i>
castor bean	<i>Ricinus communis</i>
Russian thistle	<i>Salsola tragus</i>
Peruvian peppertree	<i>Schinus molle</i>
Brazilian peppertree	<i>Schinus terebinthifolius</i>
milk thistle	<i>Silybum marianum</i>

¹ Invasive species to be controlled will be determined on a case-by-case basis depending on the degree of invasiveness, impact, and compatibility with overall project goals.

² Source: Cal-IPC 2020. Overall rating listed for southwest region, factoring impact, invasiveness, distribution, and documentation level.

2.5 KUROSHIO SHOT HOLE BORER AND RESTORATION PRACTICES

The Kuroshio Shot Hole Borer (KSHB; *Euwallacea kuroshio*) belongs to a family of ambrosia beetles that makes tiny holes in trees as part of their life cycle. Although relatives of the beetle were detected a decade earlier, the KSHB was first detected in the TRVRP around 2013. The insect likely originated in Taiwan and quickly became a nuisance pest once it arrived in the United States and TRVRP, with no natural enemies to keep their populations in check.

The KSHB are detrimental to native habitats in the TRVRP because the females of the species carry and transmit a fungus which then flourishes within a host plant. The fungus spreads within the host plant and produces a food source for both adult and larvae of the species. As a way of expanding the fungal food source, the beetles bore throughout the host plant forming “galleries” of fungus. The fungus then inhibits the host plant’s ability to transport water and nutrients throughout the host’s trunk, limbs, and branches, eventually killing the entire tree or causing limb dieback of the affected region. When the host plant health declines and is no longer producing an adequate supply of fungus, the beetles move to a new host plant. Host plants for KSHB are typically mature and stressed native riparian trees commonly found throughout TRVP.

The spread of KSHB and dieback of native tree populations within the Project Area have been well-studied and documented (Boland 2017, 2018, 2019, 2020). The five native tree species most impacted by KSHB include arroyo willow, black willow, red willow, western cottonwood, and California sycamore (Boland 2016). The effects from KSHB infestation in TRVRP were initially alarming because it caused a quick, dramatic collapse of the tall willow canopy in the main riparian corridor nearest Dairy Mart Road Bridge and downstream. Several years later, some areas initially infested with KSHB, native riparian forests have recovered and are nearly indistinguishable from pre-infestation conditions, while other areas lag in recovery since invasive species have outcompeted native species for available resources.

The initial wave of mass KSHB infestation and native tree dieback has subsided, and it is now evident as a cyclical event over the last five-year period. The fifth year of the study revealed a few key observations that will help direct management actions within this HRP (Boland 2020):

- (1) **The KSHB in TRVRP went through a rapid boom-and-bust cycle.** The infestation rates peaked in Fall 2016, and the canopy damage was greatest between 2016 and 2017. The KSHB population decline appears to be due to the KSHB depleting their preferred host trees and not reinvading the recovering host trees. This boom-and-bust cycle occurred naturally, with no management interventions to control the spread or severity of the outbreak.
- (2) **The willow forests that were extensively damaged by the KSHB are responding with vigorous regrowth.** Some of the forests have recovered so much in just four years that they are now similar to their pre-KSHB stature.
- (3) **The KSHB has not substantially reinfested the recovering willow forests.** After the peak of KSHB infestations, only three percent of mature trees, two percent of the resprouting trees, one percent of the young trees, and none of the seedlings were infested with KSHB in 2019.
- (4) **The invasive non-native plant, *giant reed*, is now a major problem.** Willow trees are giant reed's only competitors in the valley, and when the KSHB attacked and heavily damaged the willows, it allowed giant reed to flourish more than ever before.

Furthermore, the Year 5 report by Boland provides two recommended management actions for recovery of native habitats throughout TRVRP; these include (1) aggressive management of giant reed to allow for the natural restoration of riparian forests; and (2) despite current management actions, infested trees should not be removed as a means to curb KSHB spread. Instead, heavily infested trees were found to be able to withstand heavy infestations and survive and/or resprout.

With regards to these findings, trees infested with KSHB should be left in place. If the trees ultimately die, they will serve as snags for birds, and if they recover, they will add to the native diversity of TRVRP. The damaged trees additionally responded by resprouting, with less than 10 percent of resprouts observed to show signs of KSHB infestation (Boland 2018). Control of KSHB at the onset of signs of infestation would prevent large-scale re-infestation and spread of the infestation. If trimming of dead limbs is warranted treatment of invasive non-native stands (Section 4.4.4), then all cut material should be left on-site. As part of Best Management Practices (BMPs), tools used to cut limbs would also be disinfected with 70 percent ethanol, 5 percent bleach solution, or Lysol cleaning solution, prior to re-use to prevent the spread of the pest (UCANR 2020, UCIPM 2021).

3.0 PROJECT IMPACTS

Impacts associated with this restoration project are anticipated to be temporary in nature and would result from those activities deemed necessary to implement the restoration prescriptions included in this HRP and subsequent Execution Plans. The impacts described in this HRP are inclusive of all impacts to be detailed in subsequent Execution Plans, and the Execution Plans will not contain impacts to new areas not covered in this HRP.

Direct impacts may occur during construction as a result of mechanized and non-mechanized removal and trimming of vegetation, including both native and non-native vegetation, in order to safely access and treat target locations of non-native species. Direct impacts may also occur as a result of re-construction/restoring natural contours and flow patterns once non-native vegetation is removed, including impacts to areas adjacent to treatment locations that may require modification to ensure hydrologic connectivity of the restoration area. Potential indirect impacts may occur during construction

and post-construction activities, including those associated with water quality (e.g., erosion, sedimentation, pollutant release from mechanized equipment), noise, fugitive dust, and inadvertent attraction and/or spread of non-native invasive and pest species.

Implementation of the HRP is specifically planned to avoid direct impacts to special status species. Sensitive species known to occur within the anticipated Project Area include those listed in Section 2.2, Figures 8a-f, and Figures 9a-f. Although direct impacts are planned to be avoided, inadvertent indirect impacts could occur if certain removal and maintenance activities are undertaken adjacent to the species' locations and/or during the species' breeding seasons. Execution Plan development would include identification of special status species known to occur within each of the proposed project phases based on the descriptions and mapping contained in the 2018 TRVRP baseline biodiversity study and 2021 focused species surveys and will include avoidance and minimization measures for those impacts. If additional sensitive species surveys are recommended as a minimization and avoidance measure, these surveys may be conducted as a pre-construction activity (Section 4.3.1).

Implementation of the HRP is also intended to avoid permanent impacts and minimize the temporal loss of sensitive resources (i.e., waters, wetlands, and sensitive natural communities, rare plant and wildlife species individuals/habitats) as a result of invasive plant species removal and maintenance activities. Sensitive aquatic (i.e., jurisdictional) resources known to occur within the Project Area include those listed in Section 2.3 and depicted on Figure 4 of this Plan, sensitive vegetation communities are presented on Figures 7a-f, and rare plant and wildlife species individuals include those listed in Section 2.2.9 and depicted on Figures 8a-f and 9a-f. This HRP identifies the general potential impact areas and places limits on the amount of jurisdictional aquatic resources that can be impacted over the entire project footprint (Table 5, *Impacts to Potential Jurisdictional Resources within the Project Area*).

Table 5
IMPACTS TO POTENTIAL JURISDICTIONAL RESOURCES WITHIN THE PROJECT AREA¹

Resource	Resource Agency Jurisdiction (acres)			
	USACE	RWQCB	CDFW	CCC
Wetland				
Phase 1	7.83	7.83	8.43	8.43
Phase 2	8.81	8.81	9.72	9.72
Phase 3	4.17	4.17	4.17	4.17
Phase 4	98.41	98.41	104.18	104.18
Phase 5	--	--	2.10	2.10
Phase 6	0.04	0.04	0.71	0.71
Phase 7	21.27	21.27	22.60	22.60
Phase 8	1.85	1.85	4.32	4.32
Phase 9	6.00	6.00	9.14	9.14
Phase 10	0.90	0.90	0.91	0.91
Phase 11	2.42	2.42	6.87	6.87
Phase 12	--	--	1.35	1.35
<i>Subtotal</i>	<i>151.70</i>	<i>151.70</i>	<i>174.50</i>	<i>174.50</i>
Non-Wetland				
Phase 1	--	--	--	--
Phase 2	--	--	--	--
Phase 3	--	--	--	--
Phase 4	--	--	--	--
Phase 5	--	--	--	--

Resource	Resource Agency Jurisdiction (acres)			
	USACE	RWQCB	CDFW	CCC
Phase 6	--	--	--	--
Phase 7	--	--	--	--
Phase 8	--	--	--	--
Phase 9	--	--	--	--
Phase 10	--	--	--	--
Phase 11	--	--	--	--
Phase 12	--	--	--	--
<i>Subtotal</i>	--	--	--	--
TOTAL	151.70	151.70	174.50	174.50

¹ Areas are presented in acre(s) rounded to the nearest 0.01.

USACE = U.S. Army Corps of Engineers; RWQCB = Regional Water Quality Control Board; CDFW = California Department of Fish and Wildlife; CCC = California Coastal Commission.

Similarly, implementation of the HRP is specifically planned to avoid direct impacts to sensitive cultural resources. Sensitive cultural resources known to occur within the Project Area would be identified in the Cultural Resources Assessment described in Section 4.2.3. Execution Plan development would include the identification of cultural resources within each of the proposed phases based on previous cultural resource surveys and descriptions and maps obtained from the South Coastal Information Center and include avoidance and mitigation measures for those impacts such as the implementation of a cultural resource monitoring program.

4.0 HABITAT RESTORATION AND REVEGETATION METHODS

TRVRP supports a dynamic and diverse system. In addition to supporting a multitude of habitats, environmental conditions can vary significantly during any single year, as well as between years. The variability that makes this system unique and special is also the variability that makes restoration planning challenging. As stated previously, the goal of this plan is to provide a framework of habitat restoration prescriptions to be applied to a variety of situations in the Project Area, accounting for both general landscape variability as well as seasonal variability. The flow chart described below may be applied by Execution Plans in the Project Area, based on baseline biological data as well as a working knowledge of seasonal conditions.

As project phases are identified, the landscape conditions present in that phase of work will be identified, and the prescriptions corresponding to those landscape conditions will be applied. A second level of prescription is provided to accommodate for seasonally present conditions, such as flooding or nesting birds. The forum for the accumulation of the proper prescriptions will be an Execution Plan. An Execution Plan will be prepared and approved by DPR prior to beginning any new phase of work. If the Execution Plan is consistent with the prescriptions included in this document, no further Resource Agency approval is required. If the Execution Plan deviates from the prescription provided here, additional Resource Agency approval may be needed.

The following flow chart (Table 6, Flow Chart Listing Step-by-Step Process for Implementation of this HRP) and treatment matrix (Table 7, Restoration Measures and Considerations for Implementation) summarize the restoration activities described in the sections that follow and the considerations for treatments to be prescribed in Execution Plans that will be developed as each Phase is funded. A “Yes”

response in Table 7 indicates that the non-native control method could be used given the constraint, while a “No” response indicates that the treatment method would not be used given the constraint. The estimated cost per acre of the individual restoration activities is included in Appendix B.

Table 6
FLOW CHART LISTING STEP-BY-STEP PROCESS FOR IMPLEMENTATION OF THIS HRP

Flow Chart Listing Step-by-Step Process for Implementation of this HRP	
Project Identification/ Phasing	Ongoing, Dependent on funding Site Characterization/ Baseline Surveys
Execution Plan development	Within 60 days of project Identification/ Phase development
Pre-Restoration Implementation Activities	
Vegetation Impact Avoidance and Minimization	Prior to contractor mobilization and throughout construction phase
Soil and Plant Salvage and Storage	Plants: Spring or Fall (or as proper for target species) Soil: At site grading initiation
Restoration Implementation Activities	
Trash and Debris Removal	Prior to soil work or planting activities
Weed Removal	Spring/Summer (or as proper for target species)
Soil Decompaction	Prior to planting or seeding
Soil Recontouring	Prior to planting or seeding
Spread of Salvaged Topsoil	Prior to planting or seeding
Seeding	Fall/Winter
Nursery Stock Planting	Fall/Winter
Watering	In conjunction with planting, and as needed throughout establishment and maintenance period
Erosion Control	Fall/Winter/Spring as needed
Post- Implementation Maintenance Activities	
Weed Removal	Spring/Summer (or as proper for target species) as needed
Erosion Control	Fall/Winter/Spring as needed
Watering	As needed in planted areas only for plant establishment

Table 7
RESTORATION MEASURES AND CONSIDERATIONS FOR IMPLEMENTATION¹

Prescriptive conditions	Herbicide treatment	Hand removal	Mowing	Mechanized clearing	Topographic modifications	Planting	Seeding	Erosion control	Solarization
Constraint	Primary (year-round)								
Cultural Resource Site	Yes	Yes	Yes	Buffer	Buffer	Monitor	Yes	Yes	Yes
Sensitive Wildlife Species Presence	Yes	Yes	Buffer	Buffer	Buffer	Yes	Yes	Yes	Buffer
Invasive Non-native pest (i.e., insect/pathogen)	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Existing Sensitive Vegetation	Yes	Yes	Yes	Buffer	Buffer	Yes	Yes	Yes	No

Prescriptive conditions	Herbicide treatment	Hand removal	Mowing	Mechanized clearing	Topographic modifications	Planting	Seeding	Erosion control	Solarization
Limited Access	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes
Public access	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Active flow areas (Ordinary High Water Mark present)	Yes	Yes	Buffer	Yes	Yes	Yes	Yes	No	No
Constraint	Secondary (seasonally present)								
Nesting Birds	Yes	Yes	Buffer	Buffer	Buffer	Yes	Yes	Yes	Yes
Saturated soils	Yes	Yes	No	No	No	No	No	No	No
Contaminated water	Yes	No	No	No	No	No	No	No	No

¹ Certain activities may be allowed with established buffers that will ensure protection of the resource being buffered. Through development of Execution Plans, buffers may be identified for an activity that would yield desired results if site constraints are present.

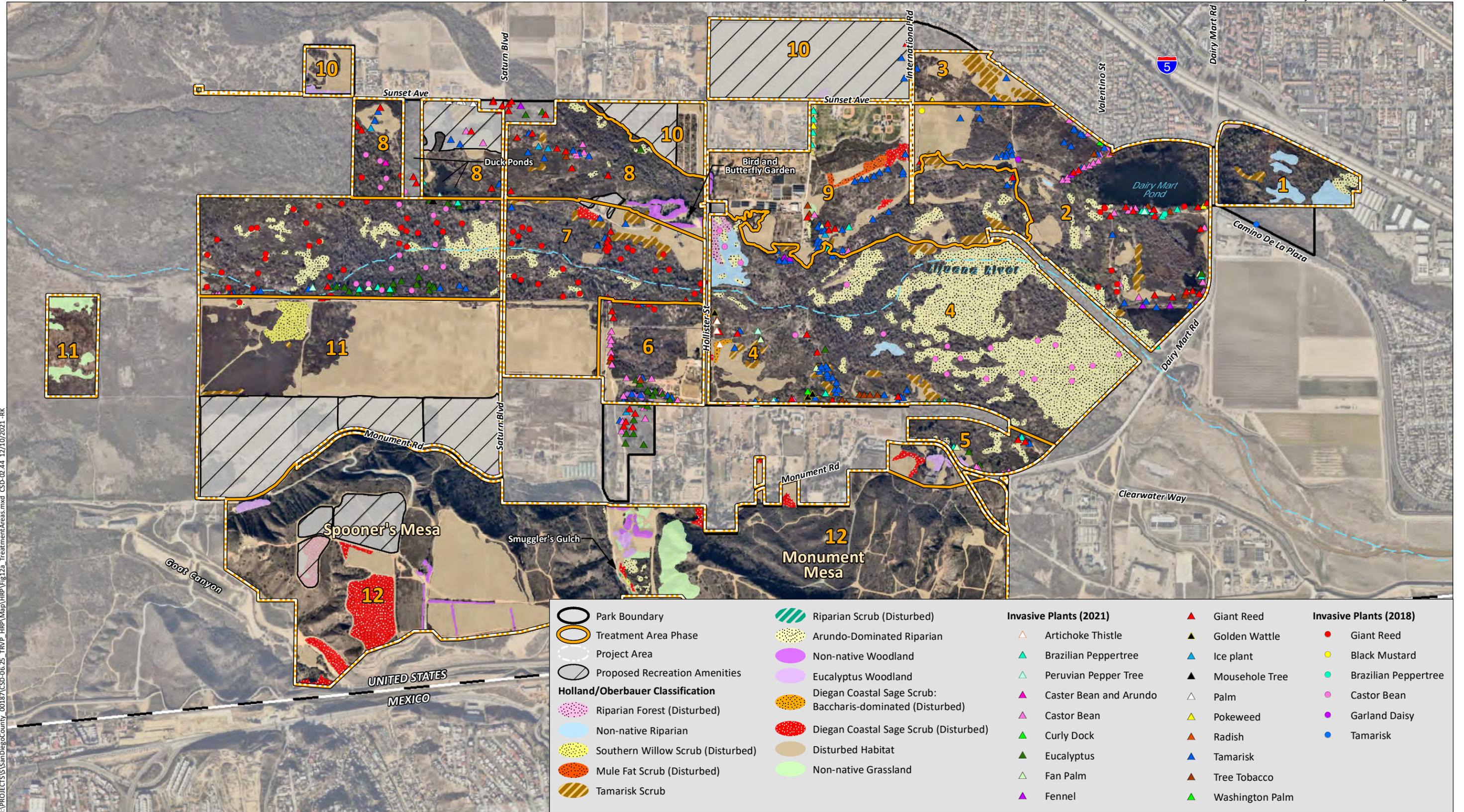
4.1 PHASE PRIORITIZATION

Due to the size of the Project Area, it is unlikely that the restoration would occur within the entirety of the system in a single event under one Execution Plan, rather the Project will be broken into phases with specific Execution Plans, based on a variety of conditions such as timing, funding availability, or capacity of County staff.

Sites identified for restoration activities will be prioritized based on a phase’s overall ecological benefit that will achieve the greatest project objectives, whether it be invasive species control, water quality, sensitive species habitat, or connectivity to adjacent resources. A restoration site may further be prioritized based on stakeholder preferences and partnerships, site access, land ownership, position in the watershed, habitat type and adjacency to sensitive resources, expansion of sensitive resource habitats, relative cost for implementation and maintenance, and other factors. In general, it would be most beneficial to initiate activities that are positioned furthest upstream, so they are not later disrupted by subsequent projects under this program.

4.2 PHASE-SPECIFIC PLANNING ACTIVITIES

The Project Area proposed by this HRP includes twelve potential phases covering 1,740.75 acres, from which specific Execution Plans will be developed in accordance with this HRP and approved by DPR prior to execution (Figures 12a-f, *Treatment Areas*). Within these twelve phases, 587.93 acres of disturbed and invasive non-native habitats may be treated and restored into native habitats. Additionally, within these twelve phases, 7.24 acres of invasive species point locations occurring within native habitat will be treated and restored into native habitats. These phased projects may be subdivided into smaller phases, or merged, as budgets and prioritization allow and based on current site conditions. Phase boundaries may also be modified if a significant biological, cultural, or other resource is discovered during pre-construction surveys (Section 4.3.1) that would need to be permanently or temporarily avoided. These potential phased projects are provided in no particular order, but initially, there would be a preference to implement these projects from upstream to downstream if there is an anticipated lag time (more



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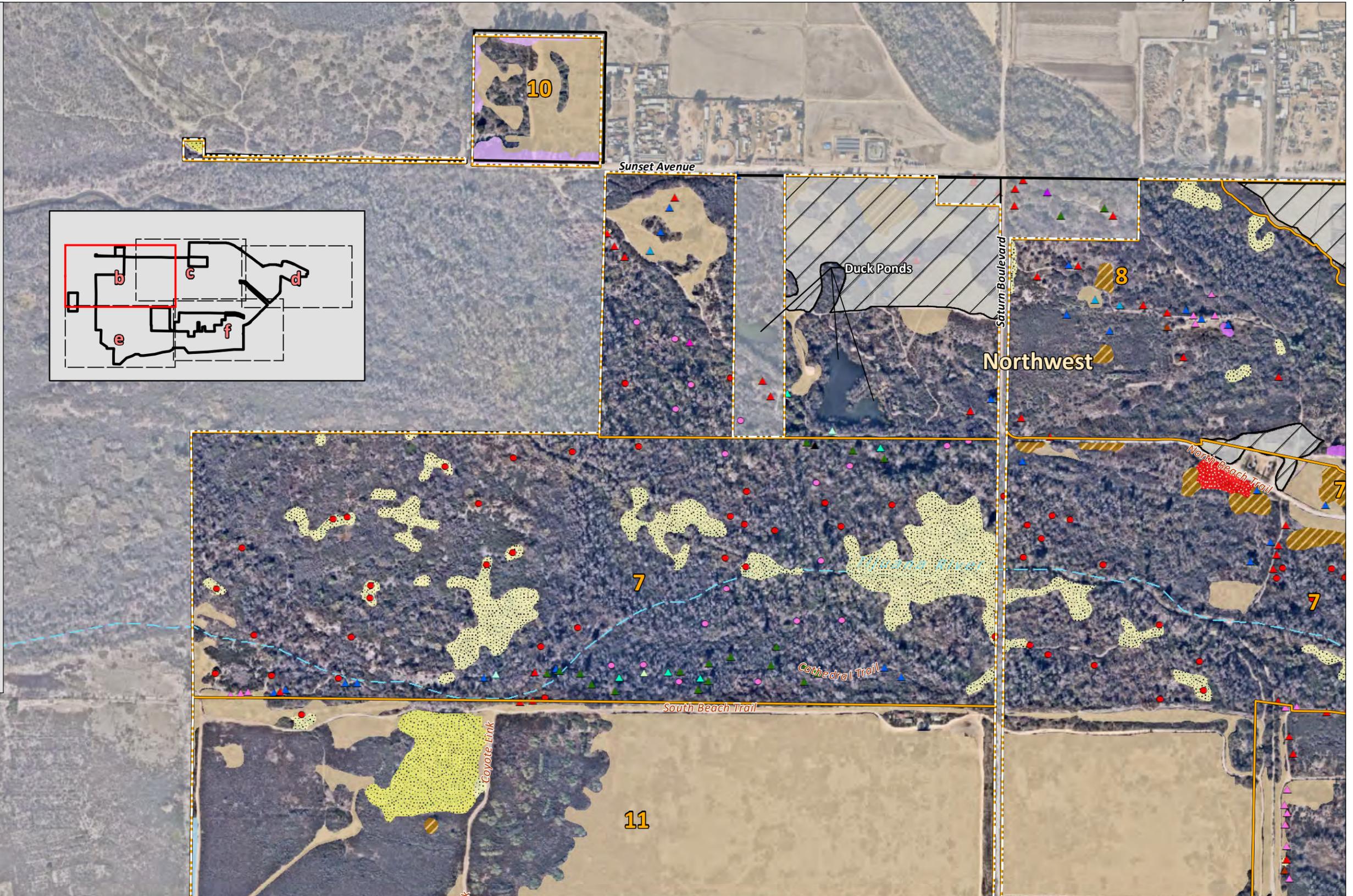
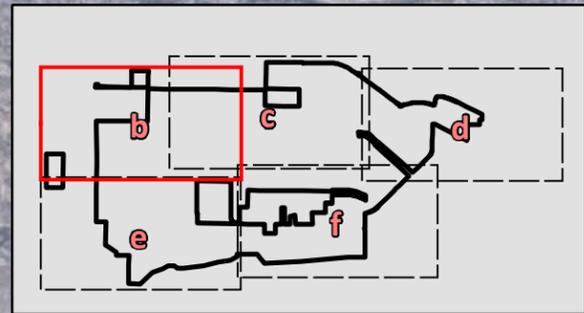


Aerial Photo: Nearmap 2021

Treatment Areas

Figure 12a

- Park Boundary
- Treatment Area Phase
- Project Area
- Proposed Recreation Amenities
- Holland/Oberbauer Classification**
- Non-native Riparian
- Southern Willow Scrub (Disturbed)
- Tamarisk Scrub
- Arundo-Dominated Riparian
- Non-native Woodland
- Eucalyptus Woodland
- Diegan Coastal Sage Scrub (Disturbed)
- Disturbed Habitat
- Non-native Grassland
- Invasive Plants (2018)**
- Giant Reed
- Castor Bean
- Invasive Plants (2021)**
- Brazilian Peppertree
- Peruvian Pepper Tree
- Caster Bean and Arundo
- Castor Bean
- Eucalyptus
- Fan Palm
- Fennel
- Giant Reed
- Ice plant
- Mousehole Tree
- Palm
- Tamarisk
- Tree Tobacco



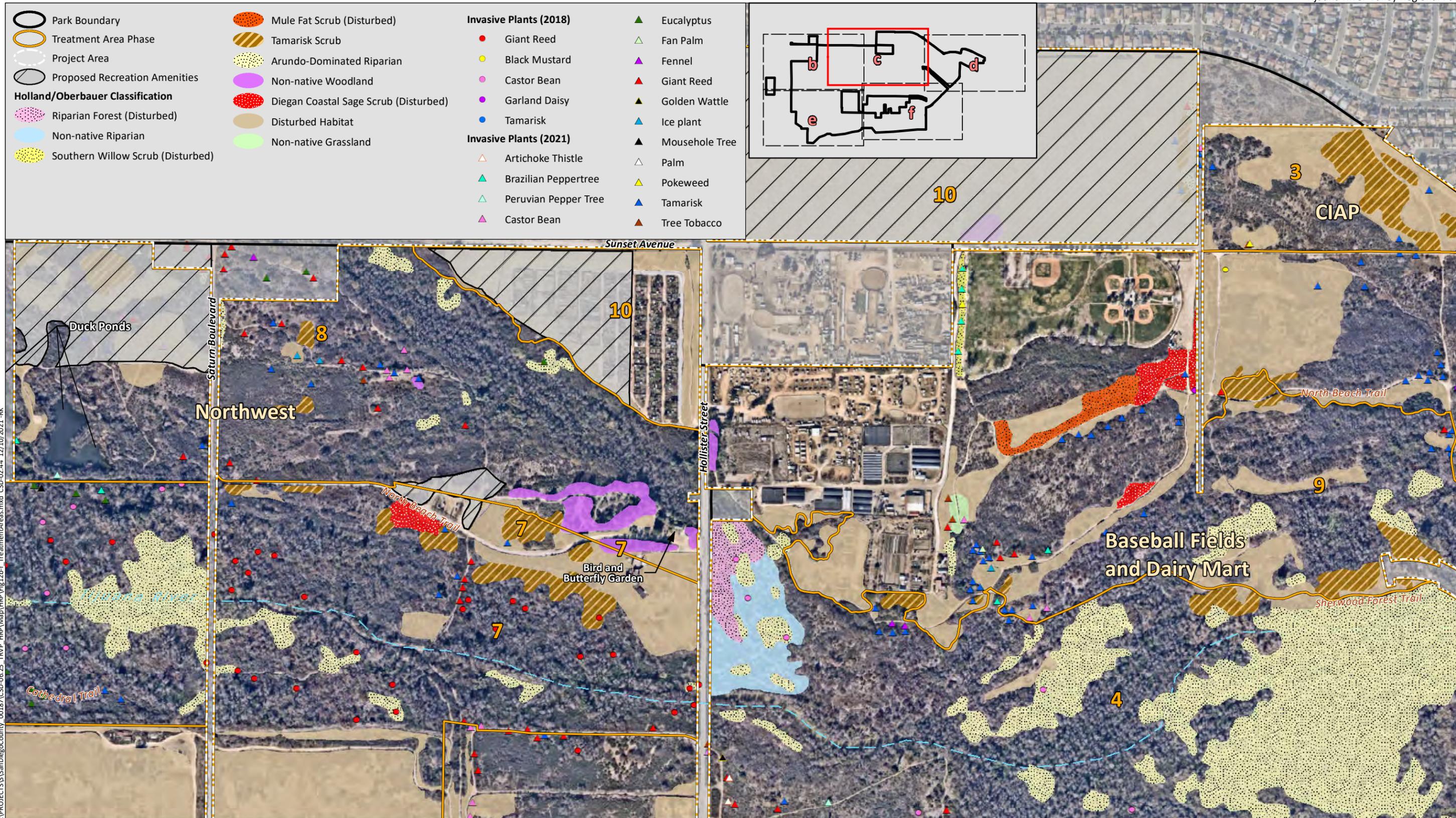
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Aerial Photo: Nearmap 2021



Treatment Areas

Figure 12b



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Aerial Photo: Nearmap 2021



Treatment Areas

Figure 12c



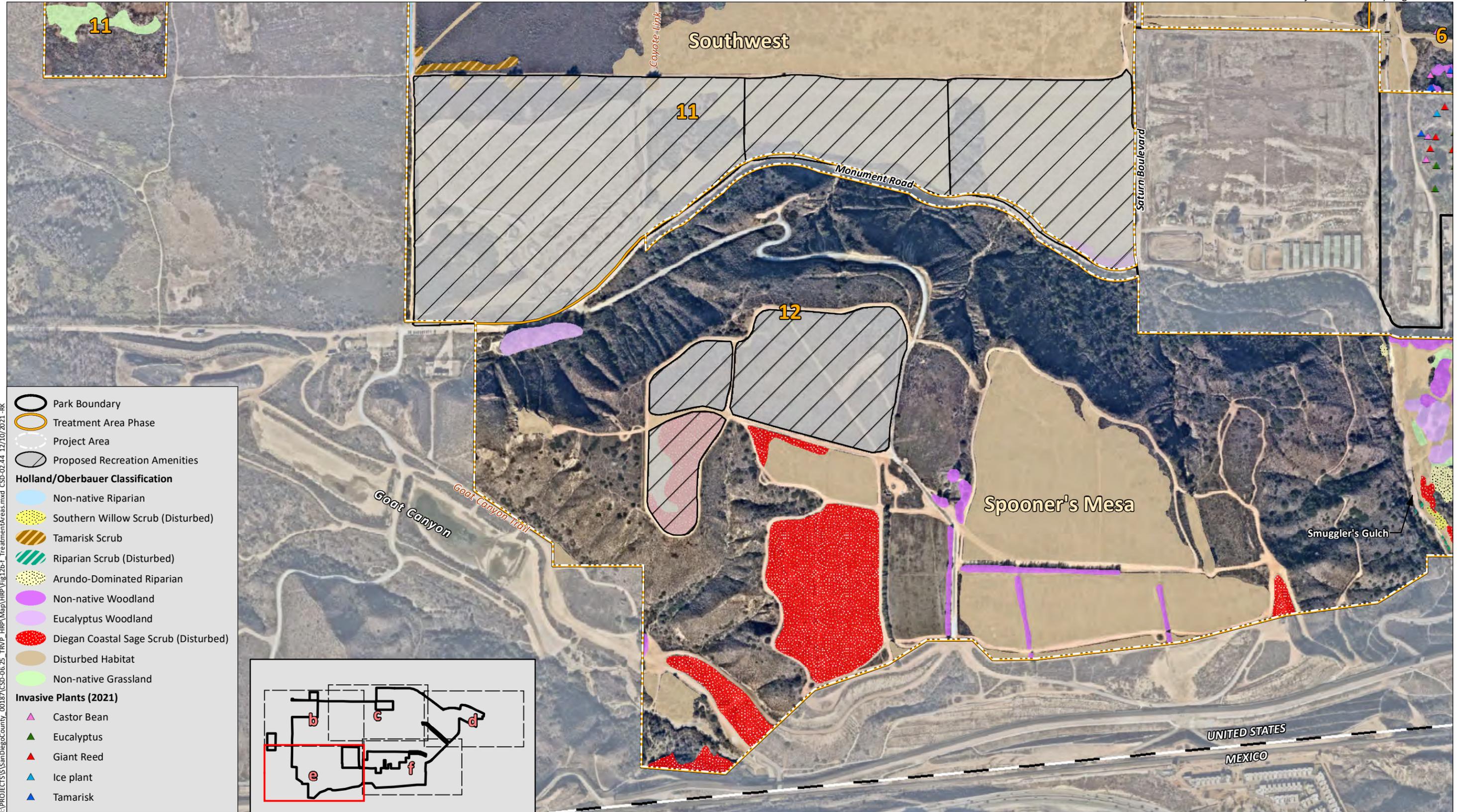
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Aerial Photo: Nearmap 2021

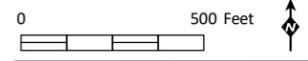


Treatment Areas

Figure 12d

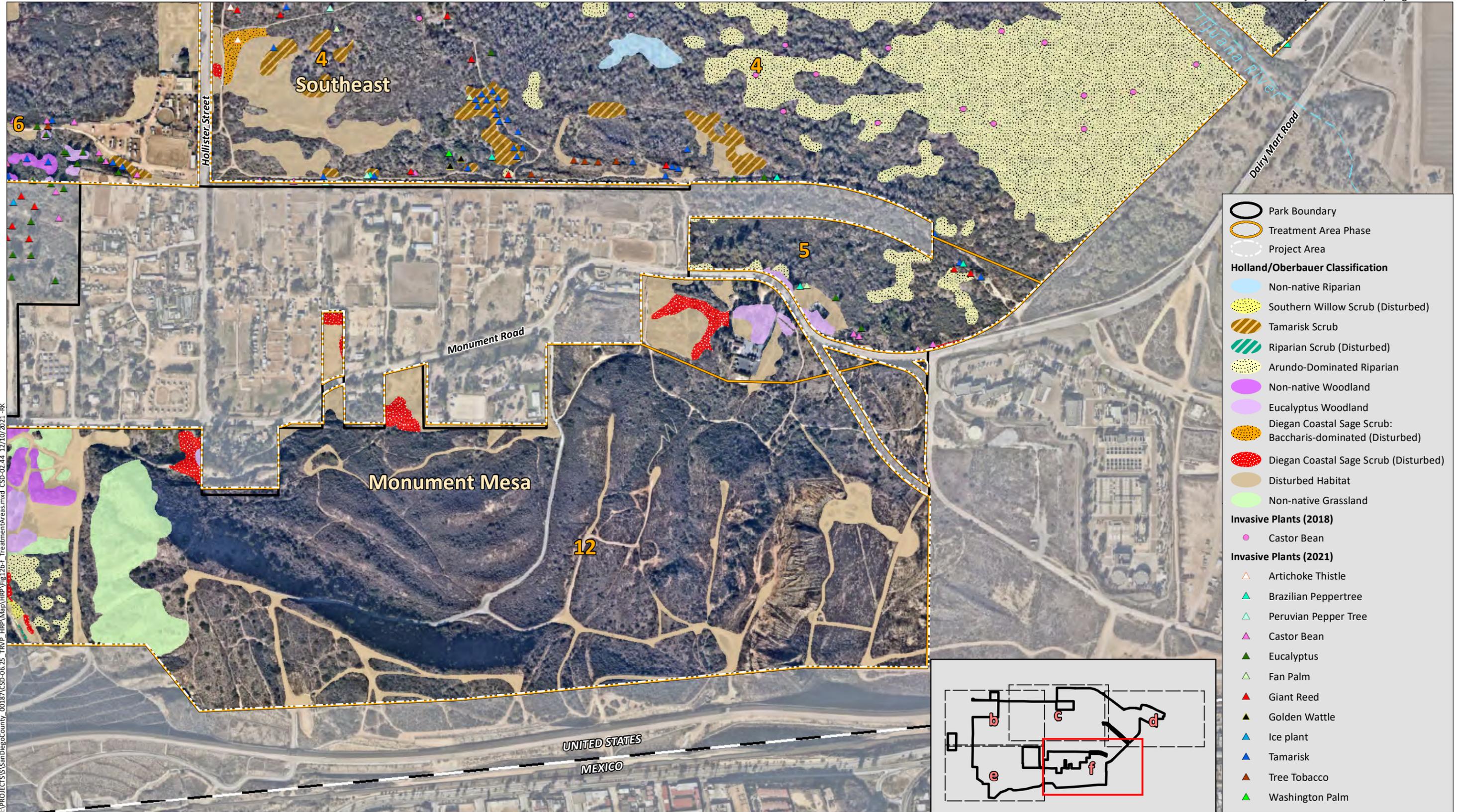


Aerial Photo: Nearmap 2021



Treatment Areas

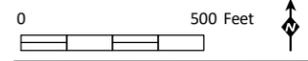
Figure 12e



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- Park Boundary
- Treatment Area Phase
- Project Area
- Holland/Oberbauer Classification**
- Non-native Riparian
- Southern Willow Scrub (Disturbed)
- Tamarisk Scrub
- Riparian Scrub (Disturbed)
- Arundo-Dominated Riparian
- Non-native Woodland
- Eucalyptus Woodland
- Diegan Coastal Sage Scrub: Baccharis-dominated (Disturbed)
- Diegan Coastal Sage Scrub (Disturbed)
- Disturbed Habitat
- Non-native Grassland
- Invasive Plants (2018)**
- Castor Bean
- Invasive Plants (2021)**
- Artichoke Thistle
- Brazilian Peppertree
- Peruvian Pepper Tree
- Castor Bean
- Eucalyptus
- Fan Palm
- Giant Reed
- Golden Wattle
- Ice plant
- Tamarisk
- Tree Tobacco
- Washington Palm

Aerial Photo: Nearmap 2021



Treatment Areas

Figure 12f

than five years) between the implementation of all phases. A matrix identifying key elements of each phase and prioritization components are included in Table 8, *Potential Project Phases and Elements*. A general summary of each proposed phase is included below. Locations of special status plant and animal species observed on-site during the 2018 biodiversity study (HELIX 2019) and 2021 focused species surveys are depicted on Figures 8a-f and 9a-f.

(1) **Location:** Upstream of Dairy Mart Road.

Size: 35.47 acres; 9.30 acres of invasive weed removal within Arundo-dominated and non-native riparian habitats as well as localized populations of eucalyptus and tamarisk.

Invasive Non-Native Target Species: Giant reed, salt cedar, eucalyptus, Brazilian peppertree, non-native invasive annual species.

Constraints: This area is entirely fenced and can be accessed along the southern border from Camino de la Plaza.

Special status plant species were not observed upstream of Dairy Mart Road during the 2018 biodiversity study and 2021 focused species surveys. Special status animal species observed during the 2018 biodiversity study and 2021 focused species surveys in this area included least Bell's vireo (FE, SE, County Group 1, MSCP Covered), Cooper's hawk (WL, County Group 1, MSCP Covered), red-shouldered hawk (County Group 1), turkey vulture (County Group 1), and yellow warbler (BCC, SSC, County Group 2).

Restoration Strategy: Hand removal of small stands, container planting, herbicide treatments of isolated individuals.

(2) **Location:** Downstream of Dairy Mart Road bridge and north of the South Bay Reclamation Plant property cut out.

Size: 154.98 acres; 39.83 acres of invasive weed removal in both upland (29.93 acres) and riparian (9.90 acres) habitat types.

Invasive Non-Native Target Species: Giant reed, tamarisk, salt cedar, castor bean, eucalyptus, tree tobacco, mustards, garland daisy, non-native invasive annual species.

Constraints: Access occurs from Dairy Mart Road, where two separate six-foot multi-use trails lead west.

No federal or State listed plant species were observed within this area during the 2018 biodiversity study. The following special status plant species were observed in this area: single-whorl burrobrush (CRPR 2B.2) and San Diego marsh elder (CRPR 2B.2, County List B).

Federally or State listed special status animal species observed during the 2018 biodiversity study and 2021 focused species surveys in this area included least Bell's vireo (FE, SE, County Group 1, MSCP Covered), yellow warbler (BCC, SSC, County Group 2), yellow-breasted chat (SSC), Cooper's hawk (WL, County Group 1, MSCP Covered), double-crested cormorant (WL, County Group 2), western mastiff bat (SSC, County Group 1), American white pelican (SSC, County Group 2), western red bat (SSC, County Group 2), and white-tailed kite (FP, County

Group 2). Additional special status species observed in this area included barn owl (County Group 2), gadwall (County Group 2), great blue heron (County Group 2), green heron (County Group 2), turkey vulture (County Group 1), western bluebird (County Group 2, MSCP Covered), and Yuma myotis (County Group 2).

Restoration Strategy: Hand removal of small stands and mowing (mastication) of contiguous large accessible stands, container planting, herbicide treatments of isolated individuals.

(3) **Location:** East of International Road and North of Sunset Avenue (CIAP area).

Size: 21.55 acres; 12.14 acres of invasive weed removal within upland (8.00 acres) and riparian (4.14 acres) habitat types.

Invasive Non-Native Target Species: Salt cedar, mustards, garland daisy, non-native invasive annual species.

Constraints: Access occurs from the eastern terminus of Sunset Avenue, where a six-foot multi-use trail leads west into the CIAP area.

No federal or State listed plant species were observed within this area during the 2018 biodiversity study. The following special status plant species were observed in this area: San Diego marsh elder (CRPR 2B.2, County List B).

Federally or State listed special status animal species observed during the 2018 biodiversity study and 2021 focused species surveys in this area included least Bell's vireo (FE, SE, County Group 1, MSCP Covered), yellow warbler (BCC, SSC, County Group 2), yellow-breasted chat (SSC), white-tailed kite (FP, County Group 2), and American white pelican (SSC, County Group 2). No additional special status species were observed in this area.

Restoration Strategy: Hand removal of small stands and mowing (mastication) of contiguous large accessible stands, container planting, herbicide treatments of isolated individuals.

(4) **Location:** Central eastern portion of Project Area, main river channel.

Size: 253.52 acres: 116.87 acres of invasive weed removal within upland (12.59 acres) and riparian (104.28 acres) habitat types.

Invasive Non-Native Target Species: Giant Reed, salt cedar, Brazilian peppertree, Peruvian peppertree, Mexican fan palm, eucalyptus, castor bean, non-native invasive annual species.

Constraints: Access occurs from Dairy Mart Road, where a single six-foot multi-use trail leads west, and from Hollister Street, where a single six-foot multi-use trail leads east.

No federal or State listed plant species were observed within this area during the 2018 biodiversity study and 2021 focused species surveys. The following special status plant species were observed in this area: San Diego marsh elder (CRPR 2B.2, County List B), single-whorl burrobrush (CRPR 2B.2), and San Diego sagewort (CRPR 4.2, County List D).

Federally or State listed special status animal species observed during the 2018 biodiversity study and 2021 focused species surveys in this area included least Bell’s vireo (FE, SE, County Group 1, MSCP Covered), yellow warbler (BCC, SSC, County Group 2), yellow-breasted chat (SSC), northern harrier (SSC, County Group 1, MSCP Covered), white-tailed kite (FP, County Group 2), and Cooper’s hawk (WL, County Group 1, MSCP Covered). Additionally, turkey vulture (County Group 1) and red-shouldered hawk (County Group 1) were observed in this area during the 2018 biodiversity study and 2021 focused species surveys.

Restoration Strategy: Mowing (mastication) large stands, hand removal of isolated populations, topographic recontouring, revegetation with container plantings.

(5) **Location:** North of Monument Road and south of the trail.

Size: 30.41 acres; 9.61 acres of invasive weed removal in both upland (7.48 acres) and riparian (2.13 acres) habitat types.

Invasive Non-Native Target Species: Giant reed, salt cedar, eucalyptus, Brazilian peppertree, castor bean, Mexican fan palm, non-native invasive annual species.

Constraints: Access occurs from Dairy Mart Road, where a single six-foot multi-use trail leads west.

No federal, State, or other listed special status plant species were observed within this area during the 2018 biodiversity study and 2021 focused species surveys. One special status plant species was observed in this area: single-whorl burrobrush (CRPR 2B.2).

Federally or State listed special status animal species observed during the 2018 biodiversity study and 2021 focused species surveys in this area included least Bell’s vireo (FE, SE, County Group 1, MSCP Covered), yellow warbler (BCC, SSC, County Group 2), yellow-breasted chat (SSC), and Cooper’s hawk (WL, County Group 1, MSCP Covered). Additionally, turkey vulture (County Group 1) and red-shouldered hawk (County Group 1) were observed in this area during 2021 focused species surveys.

Restoration Strategy: Hand removal of small stands, remove or girdle large trees and remove new saplings, container planting, herbicide treatments of isolated individuals.

(6) **Location:** West of Hollister Avenue, east of Arroyo Cañon Matadero, to main riparian corridor.

Size: 42.21 acres of mostly riparian habitat with 8.39 acres of invasive species in both upland (7.70 acres) and riparian (0.69 acre) habitat types.

Invasive Non-Native Target Species: Giant reed, salt cedar, eucalyptus, tree tobacco, garland daisy, non-native invasive annual species.

Constraints: Access occurs from Hollister Street, where a single six-foot multi-use trail and a single four-foot multi-use trail lead west. Additionally, a six-foot multi-use trail leads south into this area from the Bird and Butterfly Gardens.

No federal, State, or other listed special status plant species were observed within this area during the 2018 biodiversity study and 2021 focused species surveys. One special status plant species was observed in this area: single-whorl burrobrush (CRPR 2B.2).

Federally or State listed special status animal species observed during the 2018 biodiversity study and 2021 focused species surveys in this area included least Bell’s vireo (FE, SE, County Group 1, MSCP Covered) and yellow warbler (BCC, SSC, County Group 2). No other special status animal species were observed in this area.

Restoration Strategy: Hand removal of small stands, remove or girdle large trees and remove new saplings, container planting, herbicide treatments of isolated individuals.

(7) **Location:** Central western portion of Project Area, main riparian corridor.

Size: 223.13 acres; 57.93 acres of invasive weed removal in both upland (34.90 acres) and riparian (23.03 acres) habitat types.

Invasive Non-Native Target Species: Giant reed, salt cedar, castor bean, Brazilian peppertree, mousehole tree, mustards, non-native invasive annual species.

Constraints: Access occurs from Hollister Street, where a single six-foot multi-use trail leads south from the Bird and Butterfly Garden. Additionally, a six-foot multi-use trail leads south into this area from Saturn Boulevard.

No federal or State listed plant species were observed within this area during the 2018 biodiversity study and 2021 focused species surveys. The following special status plant species were observed in this area: single-whorl burrobrush (CRPR 2B.2), San Diego sagewort (CRPR 4.2, County List D), southwestern spiny rush (CRPR 4.2, County List D), and Torrey pine (CRPR 1B.2, MSCP Covered).

Federally or State listed special status animal species observed during the 2018 biodiversity study and 2021 focused species surveys in this area included least Bell’s vireo (FE, SE, County Group 1, MSCP Covered), yellow warbler (BCC, SSC, County Group 2), and yellow-breasted chat (SSC). Additionally, red-shouldered hawk (County Group 1), barn owl (County Group 2), were observed in this area during the 2018 biodiversity study and 2021 focused species surveys.

Restoration Strategy: Mowing (mastication) large stands, hand removal of isolated populations, topographic modification, revegetation with container plantings. A small portion (0.37-acre) of this phase, mapped as “disturbed habitat”, is located along the North Beach Trail and west of the existing Bird and Butterfly Garden has been identified in the TRVRP Feasibility Study (AEOM 2017) as a potential site as a rentable venue facility (a majority of this feature is located in Phase 8). Any planned restoration activity within this phase should coordinate with County DPR to ensure it does not conflict with any planned future development.

(8) **Location:** West of 19th street, south of Sunset Ave to main riparian corridor.

Size: 112.19 acres total, with approximately 3.0 acres identified in the 2017 Feasibility Study as a potential rentable venue; 19.31 acres of invasive weed removal within upland (14.79 acres) and riparian (4.61 acres) habitat types, including scattered invasive weed point locations.

Invasive Non-Native Target Species: Giant reed, eucalyptus, salt cedar, garland daisy, non-native invasive annual species.

Constraints: Access occurs from Saturn Boulevard, where a single six-foot multi-use trail leads south. Additionally, six-foot and four-foot multi-use trails lead south into this area from Sunset Avenue.

No federal or State listed plant species were observed within this area during the 2018 biodiversity study and 2021 focused species surveys. The following special status plant species were observed in this area: single-whorl burrobrush (CRPR 2B.2), San Diego sagewort (CRPR 4.2, County List D), southwestern spiny rush (CRPR 4.2, County List D), San Diego marsh elder (CRPR 2B.2, County List B), Southern California black walnut (CRPR 4.2, County List D), and Torrey pine (CRPR 1B.2, County List A, MSCP Covered).

Federally or State listed special status animal species observed during the 2018 biodiversity study and 2021 focused species surveys in this area included least Bell's vireo (FE, SE, County Group 1, MSCP Covered), yellow warbler (BCC, SSC, County group 2), yellow-breasted chat (SSC), Lawrence's goldfinch (BCC), Cooper's hawk (WL, County Group 1, MSCP Covered), northern harrier (SSC, County Group 1, MSCP Covered), double-crested cormorant (WL, County Group 2), Belding's orange-throated whiptail (WL, County Group 2, MSCP Covered), Baja California coachwhip (SSC), Blainville's horned lizard (SSC, County Group 2, MSCP Covered), western red bat (SSC, County Group 2). Additionally, barn owl (County Group 2), red-shouldered hawk (County Group 2), Yuma myotis (County Group 2), and monarch (County Group 1) were observed in this area during the 2018 biodiversity study and 2021 focused species surveys.

Restoration Strategy: Hand removal of small stands, remove or girdle large trees and remove new saplings, container planting, herbicide treatments of isolated individuals. Portions of this phase located along the North Beach Trail and west of the existing Bird and Butterfly Garden have been identified in the TRVRP Feasibility Study (AEOM 2017) as a potential site as a rentable venue facility. Within this planned facility, there are 1.47 acres of non-native invasive species and another 4.88 acres of disturbed habitat. Any planned restoration activity within this phase should coordinate with County DPR to ensure it does not conflict with any planned future development.

(9) **Location:** South of ballfields between Hollister Avenue and Dairy Mart Pond.

Size: 125.72 acres; 28.88 acres of invasive weed removal in both upland (19.20 acres) and riparian (9.68 acres) habitat types.

Invasive Non-Native Target Species: Brazilian peppertree, castor bean, Mexican fan palm, garland daisy, mustards, giant reed, salt cedar, non-native invasive annual species.

Constraints: Access occurs from Sunset Avenue and International Road, where multiple six-foot and four-foot multi-use trails lead into the area.

No federal or State listed plant species were observed within this area during the 2018 biodiversity study or 2021 focused species surveys. The following special status plant species were observed in this area: single-whorl burrobrush (CRPR 2B.2), San Diego sagewort (CRPR 4.2,

County List D), southwestern spiny rush (CRPR 4.2, County List D), Torrey pine (CRPR 1B.2, County List A, MSCP Covered), and San Diego marsh elder (CRPR 2B.2, County List B).

Federally or State listed special status animal species observed during the 2018 biodiversity study and 2021 focused species surveys in this area included least Bell's vireo (FE, SE, County Group 1, MSCP Covered), yellow warbler (BCC, SSC, County Group 2), yellow-breasted chat (SSC), northern harrier (SSC, County Group 1, MSCP Covered), white-tailed kite (FP, County Group 2), Cooper's hawk (WL, County Group 1, MSCP Covered), and Belding's orange-throated whiptail (WL, County Group 2, MSCP Covered). Additionally, red-shouldered hawk (County Group 2) and turkey vulture (County Group 1) were observed in this area during the 2018 biodiversity study and 2021 focused species surveys.

Restoration Strategy: Hand removal of small stands, remove or girdle large trees and remove new saplings, container planting, herbicide treatments of isolated individuals.

(10) **Location:** West of International Road, north of Sunset Avenue.

Size: 95.13 acres total, with 64 acres planned for a future Active Recreation Complex; 9.2 acres planned for a potential Community Garden and 16.2 acres for a planned Bike Skills Park. A total of 76.40 acres of invasive weed removal could occur within upland (75.50 acres) and riparian (0.90 acre) habitat types including scattered invasive weed point locations.

Invasive Non-Native Target Species: Predominantly upland herbaceous non-native species within portions not proposed for future development.

Constraints: Access occurs from Sunset Avenue and Hollister Street, where multiple six-foot and four-foot multi-use trails lead into the area.

No federally listed, State listed, or special status plant species were observed within this area during the 2018 biodiversity study or 2021 focused species surveys.

Federally or State listed special status animal species observed during the 2018 biodiversity study in this area included least Bell's vireo (FE, SE, County Group 1, MSCP Covered), yellow warbler (BCC, SSC, County group 2), northern harrier (SSC, County Group 1, MSCP Covered), Blainville's horned lizard (SSC, County Group 2, MSCP Covered). Additionally, barn owl (County Group 2) and red-shouldered hawk (County Group 2) were observed in this area during the 2018 biodiversity study and 2021 focused species surveys.

Restoration Strategy: The TRVRP Public Use Feasibility Study (AECOM 2017) identifies three future development projects within this phase: (1) an active Recreation Complex, (2) a community garden, and (3) a bike skills park. The more certain development project, the Active Recreation Complex, is a 64-acre multi-sport facility between International Road and Hollister Street, and north of Sunset Avenue. The venue will consist of soccer, baseball, tennis, basketball, and multi-use turf fields and courts, as well as a host of ancillary facilities associated with this amenity. The community garden would be a 9.2-acre community facility located west of Hollister Street and south of Sunset Avenue and serve as an expansion to the existing community garden to the east, which encompasses another approximately 10-acres. A Bike Skills Park (16.2 acres) is also proposed south of Sunset Avenue and west of 19th Street. A total

of 1.44 acres of non-native and invasive weeds are located within these planned amenity areas and another 65.26 acres are occupied by disturbed habitat.

The remaining portions of this restoration phase that is not planned for future development are largely non-native upland and ruderal vegetation situated between the developed community garden and the Tijuana River riparian corridor. Beneficial restoration of these areas would include treatment of non-native annual weeds, followed by conversion of the disturbed areas into native upland buffer and transitional habitats through seeding and native plantings. If the community garden is not expanded, and the bike skills park is not developed, larger portions of this area would be available for enhancement or restoration.

- (11) **Location:** North of Monument Road, west of Hollister St. and extending to the western Project Area boundary, and south of the Tijuana River channel.

Size: 218.45 acres total, with approximately 72.26 acres potentially available for restoration (57 acres planned for potential campgrounds and another 17.4 acres planned for a potential equestrian center); 115.87 acres of non-native weed removal within both upland (109.00 acres) and riparian (6.87 acres) habitat types.

Invasive Non-Native Target Species: Salt cedar, giant reed, mustards, non-native grasses, and annual weeds.

Constraints: Access occurs from Monument Road, where multiple six-foot and four-foot multi-use trails lead into the area.

No federally listed or State listed special status plant species were observed within this area during the 2018 biodiversity study and 2021 focused species surveys. Two special status plant species were observed in this area during the 2018 biodiversity study and 2021 focused species surveys: San Diego sagewort (CRPR 4.2, County list D) and southwestern spiny rush (CRPR 4.2, County List D).

Federally or State listed special status animal species observed during the 2018 biodiversity study in this area included coastal California gnatcatcher (FT, SSC, County Group 1, MSCP Covered), western spadefoot (SSC, County Group 2), Northern harrier (SSC, County Group 1, MSCP Covered), and black-tailed jackrabbit (SSC, County Group 2). Additionally, barn owl (County Group 2), was observed in this area during the 2018 biodiversity study.

Restoration Strategy: This restoration phase is largely within upland areas of the Project Area, and restoration activities may include initial weed removal by mowing/discing, planting, seeding, and/or providing supplemental water. Portions of this phase have been identified in the TRVRP Feasibility Study (AEOM 2017) as a potential site for future campground and equestrian facility, in addition to the campground facility already under construction. Within these planned amenities, a total of 1.1 acres of invasive non-native weeds exist as well as 38.06 acres of disturbed habitat. Any planned restoration activity within this phase should coordinate with the County of San Diego to ensure it does not conflict with any planned future development. Although drainages and jurisdictional areas exist within this Phase that drain upland habitats and feed into the Tijuana River Valley, all restoration work would be conducted outside of jurisdictional features. Restoration efforts in this Phase will focus on removal of non-native and invasive species, through line trimming and mowing large stands of invasive weeds,

removing or girdling large trees, and removing new saplings, container planting, herbicide treatments of isolated individuals.

- (12) **Location:** South of Monument Road to the park boundary and west, including Monument Mesa and Spooners Mesa, to Goat Canyon.

Size: 427.99 acres total, with approximately 78.57-acres potentially available for restoration (21.3 acres planned for potential campgrounds and rentable venue within Spooner's Mesa); 100.63 acres of non-native weed removal within both upland (98.80 acres) and riparian (1.83 acres) habitat types.

Invasive Non-Native Target Species: Garland daisy, mustards, giant reed, non-native grasses, and annual weeds.

Constraints: Access occurs from Monument Road, where multiple six-foot and four-foot multi-use trails lead into the area.

No federal listed plant species were observed within this area during the 2018 biodiversity study and 2021 focused species surveys. One State listed plant species was observed within this area during the 2018 biodiversity study and 2021 surveys: Baja California bird brush (SE, CRPR 2B.1, County List B). The following special status plant species were additionally observed in this area: San Diego viguiera (County List D), wart-stemmed ceanothus (CRPR 2B.2, County List B, MSCP covered), Nuttall's scrub oak (CRPR 1B.1, County List A), San Diego barrel cactus (CRPR 2B.1, County List B, MSCP covered), ashy spike-moss (CRPR 4.1, County List D), sea dahlia (CRPR 2B.2, County List B), cliff spurge (CRPR 2B.2, County List B), golden-spined cereus (CRPR 2B.2, County List B), single-whorl burrobrush (CRPR 2B.2), western dichondra (CRPR 4.2, County List D), and San Diego bur-sage (CRPR 2.1, County List B).

Federally or State listed special status animal species observed during the 2018 biodiversity study and 2021 focused species surveys in this area included least Bell's vireo (FE, SE, County Group 1, MSCP Covered), coastal California gnatcatcher (FT, SSC, County Group 1, MSCP covered), peregrine falcon (BCC, FP, County Group 1, MSCP Covered), Coopers hawk (WL, County Group 1, MSCP covered), sharp-shinned hawk (WL, County Group 1), white-tailed kite (FP, County Group 2), southern California rufous-crowned sparrow (WL, County Group 1, MSCP Covered), northern harrier (SSC, County Group 1, MSCP covered), Costa's hummingbird (BCC), California horned lark (WL, County Group 2), merlin (WL, County Group 2), Belding's orange-throated whiptail (WL, County Group 2, MSCP covered), San Diego Bryant's woodrat (SSC, County Group 2), black-tailed jackrabbit (SSC, County Group 2), western mastiff bat (SSC, County Group 2), western red bat (SSC, County Group 2), and pocketed free-tailed bat (SSC, County Group 2). Additionally, barn owl (County Group 2), turkey vulture (County Group 1), red-shouldered hawk (County Group 1), and Yuma myotis (County Group 2) were observed in this area during the 2018 biodiversity study and 2021 focused species surveys.

Restoration Strategy: This restoration phase is largely within upland areas of the Project Area, and restoration activities may include initial weed removal by mowing/discing, planting, seeding, and/or providing supplemental water. Portions of this phase within Spooner's Mesa have been identified in the TRVRP Feasibility Study (AEOM 2017) as a potential site for a future campground and a rentable venue. Within this planned amenity, there are 1.33 acres of disturbed habitat. Any planned restoration activity within this phase should coordinate with

County DPR to ensure it does not conflict with any planned future development. Although drainages and jurisdictional areas exist within this Phase that drain upland habitats and feed into the Tijuana River Valley, all restoration work would be conducted outside of jurisdictional features. Restoration efforts in this Phase will focus on removal of non-native and invasive species, through line trimming and mowing large stands of invasive weeds, removing or girdling large trees, and removing new saplings, container planting, herbicide treatments of isolated individuals.

Table 8
POTENTIAL PROJECT PHASES AND ELEMENTS

Phase	Invasive Species Control	Water Quality	Least Bell's Vireo Habitat Restoration	Other Sensitive Species	Corridor/Habitat Connectivity	Watershed Position	Open Water Habitat	Southern Willow Scrub	Mulefat Scrub	Other Habitats	Site Access	Seasonal Constraints
1	GR, SC, NNIS	Yes	Yes	No	Yes	Upper	No	Yes	No	No	Poor	Yes
2	GR, M, GD, NNIS	Yes	Yes	Yes	Yes	Upper	Yes	Yes	Yes	Yes	Fair	Yes
3	SC, M, GD, NNIS	No	Yes	No	No	Upper	No	Yes	Yes	Yes	Good	Yes
4	GR, SC, CB, NNIS	Yes	Yes	Yes	Yes	Middle	Yes	Yes	No	No	Poor	Yes
5	GR, SC, E, NNIS	No	Yes	Yes	Yes	Middle	No	Yes	Yes	Yes	Good	Yes
6	GR, SC, GD, NNIS	No	Yes	No	Yes	Lower	No	Yes	Yes	Yes	Good	No
7	GR, SC, CB, NNIS	Yes	Yes	Yes	Yes	Lower	Yes	Yes	No	No	Poor	Yes
8	E, SC, GD, NNIS	Yes	Yes	Yes	Yes	Lower	Yes	Yes	Yes	Yes	Good	Yes
9	GD, M, GR, SC, NNIS	No	Yes	Yes	Yes	Middle	No	Yes	Yes	Yes	Good	Yes
10	E	No	No	Yes	No	Middle	No	No	No	Yes	Good	No
11	M, NNIS, SC	No	No	Yes	Yes	Lower	No	No	Yes	Yes	Good	No
12	GD, M, SC, NNIS, E	No	No	Yes	Yes	Middle-Lower	No	Yes	No	Yes	Good	Yes

Species Code: GR = giant reed, SC = salt cedar, NNIS = non-native invasive species (annuals), M = mustards, CB = castor bean, GD = garland daisy, E = eucalyptus

4.2.1 SITE CHARACTERIZATION/ BASELINE SURVEYS

Once the location and size of the Project phase are identified, a general field survey will be initiated to confirm that field conditions within and immediately adjacent to the phase location are consistent with the biological mapping of the TRVRP. If site conditions have changed, the baseline mapping will be updated. The site will also be evaluated for its ability to support special status species identified in the baseline mapping. If conditions have changed such that special species previously identified as present, or with the potential to occur, are no longer likely to occur, baseline mapping will be updated. Similarly, if conditions have changed such that new special status species are present or have the potential to occur, similar updates will be made. Any updates to site conditions will follow the nomenclature identified in the Baseline report (HELIX 2019) and this document.

The general field surveys will be used to refine and update site-specific details, including dominant vegetation, cover and density of native vegetation, location of drainages or other potentially jurisdictional resources, site topography, and presence of any invasive non-native plant species and the extents of their populations. The field surveys will define the pre-disturbance baseline conditions on all temporary disturbance areas planned for restoration and revegetation efforts. The information collected from these efforts will be used to refine site-specific habitat restoration methods. Native species observed during botanical surveys of the Project will be used as a guide to site-specific plant selection for container plant and seed restoration palettes. The data will be collected on standardized forms and maps. Plant and seed palettes will be included in the Execution Plan for each phase, which will be approved by the Restoration Specialist and DPR prior to implementation to ensure consistency with this HRP.

4.2.2 VEGETATION MAPPING VERIFICATION

Vegetation mapping to categorize major vegetation communities within the Project Area has been completed (HELIX 2019). The general field survey will be conducted as part of Execution Plan preparation and Site Characterization/Baseline Surveys prior to phase implementation and confirm that conditions have not changed substantially from those mapped baseline conditions. If conditions have changed, this effort will include making any necessary adjustments to the existing mapped conditions, including the addition of any point locations for non-native species planned for treatment and the identification of any new weed species not yet identified.

Once vegetation mapping has been updated, a map figure set will be produced for inclusion with the Execution Plan that depicts the locations of all temporary disturbance and restoration areas.

4.2.3 CULTURAL RESOURCES ASSESSMENT

Once the location and size of the Project phase are identified, a review of cultural resources information will be conducted by the Project archaeologist to identify potential impacts to archaeological sites. The review will focus on the phased restoration activity areas that may involve ground disturbance and contain recorded cultural resources. All known cultural resources within the phased restoration activity areas will be mapped, and significant, or potentially significant, resources will be identified as 'high cultural resources sensitivity' areas. Potential adverse impacts to cultural resources will be taken into consideration and Phase boundaries may be modified or ground disturbance limited in these areas.

4.2.4 EXECUTION PLAN DEVELOPMENT

Prior to initiating a phased restoration activity, an Execution Plan will be prepared and approved by DPR. The Execution Plans will draw from the information provided in this HRP and name the specific techniques, in greater detail, which will be used to revegetate and rehabilitate the area(s) in that phase. Each Execution Plan will specify the site preparation, weed removal strategy, as well as necessary seeding, planting, irrigation, monitoring, and maintenance techniques that will be implemented at each restoration site identified. The Execution Plan will also include seed mixes, container plant lists, and an implementation schedule. An Execution Plan may also prohibit specific activities during restricted seasons or identify areas for avoidance (e.g., cultural, biological, or other). A simplified example of an Execution Plan has been included in Appendix D, *Sample Execution Plan*.

Depending on the activity proposed, an Execution Plan may contain cross-sectional details or other specifics to further describe the activity proposed and provide sufficient direction to implementation personnel, ensuring that activities are consistent with the parameters of this HRP. If any ground disturbance is anticipated, an additional explanation of the ecological benefit of the proposed activity will be provided. Site-specific figures will present anticipated temporary impacts and revegetation strategies and schedules following implementation activities.

As Execution Plans are developed for each phase, the County will provide a copy to tribal liaisons from Viejas Band of Kumeyaay Indians (Viejas) and Jamul Indian Village (Jamul) if monitoring is identified.

4.3 PRE-CONSTRUCTION ACTIVITIES

This section describes activities that may occur prior to the implementation of an Execution Plan and may not be restricted to the footprint of the project phase. As the name implies, pre-construction activities are meant to prepare the work area within a project phase (work area) site for implementation and will help buffer against delays to the expected schedule and, in some cases, may shorten the construction schedule. Pre-construction tasks will be found in the Execution Plan(s) and may begin up to a year or more prior to implementation and once the Execution Plans have been completed. In general, pre-construction activities are intended to be no-impact, non-soil disturbing measures that have benign environmental impacts. Pre-construction activities may or may not be implemented due to seasonal restrictions, potential hazards, or the seasonality of weed treatment windows and seed availability.

4.3.1 PRE-CONSTRUCTION SENSITIVE SPECIES SURVEY

Minimization and avoidance measures identified in the 2019 TRVRP baseline biodiversity study (HELIX 2019) may recommend additional special status and/or protected species surveys in order to implement minimization and avoidance measures that will ensure there are no direct impacts to special status and protected species. If additional special status species surveys are recommended, these surveys would be performed as a pre-construction activity. From these survey results, additional minimization and avoidance measures may be implemented during project construction, including but not limited to, temporal delays in work, establishing avoidance buffers, biological monitoring during implementation activities, and/or minimizing noise volume and duration. In addition, any sensitive plant species that may be impacted as part of a project phase, that species may be incorporated into the revegetation program through the incorporation of cuttings, seed, salvage and transplantation, and/or container plantings to ensure the persistence of that species within the region.

4.3.2 SEED COLLECTION

Availability of local seed varies annually in response to weather patterns. Seed for direct seeding and container plant production will be sourced as locally as possible. Seed may be obtained from on-site seed collection or from commercial vendors. Upon assessment of seed availability by year, various seed sourcing options will be considered to acquire sufficient seed for restoration at the start of the restoration, including local collection, seed bulking, and acquisition of regionally appropriate seed through commercial seed suppliers (with verified source information). Seed acquisition would begin as early as feasible and ideally one year, or more, before seeding and planting activities (Section 4.6).

For seed that is collected within the Project vicinity, care will be taken to ensure that collection sites are not located in areas occupied by invasive non-native plant species that are prolific seed producers to reduce the threat of seed contamination (i.e., salt cedar). The specific number and distribution of collection sites will vary according to size, density, continuity of populations, as well as the desired quantity of seed to be obtained.

Close monitoring is required to match the timing of seed collection activities to the distribution of seed maturation. Multiple trips to a site may be required for determining when the seed is mature and for collecting. Collecting at multiple times throughout the maturation period can help prevent unintended selection against either early or late maturing genotypes.

Seed will be collected within and adjacent to the Project Area or seed originating from the appropriate source area will be obtained from a native plant nursery or native seed supplier. Seed collected from within the Project Area will yield the best results for seeding and nursery stock production. Native seed collections should be weed-free and stored in cool dry conditions until ready for use. Collection efforts will follow the characterization of potential revegetation sites and the determination of seed mixes. Collection will target as many native annual and perennial species as are available during each collection phase.

Native seed collected in the field requires cleaning. Removing detritus and chaff from seed helps maintain seed vigor and health and will reduce seed bulk during storage (Vallentine 1979). A sieve screen will facilitate cleaning in the field. Pulpy seed will be dried and cleaned prior to storage. Seed storage in paper bags, burlap, or polypropylene seed bags will prevent seed molding, particularly when seeds are stored in cool, dry conditions. All seeds should be stored, by species, and labeled according to collection date, location, and collector. This information may be used to determine which seeds to use for plant propagation, seeding, and order of use.

If a project phase under this HRP is found to impact any sensitive plant species, collection of seed from that species will be incorporated into the revegetation program to ensure the persistence of that species within the region.

4.3.3 INVASIVE NON-NATIVE PLANT TREATMENT

Pre-construction invasive non-native plant treatments may be a useful and economic strategy for restoration practices depending on the weed species within a given Project phase and the method of invasive non-native plant treatment recommended by the Execution Plan. An example of this may be the treatment of a stand of pampas grass or iceplant (*Carpobrotus* spp.), or other perennial invasive non-native plant species. Prior to the physical removal of these species, an effective method of control is

to treat individuals/populations with a prescribed herbicide up to six months (or longer) before removal. Although the efficacy of these prescribed herbicides is extremely high, it takes time for the herbicides to take effect and kill the target plant. In the case of iceplant, after herbicide treatment, the iceplant will shed water, making the dead biomass lighter and more economical for manual or mechanical removal. Similarly, pampas grass will dry and begin to break down its fibrous leaves and roots, making it easier for removal.

In any case, pre-construction invasive non-native plant treatments consist of singular or multiple treatment events in which herbicide is applied and then the treatment area is left to take effect with no additional disturbance. Pre-construction invasive non-native plant treatments would be planned to avoid adverse impacts to surrounding vegetation, wildlife species, or resource.

Records will be kept detailing the type of invasive non-native plants treated, dates and method of treatment, herbicide type and quantity applied, and will be included in project reporting documents.

4.3.4 TRASH AND DEBRIS REMOVAL

Trash is a well-documented and recurring problem within TRVRP (HDR 2020, STANTEC 2019, Surfrider Foundation 2019, URS 2010). The TRVRP water quality issues are primarily related to transboundary flows originating in Mexico, although there are contributions from the United States. Water quality issues include sewage, industrial waste, trash, and sediment transported across the border during both dry- and wet-weather conditions. Trash can cause water quality impairments, degrade habitats, affect aesthetics, and potentially cause flooding when congestion results from an accumulation of trash at a fence, water impoundment, or other obstruction (HDR 2020). While several trash collection structures within TRVRP currently exist (trash capture devices within Goat Canyon and Smugglers Gulch), trash routinely escapes, especially during high flow events, where it comes to rest in locations downstream or eventually makes itself into the open ocean. The accumulation of trash becomes embedded in sediments, facilitates a vector breeding environment, and impacts the aesthetics in the valley.

The Execution Plan will identify any pre-construction trash and debris removal, as necessary, prior to construction activities. Trash and debris removal will endeavor to remove trash that is not deeply embedded in sediments and can upend itself and mobilize during a flood event. Buried trash such as shopping carts, construction debris, metal, furniture, appliances, and hazardous materials, etc., would be left in place and removed during construction, as possible. All trash and debris removed during pre-construction activities would be sorted, hauled off-site, and disposed of in an approved landfill.

Records will be kept detailing the tonnage, type, and dates of trash removed from the site and will be included in project reporting documents.

4.3.5 PUBLIC NOTIFICATION/POSTING

A public notice or posting is the primary method for advising all interested parties of a proposed activity. A posting may solicit comments and information necessary to evaluate the impacts a project may have on the public interest. All project phases which are near or border adjacent property owners will be posted with signage that will include a brief description of the proposed activity, any dates of closure or dates the Project Area should be avoided, and a contact phone number and email address for more information. The contact information may also provide an outlet for public comment on the proposed activity. If encampments of unhoused individuals are known to exist within the area, the posting may

also include police codes for trespassing so that trespassers may be legally removed from the premises prior to construction. In these cases, coordination with local law enforcement will be necessary and homeless sweeps would be coordinated prior to any activity.

4.4 CONSTRUCTION ACTIVITIES

4.4.1 BIOLOGICAL AND CULTURAL RESOURCE MONITORING

Biological Resource Monitoring

To help ensure errant impacts to sensitive vegetation communities outside of the impact footprint are avoided during construction, an environmental boundary would be installed at the edges of the impact limits prior to the initiation of construction activities. A qualified biologist will monitor the installation of boundary markers (fencing, flagging, high visibility rope) wherever it would abut sensitive vegetation communities, jurisdictional waters or wetlands, or open space. Similarly, the biologist will work with construction personnel to identify and demarcate access paths through native vegetation. In areas where project activities may include the treatment of singular individuals, the biologist will identify the individuals to be removed by flagging that individual rather than the avoidance area. The biologist also will conduct a pre-construction environmental training session for construction personnel for each Phase to inform them of the sensitive biological resources on-site and avoidance measures to remain in compliance with project approvals. The biologist will monitor vegetation clearing, grubbing, and grading activities at least weekly to help ensure compliance with project approvals. All construction staging shall occur within the approved limits of construction.

Cultural Resources Monitoring

To ensure the protection and preservation of cultural resources, as well as the avoidance of inadvertent impacts to significant cultural resources, cultural resources monitoring will occur during implementation of all mechanized discing/clearing and topographic modification restoration techniques (i.e., those involving bulldozers and excavators) within the impact footprint and within (or near) known cultural resource locations. The monitoring program will include pre-construction environmental training by the cultural resource specialist and Kumeyaay Native American monitor for construction personnel for each Phase to inform them of the cultural resources sensitivity of the area and protocols to follow in the event inadvertent cultural resources are identified, and the presence of an archaeological monitor and Kumeyaay Native American monitor full-time during all ground disturbance within upland areas of the impact footprint and within (or near) known cultural resource locations, including vegetation clearing, grubbing, and grading activities. If intact subsurface deposits are identified during construction, the archaeological and Native American monitors will be empowered to divert ground disturbing activities away from the find to investigate the find and determine its significance.

4.4.2 SENSITIVE RESOURCE IMPACT AVOIDANCE AND MINIMIZATION

During restoration activities, impacts to native vegetation will be avoided and/or minimized as follows:

- Execution Plan details will designate ESAs to minimize the extent of disturbance and removal of native vegetation, to the extent feasible. This includes orienting activities to avoid sensitive plants and plant communities to the maximum extent practicable.

- Execution Plan details will also designate cultural resources ESAs to minimize impacts to known cultural resources. This includes orienting activities to avoid significant cultural resources.
- Access to project phases sites will be via pre-existing access routes to the greatest extent possible.
- Construction yards and staging areas will be in previously disturbed areas to the extent feasible to minimize impacts to native vegetation.
- Work areas will be conspicuously staked, flagged, or otherwise marked to clearly identify the work area boundaries and ESAs.
- All work activities, vehicles, and equipment will be limited to approved roads, staging areas, and marked work areas.
- Removal of perennial, native vegetation will be avoided to the maximum extent practicable.
- To the extent feasible, stockpiling of spoils and salvaged topsoil will be in previously disturbed areas and will avoid native vegetation and known cultural resource locations.
- Jurisdictional resources to be avoided will be flagged for avoidance prior to beginning work, with adequate buffers established to ensure sensitive resources are protected. Boundary flagging will be checked throughout implementation activities to ensure protection by the Project Biologist (Section 1.4.2).
- Cultural resources to be avoided will be flagged for avoidance prior to beginning work, with adequate buffers established to ensure significant cultural resources are protected.

4.4.3 SOIL SALVAGE AND STORAGE

Topsoil Salvage

In some areas, topsoil salvage may be appropriate and feasible to preserve the existing seed bank. This seed has advantages over the subsequently sown seed in that it is preconditioned to the existing soil environment. However, topsoil salvage may not be feasible at many sites due to the presence of invasive non-native species and trash.

The following are the criteria for identifying potentially suitable sites for topsoil salvage:

- Location is a previously undisturbed area and/or areas where desirable vegetation is dominant;
- Construction activities include topographic reconstruction, or other excavation activities where natural soil horizons are disrupted;
- Salvage activities can be executed safely and feasibly (topographic limitations);
- Stockpile locations can be identified in safe locations within existing approved disturbance areas and in compliance with other environmental and visual restrictions.

Topsoil salvage will not occur under the following circumstances:

- Slopes greater than 25 percent;
- Locations where ground disturbing activities are limited due to environmental resources (e.g., sensitive habitats, cultural resources);
- Locations with high densities of invasive non-native plant species;
- Locations with low availability of substrate material (thin soils or rocky);
- Topographical or geographical constraints that preclude safe execution of construction activities.

Topsoil will be carefully removed by an experienced operator using a dragline, excavator, scraper, or dozer and will be stockpiled in uncompacted piles less than four feet tall. Stockpiled soils will be placed within temporary disturbance areas. Topsoil stockpiles will be stabilized by spraying with a tackifier (soil stabilizer) or covered with a permeable natural material, such as jute or coconut fiber blankets. To minimize compaction, no equipment will be allowed to travel over or park on the salvaged soil stockpiles.

Care will be taken to limit the potentially adverse effects of stockpiling topsoil. For example, stockpiling has been shown to reduce organic carbon (especially at the surface) and reduce microbial activity and mycorrhizal inoculum potential for vesicular arbuscular mycorrhizae (Bainbridge 2007). Wet stockpiles show a greater reduction of vesicular arbuscular mycorrhizae propagules than dry stockpiles (Bainbridge 2007). Therefore, topsoil stockpiles will be maintained in a dry condition as much as possible. Nutrients, organic matter, and the seed bank will be diluted if the topsoil is mixed with subsoil material, so care will be taken to ensure a minimum thickness of topsoil is removed and stockpiled, and that topsoil remains segregated from the subsoil.

If soils are stockpiled, it would occur outside of the rainfall season and for a short duration, not more than six months. Soil stockpiles will be monitored for invasive non-native plants, and invasive non-native plants will be removed if present. Grubbed native vegetation not used as vertical mulch may be included in the stockpiled soil. Once stockpiled, soils will not be disturbed until they are re-spread to initiate revegetation of disturbed areas.

Vertical Mulch

Vertical mulching will be incorporated into revegetation efforts where feasible and may also be used in select areas for trail closures and to create a visual barrier to deter trespassing into revegetation areas. Materials for vertical mulch include rocks, boulders, and natural organic debris (e.g., shrub branches, logs, and other plant materials). In some areas, vertical mulch may be salvaged, as feasible, during vegetation removal activities and will be used to restore those impacted habitats. Woody plant material generated during vegetation removal operations will be preserved (windrowed) on-site as mulch for later use in soil rehabilitation of temporary disturbance areas. If non-native materials are used for vertical mulching, only inert portions of the plant will be used (i.e., logs and branches), while the seeds and portions of plants capable of regenerating (i.e., root balls and rhizomes) will be hauled off-site or dried and effectively made inert prior to use.

4.4.4 INVASIVE NON-NATIVE PLANT TREATMENTS/BIOMASS REMOVAL

Herbicide Treatment

Chemical means of controlling invasive non-native plants consist of the application of herbicides. Herbicides can be a highly effective method in controlling invasive non-native plant species by killing or inhibiting plant growth. The proper method of chemical application varies based on species and with the degree of the infestation, time of year, temperature, and environmental conditions. Herbicides will be used to control invasive non-native plants under the supervision of an individual with a Qualified Applicator License from the State of California Department of Pesticide Regulation (CADPR), herbicide application will be performed in accordance with any Pest Control Advisor recommendations, and only where directed by biologists experienced in habitat restoration. Only herbicides approved by the CADPR and the local agricultural commission's office will be used within or next to the Project Area. The environmental risks of using herbicides will be minimized by using marker dyes to make the herbicide visible in areas where it has been applied. Higher visibility is desirable because it allows personnel to protect themselves more effectively against contamination, prevents unintended multiple applications to a particular area or plant, ensures complete coverage of the target area and plants, and informs personnel of overspray and wind-drift issues, which protects non-target plants.

Hand Removal

Physical invasive non-native plant control methods are labor intensive and will be used to control small populations of invasive non-native plants or used in sensitive habitats where wildlife may be indirectly affected by invasive non-native plant removal activities. The invasive non-native plant control methods may provide an advantage in native habitats where desirable species are left in place while removing surrounding invasive non-native plants. Recommended physical control methods are as follows:

- Hand pulling will be used to remove localized and discrete populations of annual and biennial species that have a single-root mass and will be timed to occur prior to seed set. Hand pulling will minimize soil disturbance. Cutting will be used to remove shrub and tree species. This method will require follow-up herbicide applications to kill the root system and prevent re-sprouting.

Mechanical Mowing and Discing

For large monotypic stands of invasive non-native plants such as giant reed and salt cedar, biomass reduction is an effective restoration strategy for invasive non-native plant removal. Biomass reduction involves using large mowers to mulch plant material and leave it in place. The mowers are large tractors (up to 50,000 pounds) with fixed teeth mowing heads mounted in front of enclosed cabs with either rubber tires or tracks. The mulched material left by mowers is typically fragmented and splintered material no more than three to five inches in length and two inches in diameter.

This mowing process (mastication) can be performed either before or after herbicide application, but in either case, follow-up herbicide treatments would be needed to ensure the targeted species does not repopulate the treated area. The mulched biomass left behind acts as a mulch layer which may reduce subsequent non-native plant invasions.

To avoid impacts to native vegetation, prior to mowing, stands of vegetation to be treated may be separated from native stands of vegetation by hand crews who separate the canopies of native and non-native vegetation that overlap. By employing this preparation step, native vegetation is preserved.

However, to create a native/non-native mowing buffer, native material (limbs/branches) up to four inches in diameter at breast height may be trimmed to help separate native and non-native stands.

In some instances where access for large mowers is impractical, such as steep banks, hand crews using chainsaws will cut the target weed species, which is then hauled to mowed areas and masticated with mowers. Mowing would also occur away from flowing water such that mowed biomass is not left or deposited in low flow channels.

For moderate to small sized populations of non-native weeds, line trimmers, tillers, or walk-behind brush mowers may be used by hand crews to reduce vegetation. These apparatuses provide more detailed work and may be more appropriate around edges of treated areas where they adjoin sensitive resources or where access with larger equipment would result in undesired impacts. In some areas where container planting and/or seeding is planned, trimmed/mowed vegetation may be raked into piles, or de-thatched, and removed prior to these activities.

In upland areas that contain dense stands of non-native vegetation, particularly fallow agricultural fields, discing may be an effective strategy to reduce non-native weeds and incorporate surface thatch into the soil. Discing can also loosen the surface soils, which can improve plant establishment, water infiltration, and soil roughness.

Mechanical Clearing

Like mowing, alternate mechanical treatments may be used in conjunction with herbicide control to control invasive non-native plants. Alternate mechanical control ranges from the use of chain and brush saws to bulldozers and excavators, and specialized logging equipment to remove woody plants. Machinery, such as excavators with long reach arms may be useful in removing individual invasive non-native plant species such as eucalyptus or palm trees, while bulldozers may be used to remove large swaths of invasive non-native vegetation at the expense of some soil disturbances.

Unlike mowing, mechanical clearing will result in biomass removal, which may be the desired outcome in many situations where an invasive non-native plant species is slow to break down and decompose, when removal of invasive non-native plant species would remove a large invasive non-native plant seed bank, when plant mulch left behind would yield allelopathic effects, or where it is not desirable for the material to become mobile in flood situations.

Although ineffective by themselves to achieve eradication, mechanical treatments can increase mortality of herbicide weakened plants and be a useful tool in an integrated pest management program. The stumps and stems of non-native trees, shrubs, and bamboos can be treated with herbicides immediately after cutting, allowing for direct uptake of herbicide into the plant. The resulting mortality further leads to drying and rotting in-situ.

Solarization

Soil solarization is the technique of placing a film (usually black or transparent plastic) over the soil surface to trap solar radiation and cause an increase in soil temperatures to levels that kill plants, seeds, plant pathogens, and insects. In addition, when black plastic or other opaque materials are used, sunlight is blocked, prohibiting photosynthesis and plant growth. However, soil solarization can cause significant biological, physical, and chemical changes in the soil that can last up to two years and deter the growth of desirable native species (The Nature Conservancy 2001).

The effectiveness of soil solarization depends, in part, on how susceptible invasive non-native plant seeds are to temperature increases. Solarization is most effective against winter annual invasive non-native plants that germinate under cool conditions (Elmore 1990), while summer annuals and other species adapted to higher temperatures, which germinate during warmer parts of the year, are less susceptible. Soil solarization is most effective during the summer months when there may be higher temperatures and longer hours of direct sunlight. Solarization is effective only if done in wet soil. Where soils are typically dry, they must first be irrigated until soil from the surface to 50 to 60 cm (about half the length of a baseball bat) deep is at field capacity (Grinstein and Hetzroni 1991).

Polyethylene plastic film is used most often for soil solarization efforts and is usually applied over one season, or longer, to obtain the desired results. Thinner plastic film tends to work more favorably than thicker film; however, it can be more easily damaged. Either clear or black films may be used; each has advantages over the other depending on the target weed being treated. In any case that solarization techniques are applied, seeding, planting, and ongoing maintenance activities would be necessary to prevent the solarized area from weed re-infestation or recruitment by an alternate non-desirable weed species.

4.4.5 TOPOGRAPHIC MODIFICATIONS

Topographic modifications include small surface recontouring activities that would enhance the Tijuana River stream and flood flows and/or remove impediments within the TRVRP floodplain. No large-scale topographic modifications would be proposed under this project, but small topographic modifications (potentially up to 0.25-acre per occurrence) may be proposed to enhance hydrologic functions over larger swaths of vegetation communities. Details of any topographic modification activity would be described in an Execution Plan and would also include expected post modification topographic conditions and overall project benefits. A topographic modification may be performed by a small skip-loader, skid-steer, or small bulldozer. Any impacts created from this activity would be temporary and disturbed areas would be revegetated upon completion.

Examples of topographic modification activities within the wetland and riparian areas may include the removal of an impediment to a low flow channel that has been caused by an accumulation of debris or rhizomatous root masses, which are altering the natural topography of the floodplain. Topographic modification within upland areas may include the redirection of concentrated surface flows to reduce point source erosion and the creation of water bars along dirt roads/trails (i.e., Customs and Border Protection dirt roads/trails on Spooners Mesa and Monument Mesa, see Figure 6).

4.5 POST-CONSTRUCTION ACTIVITIES

This section describes general methods that will be used to revegetate and restore vegetation communities and habitats temporarily impacted by construction activities. A list of the BMPs applicable to each project phase and the measures that incorporate the BMPs will be provided in the Execution Plans. Restoration and revegetation of temporary disturbance areas following construction will occur as soon as practical after the completion of construction activities in the affected area. To the extent feasible, seeding will occur in the fall following the completion of construction activities to take advantage of the full seasonal rainfall year (October to March).

Prior to initiating restoration/revegetation activities, Execution Plans will be prepared that specify site-specific techniques from those named in this Plan to be used in the revegetation of temporary

impact areas. The Execution Plan(s) will specify the site preparation, seeding, planting, irrigation, monitoring, and maintenance techniques that will be implemented at each project phase and will include refined seed mixes and container plant lists proper for the specific work areas, and an implementation schedule. The Execution Plan(s) will be developed prior to project phase construction and will follow procedures and methods described in this Plan.

4.5.1 TRASH AND DEBRIS REMOVAL

Following the completion of project phase construction activities, any trash and debris remaining within the Project Area to be restored will be removed and hauled off-site for disposal. Organic materials, including wood debris, plant material, straw, and sand, may be incorporated into the site soils prior to soil decompaction. However, this will be evaluated case-by-case to ensure that the fundamental characteristics of the underlying soil are not altered to favor non-native over native plant species.

4.5.2 SOIL DECOMPACTION

Decompaction of soils following construction activities is anticipated to be required for temporary disturbance areas that have been subjected to use by heavy machinery and where unauthorized trails to be removed have heavily compacted soils. Decompaction of soils will improve water infiltration and allow for plant root growth in restoration areas. In these instances, the Work Area will be decompacted by ripping and cross-ripping to a depth of up to six to 12 inches with ripper teeth mounted to the back of a bulldozer or skip loader. For some sites, decompaction may be limited by the Execution Plan, Cultural, and/or biological requirements. If a Work Area was found to be dominated by native plants (including bulb plants) prior to construction activities, soils will be lightly ripped or scarified to retain their abundance and contribute to the restoration.

4.5.3 SOIL RECONTOURING

Similar to topographic modifications (Section 4.4.5), soil recontouring would involve a small earth-moving activity to correct, improve, or expand stream and flood flows within a project phase. However, in this instance, the soil recontouring activity would not originally be proposed at the Project phase outset but became necessary once construction activities have been implemented, and the soil obstruction has become exposed. In this instance, soil recontouring would be an activity determined to be necessary in order to provide a hydromorphic enhancement to a work area and would be ancillary to the scope and purpose of the Project itself. Project phases that require soil recontouring and topographic modifications will be contour-graded to mimic natural surface topographies prior to implementation of restoration activities, with soil recontouring details included in an as-built report for the respective Execution Plan. Soil recontouring activities are intended to be comparatively small activities, at less than 0.1 acre, in each location where soil recontouring is determined to be necessary. If a soil recontouring activity is undertaken, all sensitive resource impact avoidance and minimization measures will be followed (Section 4.4.2).

The following landform grading techniques will be incorporated during recontouring to return the topography of the sites to a condition that blends with the surrounding undisturbed habitat areas:

- Varying slope ratios will be used to avoid the regularity and linearity of straight graded 2:1 slopes throughout the work area. Slope ratios will vary in the horizontal planes, and both steep and flat gradients should be incorporated.

- In areas where recontouring activities will be utilized to reconnect disrupted hydrology, elevational data will be collected from both upstream and downstream of the recontouring area to inform proper site elevations.

4.5.4 SPREADING OF SALVAGED SOIL

In areas where topsoil has been salvaged, the finished grade will be scarified to a minimum depth of six inches, and the salvaged soil spread over the restoration area to the maximum depth based on the availability of soil. The loose topsoil will then be tamped into the scarified surface by track walking the area with a dozer, sheep-foot roller, or similar equipment. Track walking should be perpendicular to the contours on any slope. Topsoil surfaces will be left in a roughened (scarified) condition suitable for planting.

4.5.5 EROSION CONTROL

In all areas where the soil has been disturbed, erosion control devices will be considered. Erosion control devices will be installed to reduce erosion and sedimentation, bank stabilization, runoff management, and may also function to facilitate revegetation efforts. The Execution Plan will contain details for recommended erosion control devices; the locations and/or types of erosion control devices will be detailed in the Stormwater Pollution Prevention Plan (SWPPP), if applicable. Erosion control devices will typically include hydroseeding with a mulch and tackifying agent, fiber rolls, gravel bags, jute netting, or another device. All erosion control devices will be installed per the manufacturer's recommendations for the application type. Given the dynamic present in an active floodplain, the prescription for erosion control will attempt to balance the need for site stabilization with the reality of natural sediment transport within a dynamic river system.

4.5.6 SUPPLEMENTAL WATERING

One of the goals of this HRP is to restore, enhance, and establish native habitats that persist over time and are self-supporting. Although mature plants are able to survive on natural sources of water (often through times of drought), young plants typically require supplemental water during the establishment period. A young plant's water demand is expected to be highest during the first one or two growing seasons, tapering off gradually until no supplemental water is necessary. The amount of watering initially needed will be variable for the different habitats on-site and the proximity to groundwater.

Watering of the container plants may be required to establish an ecological system that can eventually maintain and support itself. However, overwatering shall be avoided because native plant species require significantly less watering for healthy plant growth, and too much water may result in the establishment of undesirable weed species. In addition, the installation of plant materials during the recommended time of year can greatly reduce the amount of watering needed.

Based on previous restoration projects implemented by HELIX within the TRVRP, it is known that surface soils within the region are high in salts which inhibit the ability of the target plant community to become established. In these instances, the application of supplemental water has been beneficial in remediating these highly saline soils to a level where they are tolerated by target plant species (J. Fischbeck, personal communication, December 16, 2020). Leaching is the process of adding low-salt water to the soil surface to dissolve salts and move them below the root zone. Leaching works well on saline soils that have good structure and internal drainage. If leaching is implemented in highly saline areas, soil tests will determine how much water is needed to correct a particular soil.

Supplemental water may be provided by one of several methods, and the method selected is largely dependent on the availability and proximity of a water source, site access, site protection, and the size and number of container plants to be watered, among other factors. The Execution Plans will consider these factors and may prescribe a strategy for supplemental watering if container plantings are included in the scope.

In areas that have reasonable access to a water source, temporary above-ground irrigation may be used for plant establishment. In these instances, following initial non-native plant control, temporary, above-ground irrigation would be installed. If no point of connection is available, an irrigation system may be charged via a water truck and hose, or all plants may be hand-watered by truck and hose. In other areas, a tank-fed drip irrigation system may be used where the tanks are filled by water trucks, as needed. In the most remote areas, maintenance crews may need to carry in water for container plants.

No matter what type of supplemental watering is implemented, the timing and frequency of watering events will be determined by seasonal conditions and/or at the direction of the restoration specialist, with the goal of successful plant establishment.

4.5.7 ROAD/TRAIL VEGETATION MANAGEMENT

Passive recreation is a major component of TRVRP. As such, there are approximately 20 miles of designated non-motorized multi-use trails for hikers, bikers, and equestrians, and another 2.5 miles of trails for non-motorized trails for hikers and equestrians only. Vegetation growing alongside designated trails and roads will need to be maintained in order to comply with trail and road safety design requirements. Vegetation maintenance along roads and trails may occur annually, biannually, or on an as-needed basis, depending on the type and amount of vegetation overgrowth. It is likely that vegetation maintenance along roads and trails would not be needed until sometime into the long-term maintenance period if planting activities take proper trail spacing into account.

Vegetation maintenance along roads and trails will generally include the trimming of branches and limbs of overgrowth into the trail/road, rather than full removal of an individual shrub or tree, unless visibility requirements are needed for road/trail safety. In these instances, all cut biomass would be hauled off-site and properly disposed of or mulched and left as groundcover in-situ.

4.6 SEEDING AND PLANTING

4.6.1 NATIVE PLANT PALETTES

Plant palettes will be created for specific revegetation sites from seed or other propagules (i.e., vegetative cuttings) collected near the Project Area, sourced from within 25 miles of the Project Area, or sourced from within the Jepson Herbarium California Floristic Province South Coast ecoregion (SCo; Jepson 2023), if feasible. Preference will be given to seed and plants sourced from southern coastal San Diego County, if available. If seed and plants are not available in the immediate counties, seed or plants may be acquired from other southern California counties or from commercial sources, as available and deemed appropriate. Representative species palettes for plantings, cuttings, and seedings are presented below for major habitat types within TRVRP and do not include sensitive plant species, which may be incorporated into planting palettes if sensitive species are found to be impacted by a Project phase's activities. During the development of the Execution Plans, these plant palettes will be customized for each Project phase according to target habitat type and adjacent dominant vegetation. Only native

species will be used for planting and seeding. Appendix C includes a complete list of native species observed within TRVRP, which may be used for restoration Planting and Seeding. Example container plant and seed palettes are included as Table 9, *Riparian Woodland and Forests Plant and Seed Palette*, Table 10, *Riparian Shrubland Plant and Seed Palette*, and Table 11, *Diegan Coastal Sage Scrub Plant and Seed Palette*.

**Table 9
RIPARIAN WOODLAND AND FORESTS PLANT AND SEED PALETTE**

CONTAINER PLANTINGS ¹					
Scientific Name	Common Name	Spacing on Center (feet)	Grouping Size	Number Per Acre	Notes
<i>Baccharis salicifolia</i>	mule fat	6	3	200	Drier areas
<i>Distichlis spicata</i>	saltgrass	8	5	150	Saline soils
<i>Juncus acutus</i> ssp. <i>leopoldii</i>	spiny rush	20	3	100	Wet areas
<i>Platanus racemosa</i>	western sycamore	50	2	100	Drier areas
<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont cottonwood	12	3	50	
<i>Salix exigua</i>	sandbar willow	12	5	150	Sandy soils
<i>Salix gooddingii</i>	Goodding's black willow	12	3	100	Wet areas
<i>Salix laevigata</i>	red willow	12	3	100	
<i>Salix lasiolepis</i>	arroyo willow	12	5	300	
<i>Sambucus nigra</i> ssp. <i>Caerulea</i>	blue elderberry	12	3	50	Drier areas
<i>Vitis girdiana</i>	wild grape	15	2	100	
TOTAL				1400	
SEED MIXTURE					
Scientific Name	Common Name	% Purity / Germin.	Application Rate ^{1,2} (lbs./acre)		
<i>Ambrosia psilostachya</i>	western ragweed	20/30	2		
<i>Amsinckia intermedia</i>	rancher's fiddleneck	45/65	2		
<i>Artemisia douglasiana</i>	nugwort	15/50	3		
<i>Baccharis salicifolia</i>	mule fat	10/20	2		
<i>Isocoma menziesii</i>	goldenbush	40/30	0.5		
TOTAL				9.5	

¹ All plantings will be in one-gallon sized containers, D-40 container, and/or cuttings.

² If seed is sourced locally, approximations may be made in order to apply the quantity of pure live seeds (PLS) reflected in the assumed % purity/germination column

**Table 10
RIPARIAN SHRUBLAND PLANT AND SEED PALETTE**

CONTAINER PLANTINGS ¹					
Scientific Name	Common Name	Spacing on Center (feet)	Grouping Size	Number Per Acre	Notes
<i>Ambrosia monogyra</i>	singlewhorl burrobrush	10	3	50	Drier areas
<i>Baccharis salicifolia</i>	mule fat	6	5	600	Drier areas
<i>Corethrogyne filaginifolia</i> var. <i>incana</i>	San Diego sand aster	30	2	50	Drier areas
<i>Croton californica</i>	California croton	12	3	150	Dry sandy areas
<i>Distichlis spicata</i>	saltgrass	8	5	150	Saline soils
<i>Iva hayesiana</i>	San Diego marsh elder	6	3	150	Drier areas
<i>Pluchea sericea</i>	arrow weed	12	3	150	Drier areas
<i>Quercus agrifolia</i>	coast live oak	20	1	50	Dry deep soils
<i>Salix exigua</i>	sandbar willow	12	5	150	Sandy soils
<i>Salix lasiolepis</i>	arroyo willow	12	5	100	
<i>Sambucus nigra</i> ssp. <i>Caerulea</i>	blue elderberry	12	3	50	Drier areas
TOTAL				1450	
SEED MIXTURE					
Scientific Name	Common Name	% Purity / Germin.	Application Rate ² (lbs./acre)		
<i>Ambrosia monogyra</i>	singlewhorl burrobrush	40/30	0.5		
<i>Ambrosia psilostachya</i>	western ragweed	20/30	2		
<i>Amsinckia intermedia</i>	rancher's fiddleneck	45/65	2		
<i>Artemisia douglasiana</i>	mugwort	15/50	3		
<i>Baccharis salicifolia</i>	mule fat	10/20	4		
<i>Corethrogyne filaginifolia</i> var. <i>incana</i>	San Diego sand aster	15/30	1		
<i>Isocoma menziesii</i>	goldenbush	40/30	0.5		
<i>Iva hayesiana</i>	San Diego marsh elder	30/30	2		
TOTAL				12.5	

¹ All plantings will be in one-gallon sized containers, D-40 container, and/or cuttings.

² If seed is sourced locally, approximations may be made in order to apply the quantity of PLS reflected in the assumed % purity/germination column.

**Table 11
DIEGAN COASTAL SAGE SCRUB PLANT AND SEED PALETTE**

CONTAINER PLANTINGS ¹				
Scientific Name	Common Name	Spacing on Center (feet)	Grouping Size	Number Per Acre
<i>Acmispon glaber</i>	deerweed	4	4	100
<i>Artemisia californica</i>	California sagebrush	5	6	300
<i>Baccharis pilularis</i>	coyote brush	6	3	30
<i>Cylindropuntia prolifera</i>	coast cholla	3	5	250
<i>Encelia californica</i>	California encelia	4	4	100
<i>Eriogonum fasciculatum</i>	California buckwheat	4	5	200
<i>Euphorbia misera</i>	cliff spurge	4	3	30
<i>Isocoma menziesii</i>	goldenbush	4	4	100
<i>Malosma laurina</i>	laurel sumac	4	3	30
<i>Opuntia littoralis</i>	coast prickly pear	4	5	250
<i>Rhus integrifolia</i>	lemonadeberry	8	3	30
<i>Salvia apiana</i>	white sage	5	4	80
<i>Salvia mellifera</i>	black sage	5	4	100
<i>Stipa pulchra</i>	purple needlegrass	3	5	200
			TOTAL	1800
SEED MIXTURE				
Scientific Name	Common Name	% Purity / Germin.	Application Rate ² (lbs./acre)	
<i>Acmispon glaber</i>	deerweed	95/80	1.5	
<i>Artemisia californica</i>	California sagebrush	15/60	2	
<i>Baccharis pilularis</i>	coyote brush	2/40	0.5	
<i>Castilleja exserta</i>	purple owl's clover	50/50	2	
<i>Encelia californica</i>	California encelia	40/60	1	
<i>Eriogonum fasciculatum</i>	California buckwheat	50/20	2	
<i>Isocoma menziesii</i>	goldenbush	40/30	1.5	
<i>Lasthenia californica</i>	California goldfields	70/50	2	
<i>Plantago erecta</i>	dot seed plantain	90/80	2	
<i>Salvia apiana</i>	white sage	70/30	0.5	
<i>Salvia mellifera</i>	black sage	70/50	1	
<i>Stipa pulchra</i>	purple needlegrass	90/80	2	
			TOTAL	18

¹ All plantings will be in one-gallon sized containers, D-40 container, and/or cuttings.

² If seed is sourced locally, approximations may be made in order to apply the quantity of PLS reflected in the assumed % purity/germination column.

4.6.2 PLANTING

Container planting will be used, where appropriate, in conjunction with seed application. The size and shape of the containers should match the plant’s rooting strategy (i.e., deep-rooted plants should be grown in tall pots to encourage more root development, while fibrous-rooted plants can be grown in shorter pots or as plugs). The numbers, species, sizes, and spacing of container plants will be decided in conjunction with the development of site-specific seed mixes and seeding approach in the Execution Plan. Container plants would be installed between October and March.

Container stock installation requires supplying supplemental irrigation through the first one to two years, at a minimum, until the plantings have become established and can sustain themselves on natural rainfall. Supplemental irrigation may be provided by the use of a water truck/water buffalo and hose (for small and remote sites) or a temporary above-ground irrigation system (for larger sites and when a water source is available).

For planting, holes will be excavated to diameters twice that of the root ball (but not deeper than the root ball, to avoid settling). Planting holes will be filled with water and let to drain prior to placement of container plants. During the installation of container stock, care will be taken to minimize disturbance of the root system while extracting the plants from their containers. The plants will be placed in the holes, and loose native soil will be backfilled into the hole around the plant and firmly hand-packed around the root ball to eliminate any air pockets. For deep pots, the soil will be backfilled and packed in lifts of a few inches at a time to discourage the settling of plants. Berms or basins may be constructed to aid in retaining water provided by supplemental irrigation, but particular care will be taken to avoid pooling of water around plant stems or settling of the stem/root union below grade. Plants will be watered immediately after installation.

4.6.3 CUTTINGS

Willows, cottonwoods, sycamores (*Platanus* spp.), and other riparian trees species can thrive from live cuttings provided by a donor source or specimen. "Cuttings" can refer to leaves, stems, or roots and may be rooted or unrooted (Newton and Claassen 2003). Installing cuttings of woody species that reproduce vegetatively (e.g., willow and cottonwood species) can be a successful revegetation method within riparian areas and along stream channels. As the cuttings flourish, they offer erosion control along banks, fast-growing native vegetation, and, when mature, create a source for future vegetative diversity.

When using woody stems of donor trees, cuttings should be of a minimum size (0.75-inch diameter) and should be long enough so that eight inches are at the lowest annual point of the water table and at least one-half of the length of the stem is in the ground (Hoag 2004), typically three to four feet in length. If used, unrooted cuttings will be:

- (1) Collected from as many individuals as possible and not more than 20 percent of any one individual;
- (2) Free of insect infestation, insect damage, cankers, decay, or excessive fungal intrusion (loppers used to cut poles will be sprayed with alcohol in between collections made from different plants);
- (3) Collected and planted during the dormant season;
- (4) Oriented in the planting area as from the collection site (bottom versus top);
- (5) Trimmed to one primary piece/stem with a 45° angle bottom and flat top cut;
- (6) Soaked in buckets of water containing liquid kelp for no longer than two weeks from cutting to planting; and
- (7) Watered when planted and planted deeply enough to contact adequate soil moisture for rooting (Newton and Claassen 2003).

The Execution Plan will evaluate the potential to utilize this method of planting on a site-by-site basis by evaluating upstream and downstream conditions of these riparian species and bank conditions on a site.

4.6.4 SEEDING

Seeding may be used in conjunction with container planting, when appropriate. The seeding methodology and seed mix will be described in the Execution Plan. Recommendations and seeding specifications (if any) will be based on site-specific conditions, which may include soil structure, the potential for water to infiltrate the soil, soil texture, fertility, organic matter, lack of topsoil, a significant percentage of rocks, and vulnerability to weed invasions. In some instances, seeding may also be delayed until after problematic weeds have been controlled.

Seeding mixes and rates will be developed based on the location of revegetation and, therefore, will be site-specific. To calculate the number of pounds of seed needed for seeding, it is necessary to calculate the number of pure live seeds (PLS) per pound. This will vary depending on which species and even within each batch of seed.

PLS calculations consider the purity (number of actual seed of the species) and the germination rate of that batch of seed. So, for any given batch of seed, the PLS equals:

$$\% \text{ purity} \times \% \text{ germination} / 100 = \text{PLS}$$

The amount of PLS is then used to calculate the actual seeding rate needed. To do this, divide the PLS figure into the recommended seeding rate to get the actual seeding rate:

$$\text{recommended seeding rate} / \% \text{ PLS} = \text{actual seeding rate needed}$$

Seed will be collected from species that exist within the adjacent native plant communities and in accordance with the seed palette listed in Section 4.6.1. These seed mixes include dominant species for each vegetation community, species known to be successful during planting/seeding, uncommon species (for example, characteristic species within special status vegetation communities), and species known to provide habitat for target wildlife species. Additionally, species in the seed palettes have a mix of species with differing rooting strategies (Newton and Claassen 2003). These example seed mixes do not include sensitive plant species, which may be incorporated into seeding palettes if sensitive species are found to be impacted by a project phase.

Total seed application rates will include a minimum of 9 to 19 PLS pounds per acre, but specific rates will be determined at the time of seeding. To promote diversity and site stabilization, seed mixes will have at least five to 10 native species.

Seeding will only be applied to areas that are generally weed free and where soils are accessible to seed installation and proper seed-to-soil contact can be reasonably expected. Areas that contain a layer of mulch or chipped material on the soil surface would not be target seeding sites since seed to soil contact is essential for seed germination.

4.6.4.1 SEEDING METHODS

One or a combination of three available methods of seed application may be used depending on the specific restoration area conditions. The methods include imprint seeding, broadcast (or hand-

broadcast) seeding, and hydroseeding. Restoration seeding will be completed in the fall, as it is practical to take advantage of the full seasonal rainfall year (October to March). If seeding must be delayed due to construction schedule impacts, sites will be stabilized as per methods in Section 4.5.5 until seeding can occur.

Imprint Seeding

Imprinting may be used on areas larger than 0.5 acre (about four times the area of a basketball court) where soils are neither too loose nor heavily compacted. In appropriate soils, imprinting facilitates the successful establishment of seed into the soil and eliminates the need for mulch, soil irrigation, and soil binding. Imprinting also increases rainwater infiltration, improves gas exchange between the soil and atmosphere, reduces erosion, and improves contact between seeds and soil water (Barnes 1950; Gintzburger 1987; Oliveira et al. 1987; Slayback and Cable 1970). In addition, imprinting may create microsities that catch and hold wind-dispersed seed, encouraging germination and plant establishment.

Imprinting is accomplished via a mechanical imprinter that is pulled behind a tractor and simultaneously spreads and buries pre-developed seed mixes in V-shaped depressions three to five inches deep. Imprinting under most conditions results in plant establishment within one to three years. However, imprinting achieves the best results when accomplished during, or immediately following, the rainy season. Imprinting is recommended for friable soils that are likely to maintain their shape once treated.

Hand Seeding/ Broadcast Seeding

Hand seeding or broadcast seeding will be used where other seeding methods are deemed infeasible because of substrate, location, or disturbance area size. In general, application of hand- (or mechanical-) broadcasted seed will be reserved for areas 0.5 acre and up to five acres, where lesser amounts of seed are needed. Hand broadcasting involves field crews who distribute the seed by hand or belly grinder while mechanical broadcast seeding may be performed by a mechanical seed spreader. In these instances, an inert seed bulking agent, such as rice hulls, may be added to the seed mix to facilitate even distribution of seed.

Hand-seeded and broadcast seeded sites will be raked or harrowed before seeding to break up the soil surface and after seeding to facilitate seed-to-soil contact. Raking or other post-seeding treatment to lightly cover seed will also be completed to enhance germination likelihood, provide even distribution of seed, and reduce losses to granivores. This procedure will also help retain moisture for germination. Hand and broadcast seeding will be timed to occur in the late fall prior to rains.

Hydroseeding

Hydroseeding is an effective method of reseeding that can be used in a variety of settings and with diverse seed mixes. Hydroseeding is ideal for steeply sloped or erosive areas, rocky substrates, or large, flat features that require substantial amounts of material cover. Because hydroseeding requires trucks or trailers to haul, mix, and apply the hydroseed, some accessibility is required near a site; however, hoses may be used to broadcast seed in more remote areas. Hydroseeding does not break apart the soil surface; therefore, a site should be prepared by decompaction, scraping, or raking prior to application of the hydroseed. Each hydroseed mix contains seeds, water, and a small amount of mulch. Additional hydromulch or a tackifying agent may be added to the hydroseed mixture or implemented as a separate step for immediate soil stabilization and to enhance erosion control.

When hydroseeding is used in a work area, a four-step process will be implemented;

- First, the soil will be prepared. If it is determined by a biologist experienced in habitat restoration that the soil is too compacted, then a site will be decompacted, scraped, or raked prior to application of the hydroseed.
- Just before the hydroseed is applied, the soil will be moistened to allow the seed to stick to the soil surface (Newton and Claassen 2003). However, if significant rainfall has occurred within 24 hours, pre-wetting may not be necessary and may be determined by the biologist on-site.
- The hydroseed mixture will then be applied across the site.
- Lastly, the hydromulch (organic fiber, soil amendments, and tackifier) will be applied.

Separating the hydroseed and hydromulch into separate layers helps ensure that the seed meets the soil rather than being bound up in the mulch or exposed to air where it can dry up without germinating (Newton and Claassen 2003). A typical rate of application in arid California is 500 pounds per acre of wood fiber mulch for hydroseed-only sites and 1,500 to 2,000 pounds per acre of wood fiber mulch and a tackifier for the hydromulch method (Newton and Claassen 2003); however, the restoration contractor will determine the specific rate of application on a site-by-site basis, and as directed by the Execution Plan and SWPPP (if applicable).

4.7 RIPARIAN AND JURISDICTIONAL DRAINAGE RESTORATION

Potential impacts to riparian and jurisdictional habitats identified within Phases 1-12 (Figures 10a-f) and located within the Tijuana River valley will be avoided and minimized to the greatest extent feasible, but some impacts, due to the nature of some invasive non-native species targeted for removal, may be unavoidable. All activities under this HRP program are intended to be self-mitigating and impacts, if any, would be temporary disturbances that would be revegetated to a greater habitat value than what previously existed. Furthermore, temporary impacts would result in no net loss of USACE, RWQCB, CDFW, and/or CCC wetland acreage or wetland/riparian habitat value, either directly or indirectly, because of project execution and downstream or upstream effects to channels or their associated habitat.

To restore jurisdictional areas, a combination of recontouring, seeding, and installation of cuttings may be used to restore/replant temporarily disturbed wetland/riparian areas. Seeds and cuttings from riparian trees and shrubs will be collected on or near the Project site (when feasible).

Temporary impacts to riparian and jurisdictional resources within Phases 1-12 are expected to occur, as these phases generally lie within the floodplain of the Tijuana River. Potential impacts to jurisdictional wetlands and waterways, by phase, are listed in Table 12a-12b, *Temporary Impacts to Jurisdictional Wetlands and Waterways* and *Temporary Impacts to Jurisdictional Wetlands and Waterways by Phase*.

Table 12a
TEMPORARY IMPACTS TO JURISDICTIONAL WETLANDS AND WATERWAYS (acre[s])¹

Habitat	Waters of U.S.	Waters of the State	CDFW	CCC
Wetland Waters/Riparian				
Coastal and Valley Freshwater Marsh	<0.01 (0.003)	<0.01 (0.003)	<0.01 (0.003)	<0.01 (0.003)
Emergent Wetland	0.03	0.03	0.03	0.03
Saltgrass Grassland	0.01	0.01	0.01	0.01
Southern Riparian Forest	3.46	3.46	4.07	4.07
Disturbed Southern Riparian Forest	2.14	2.14	2.14	2.14
Non-native Riparian	12.12	12.12	12.78	12.78
Southern Willow Scrub	0.58	0.58	1.40	1.40
Disturbed Southern Willow Scrub	2.50	2.50	5.69	5.69
Mule Fat Scrub	0.15	0.15	0.63	0.63
Disturbed Mule Fat Scrub	--	--	1.88	1.88
Tamarisk Scrub	13.62	13.62	23.30	23.30
Disturbed Riparian Scrub	--	--	0.06	0.06
Arundo-dominated Riparian	117.09	117.09	122.50	122.50
<i>Subtotal:</i>	<i>151.70</i>	<i>151.70</i>	<i>174.50</i>	<i>174.50</i>
Non-Wetland Waters				
Open Water	0.03	0.03	0.03	0.03
<i>Subtotal:</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>
TOTAL	151.73	151.73	174.53	174.53

¹ Areas are presented in acre(s) rounded to the nearest 0.01.

Table 12b
TEMPORARY IMPACTS TO JURISDICTIONAL WETLANDS AND WATERWAYS BY PHASE (acre[s])¹

Resource	Resource Agency Jurisdiction (acres)			
	USACE	RWQCB	CDFW	CCC
Wetland				
Phase 1	7.83	7.83	8.43	8.43
Phase 2	8.81	8.81	9.72	9.72
Phase 3	4.17	4.17	4.17	4.17
Phase 4	98.41	98.41	104.18	104.18
Phase 5	--	--	2.10	2.10
Phase 6	0.04	0.04	0.71	0.71
Phase 7	21.27	21.27	22.60	22.60
Phase 8	1.85	1.85	4.32	4.32
Phase 9	6.00	6.00	9.14	9.14
Phase 10	0.90	0.90	0.91	0.91
Phase 11	2.42	2.42	6.87	6.87
Phase 12	--	--	1.35	1.35
<i>Subtotal</i>	<i>151.70</i>	<i>151.70</i>	<i>174.50</i>	<i>174.50</i>

Resource	Resource Agency Jurisdiction (acres)			
	USACE	RWQCB	CDFW	CCC
Non-Wetland Waters				
Phase 1	--	--	--	--
Phase 2	0.03	0.03	0.03	0.03
Phase 3	--	--	--	--
Phase 4	--	--	--	--
Phase 5	--	--	--	--
Phase 6	--	--	--	--
Phase 7	--	--	--	--
Phase 8	--	--	--	--
Phase 9	--	--	--	--
Phase 10	--	--	--	--
Phase 11	--	--	--	--
Phase 12	--	--	--	--
<i>Subtotal</i>	0.03	0.03	0.03	0.03
TOTAL	151.73	151.73	174.53	174.53

Areas are presented in acre(s) rounded to the nearest 0.01.

Impacts to riparian and jurisdictional resources within Phases 10-12 (Figures 10a-f) that are surrounded by upland habitats will be avoided with buffers established prior to implementation to prevent any potential impacts. Jurisdictional areas within these phases are generally deeply incised, unstable, erosion gullies which would require additional environmental and engineering studies, bank stabilization and grade control structures, and regulatory agency permitting in order to stabilize and restore these features. Although restoring highly eroded drainages would be beneficial to the entire TRVRP, for these reasons, any activity within these jurisdictional resources is not part of this restoration program.

5.0 MAINTENANCE, MONITORING, AND REPORTING REQUIREMENTS AND PERFORMANCE CRITERIA

Maintenance, monitoring, and reporting of the revegetation or restoration sites will begin with the implementation of the restoration and revegetation work at each of the Project’s temporary disturbance areas and will continue until the defined success criteria are met or up to three years, whichever is shorter.

5.1 MAINTENANCE ACTIVITIES AND SCHEDULE

Restored sites will be maintained per the schedule presented in Table 13, *Maintenance Schedule*, and the methods outlined in the following subsections.

**Table 13
MAINTENANCE SCHEDULE**

Maintenance Activity	Frequency
Watering (container plants, cuttings, or as deemed necessary as a remedial action)	<ul style="list-style-type: none"> Once or twice weekly during the establishment period (the first three months after planting). Once or twice monthly for the first year. As deemed necessary by a qualified biologist for the second year or as a remedial action for under-performing sites. (Irrigation frequencies will be determined by precipitation patterns and site conditions).
Weed Control	<ul style="list-style-type: none"> Four times per year and times accordingly with weed growth cycles. Frequency may be adjusted as needed on a site-by-site basis.
Erosion Control	<ul style="list-style-type: none"> Once per year in spring (February to April). More visits conducted as conditions (flood, fire, etc.) require.
Trash/ Debris Removal	<ul style="list-style-type: none"> Trash and debris removal will occur concurrent with other maintenance activities.
Vegetation Trimming	<ul style="list-style-type: none"> As needed to make safe passage for trail use

5.1.1 WEED CONTROL

For the purposes of this HRP, weed control methods have been organized into two categories: physical control and chemical control. Physical control methods include manual removal using hand tools and mechanical removal using motorized tools. Chemical control methods include herbicide application.

These methods are described further in the following sections and in Table 14, *Maintenance Period and Invasive Non-Native Plant Control Methods*. Invasive non-native plant control should be based on the invasive non-native plant species, location of invasive non-native plants, and the time of year that invasive non-native plant control operations occur and may include more than one treatment method. Table 15, *Control Methods for Invasive Non-Native Plants Likely to Occur in the Project Area*, describes the control methods applicable for treating specific species both known to already occur within the Project Area, and those species expected to occur throughout the maintenance period. Alternative treatment methods are not included here because they are either not practical to implement at this stage or are not appropriate for the area.

**Table 14
MAINTENANCE PERIOD AND INVASIVE NON-NATIVE PLANT CONTROL METHODS**

Control Method	Description	Appropriate Target	Key Considerations
Physical Control			
Manual Removal			
Pulling	Removing the plant from the ground by hand or using hand tools (e.g., weeder, pry bar, Weed Wrench).	Taprooted and shallow rooted plants (annuals and some perennials) unable to re-sprout from roots or other vegetative organs.	Plants need to be large enough to be grasped, and soils should be damp or loose enough to release roots. Labor intensive may need to be repeated. Minimal Disturbance

Control Method	Description	Appropriate Target	Key Considerations
Hoeing	Scraping seedlings at the soil line or cutting off small plants just below the ground surface.	Annual and perennial plants (seedlings and small plants) unable to re-sprout from roots or other vegetative organs.	Applicable for seedlings and small plants. Labor intensive may need to be repeated. Moderate disturbance.
Digging	Removing a plant from the ground using trowels, spades, picks, or other tools to loosen the plant's roots from the soil. Often combined with pulling.	Taprooted and shallow rooted plants (annuals and some perennials) unable to re-sprout from roots or other vegetative organs.	Labor intensive may need to be repeated. Moderate disturbance.
Mechanical Removal			
Trimming/Brush Cutting	Using handheld line trimmers or other motorized tools to cut off plants at the ground surface.	Plants that reproduce primarily by seed. Effective on plants less than two inches in stem diameter.	Conduct during the bolting/budding stage of target plants, before seed development. Labor intensive. Can also affect interspersed native individuals.
Mowing	Using mechanized equipment (walk behind, tractor or skid steer) to cut off plants near ground level	Plants that reproduce primarily by seed.	Conduct during the bolting/budding stage of target plants, before seed development. Non-selective and may result in damage to interspersed native individuals
Discing	Using agricultural type equipment to remove herbaceous weeds and biomass an incorporate into soil. Break up compacted soil surface.	Fallow agricultural fields dominated by non-native forbs and grasses.	Will create soil disturbance and may facilitate flush of additional weeds needing to be treated.
Chemical Control			
Herbicide Application			
Foliar Treatment	Applying herbicide to the leaves of plants using a spray bottle, backpack applicator, skid-mounted sprayer (spot application); by wiping using a hand, trail, or vehicle mounted wick.	Low-growing annual and perennial plants, shrubs, and saplings where little non- target vegetation exists.	Apply when plants are actively growing, and after full leaf expansion. Requires complete coverage to be effective. Ineffective on plants with waxy cuticles. May require several applications. Overspray /wind drift may affect adjacent desirable plants. Spot spraying and hand wicking are labor intensive.

Control Method	Description	Appropriate Target	Key Considerations
Basal Bark	Applying herbicide in a band encircling the base of the trunk.	Woody vines, shrubs, and trees.	Can be conducted at any time of year. Little chance of impacting adjacent desirable plants. Labor intensive.
Hack and Squirt	Cutting the bark using an axe, or similar tool, at selected points around the base of the stem/trunk. Cuts should angle downward, be less than one inch apart, and extend into the sapwood. Apply herbicide to each cut.	Woody vines, shrubs, and trees.	Can be conducted at any time of year. Little chance of impacting adjacent desirable plants. Labor intensive.
Cut Stump	Painting herbicide on the stump immediately after a tree or shrub has been cut. Herbicide must be applied within five minutes of being cut.	Woody vines, shrubs, and trees.	Delayed treatment may reduce effectiveness. Labor intensive.

Sources: Bell and Lehman 2005, Cal-IPC 2020.

5.1.1.1 PHYSICAL CONTROL

Physical removal of invasive non-native plants is employed for localized, discrete control. Typically, physical control methods uproot, girdle, or cut plants through manual hand-pulling or use of power tools. Several types of physical removal techniques are recommended, including the following: hand-pulling, lever arms, weed whipping, hoeing, and mowing.

Hand-pulling should be focused on discrete populations of invasive non-native plant species that have a single-root mass. Hand-pulling is particularly effective to remove annual species after germination and prior to seed set, when the stems are not as easily broken, so that no root mass is left behind. Broken root pieces and other fragments of invasive non-native plant species can resprout and recolonize cleared areas. Hand-pulling is less effective in large areas and with invasive non-native plant species that spread through an underground root system (for example, tamarisk).

The Weed Wrench and Root Jack are types of lever arm devices that secure stems. They are readily procured at plant nurseries and can be used to pull out and remove woody shrubs such as salt cedar. This effort should be focused on invasive non-native plant species that have a single-root mass.

Hoeing and weed whipping may be used to control herbaceous invasive non-native plants in limited discrete areas before seed has set. Care must be taken not to damage adjacent native plants. Hoeing and weed whipping are most effective on small invasive non-native plants with single root masses. Larger invasive non-native plants are more likely to regenerate from cut roots. Methods below should be implemented following physical control activities to help prevent the spread of target species.

- Cover all loads while removing vegetation using a tarpaulin. Caution must be taken to contain all plant stem and root fragments because they may recolonize cleared areas and can invade new areas if not disposed of properly.

- Avoid contact with established native species.
- Cut plant material will be bagged and removed to prevent resprout and seed maturation. Seed heads and plants will be removed from the site in a covered vehicle to prevent seed dispersal and transported to a licensed landfill or composting facility.

5.1.1.2 CHEMICAL CONTROL

Herbicide applications are widely used to control or eradicate infestations of invasive non-native plant species. Herbicides may be used selectively to control discrete but significant infestations where manual and mechanical control methods are deemed ineffective. Where herbicides are applied, all treated areas must be identified and mapped to record treatment type and extent and to allow future monitors to compare or verify treatment effectiveness.

All herbicides will be applied following applicable laws, regulations, permit conditions, and USEPA label instructions. Only herbicides and adjuvants approved by the CADPR and the local agricultural commissioner's office will be used within the Project Area.

Herbicide Use and Regulations

Control of some invasive non-native plants may be most effectively accomplished through herbicide application. The application of these general use herbicides will follow all federal, state, and local laws and regulations.

Most chemical invasive non-native plant treatment would take place with glyphosate-based herbicides. Glyphosate is a polar compound that works to kill target plant material by disrupting a plant enzyme, which is not present in humans or animals. This nonselective herbicide provides effective control of many species, including grasses, forbs, vines, shrubs, and trees.

The following additional herbicides would be used in a limited fashion for control of invasive non-native plants in specific cases, as follows:

- Chlorsulfuron has a specific mode of action: the inhibition of the amino acid acetolactate synthase. This herbicide is broad-leaved selective and has a negligible effect on grasses and other monocots.
- Clopyralid is an auxin-mimicking herbicide that stimulates rapid cell elongation, which destroys cell walls by rupturing them. It is a selective post-emergent herbicide that is often used to control members of the sunflower family (for example, thistles).
- Imazapyr works by inhibiting the synthesis of branched-chain amino acids. Imazapyr is used for the control of terrestrial annual and perennial grasses and woody species. It also has limited activity on some broad-leaved herbs. Imazapyr is a selective systemic herbicide used to control woody and herbaceous broad-leaf plants but does not harm monocots (grasses).
- Triclopyr works by mimicking the plant hormone auxin, causing uncontrollable growth in targeted weeds. It is typically used to control annual and perennial broad-leaf plants, particularly woody species (i.e., shrubs and trees).

- Pelargonic Acid is a chemical substance that is found in almost all species of animals and plants. Because it contains nine carbon atoms, it is also called nonanoic acid. It is found at low levels in many of the common foods and is readily broken down in the environment. As an herbicide, pelargonic acid causes extremely rapid and non-selective burn-down of green tissues (desiccates) but does not prevent regrowth from buds or basal meristems. Pelargonic acid has no residual soil activity.
- Fluazifop-P-butyl is a post-emergent organic compound that is used as a monocot-specific herbicide, meaning it is an effective treatment of annual and perennial grasses while doing little to no harm to broad-leaved plants. It kills grasses by inhibiting lipid synthesis (lipids are necessary components of cell membranes), particularly at the sites of active growth. In the environment, Fluazifop-p-butyl is degraded primarily through microbial metabolism and hydrolysis. It is not degraded readily by sunlight.
- Aminopyralid is a selective herbicide used for the control of broad-leaved weeds, especially thistles and clovers. Aminopyralid can also provide residual weed control activity controlling re-infestations and reducing the need for re-treatment depending on the rate applied and the target weeds.

Each herbicide proposed for use is registered with the USEPA for weed control.

Herbicide treatment would be implemented by a Licensed Qualified Applicator. Treatment crews would be familiar with the detailed requirements for invasive non-native plant control. All herbicide applications would follow EPA label instructions and be in accordance with federal, state, and local laws and regulations. Herbicides would be applied using backpack sprayers to treat invasive non-native plant species. A backpack sprayer is typically a five-gallon backpack worn by the applicator and used for spot application of herbicides to allow for an accurate application process. This method would be used to target individual invasive non-native plant occurrences, or to apply herbicide to small or scattered invasive non-native plant populations. Truck-mounted spray rigs would not be used.

Herbicide Use Guidelines

Only approved herbicides will be used as needed to control invasive non-native plant infestations. The following environmental protection measures will be followed to minimize the adverse impacts to biological resources:

- Herbicide treatments would be conducted under the direction of a Licensed Qualified Applicator to minimize both environmental and personal risk. The applicator should be familiar with all safety and environmental regulations, as well as be able to identify target plant species.
- A biological monitor would be used to minimize impact to sensitive resources such as special-status plant species and jurisdictional waters. The biological monitor will flag avoidance areas ahead of personnel applying herbicide.
- Only aquatic approved herbicide and associated adjuvants will be used in riparian areas or within channels where they could run off into downstream areas. The biological monitor also determines when to choose manual treatment methods (such as hand pulling) in areas with abundant sensitive native vegetation.

- Use drift reduction agents, as appropriate, to reduce the drift hazard to non-target species.
- Use timing restrictions (for example, do not treat during critical wildlife breeding or staging periods) to minimize impacts to wildlife.
- Crews that conduct invasive non-native plant treatment will have experience working on sensitive habitats and with special status species. Crews would be trained in the identification of invasive non-native and native plant species. Methods of chemical treatment utilize spot application of herbicide on individual plants. This approach avoids broad chemical application to avoid any non-target species. These activities would be supervised by a qualified biologist or experienced monitor.
- High winds or precipitation events occurring during the application of herbicide could result in drift or runoff and chemical contact with non-target vegetation. Herbicide applications would be suspended if any of the following conditions occur:
 - Sustained wind more than six miles per hour,
 - Precipitation is occurring or predicted within 72 hours (about three days),
 - Any other weather requirements as stated on the label.
- Crews would use spray bottles with water to immediately douse non-target vegetation or immediately clip/remove the affected leaves in the case of drift or mistaken chemical application. Systemic absorption of herbicide typically takes a few hours depending on the properties of the chemical and the plants being treated; thus, an application of water only would dilute the herbicide and minimize the damage from accidental non-target application. Immediate removal of the affected plant material would prevent the herbicide from moving into other non-affected parts of the plant, thus preventing accidental mortality.

Table 15
CONTROL METHODS FOR INVASIVE NON-NATIVE PLANTS LIKELY TO OCCUR IN THE PROJECT AREA

Scientific Name	Common Name	Control/Avoidance Strategy	Control Methods
<i>Ailanthus altissima</i>	tree-of- heaven	Eradication/Suppression. Monitor for occurrence year-round and treat for eradication/suppression as required.	<u>Pulling, Cut Stump</u> : Pull small saplings; cut stems of mature trees as low to the ground as possible early in the Spring and a second time at the end of the growing season around June or July. Apply herbicide on the stump immediately after cutting.
<i>Arundo donax</i>	giant reed	Eradication/Suppression. Monitor for occurrence year-round and treat for eradication/suppression as required.	<u>Pulling, Digging, Foliar Treatment, Cut Stump</u> : Pull or dig plants after heavy rains loosen the soil; cut the stems and dig up the roots using hand tools or heavy equipment (only works on seedling/sapling sprouts in isolated conditions); apply herbicide (foliar spray) after the plant has flowered but before summer dormancy; cut and treat the cut stems with herbicide (Bell No Date).

Scientific Name	Common Name	Control/Avoidance Strategy	Control Methods
<i>Bassia hyssopifolia</i>	five-hook bassia	Eradication/Suppression. Monitor for occurrence year-round and treat for eradication/suppression as required.	<u>Pulling, Foliar Treatment:</u> Small infestations can be removed by hand and mowing before seeding can reduce seed production. For stands, spray with post-emergent herbicide (glyphosate) during the early growth phase. A pre-emergent herbicide (chlorsulfuron) may also be effective but may inhibit restoration goals until herbicide metabolizes.
<i>Bromus</i> sp. (and other non-native grasses)	annual brome grasses	Containment. Treat known occurrences so that populations of brome grasses do not expand. Monitor for occurrence and eradicate new populations if found.	<u>Pulling, Foliar Treatment:</u> Small infestations can be removed by hand and mowing before seeding can reduce seed production. For stands, spray with post-emergent herbicide (glyphosate) during the early growth phase. A monocot-specific herbicide (Fluazifop-P-butyl) may also be effective as non-native grasses tend to emerge before native annuals.
<i>Carduus pycnocephalus</i>	Italian thistle	Containment. Treat known occurrences so that sizes do not increase. Monitor for occurrence and eradicate new populations if found.	<u>Pulling, Foliar Treatment:</u> For select occurrences, pull out entire plant and dig out roots. Bag for proper disposal. For stands, spray with post-emergent herbicide in the spring during the early bloom phase.
<i>Carpobrotus chilensis</i>	iceplant	Eradication/Suppression. Monitor for occurrence year-round and treat for eradication/suppression as required.	<u>Pulling, Foliar Treatment:</u> For select occurrences, pull out entire plant and root and bag for proper disposal. For stands, spray with post-emergent herbicide. Remove and bag for disposal after senescence.
<i>Centaurea melitensis</i>	totalote	Suppression. Monitor for occurrence between February and April and treat as feasible.	<u>Pulling, Foliar Treatment:</u> For select occurrences, pull out entire plant and root and bag for proper disposal. For stands, spray with post-emergent herbicide. Remove and bag for disposal after senescence.
<i>Cirsium vulgare</i>	bull thistle	Eradication/Suppression. Monitor for occurrence between March and August and treat as required.	<u>Pulling, Foliar Treatment:</u> For select occurrences, pull out entire plant and root prior to flowering and bag for proper disposal. For stands, apply herbicide during the bolting phase or at the onset of flowering.
<i>Conium maculatum</i>	poison hemlock	Eradication/Suppression. Monitor between February and August and treat as feasible.	<u>Pulling, Trimming, Foliar Treatment:</u> For select occurrences, pull out entire plant and root prior to flowering and bag for proper disposal. Mowing or slashing of the plants prior to flowering is also effective. For stands, spray with post-emergent herbicide in late spring.

Scientific Name	Common Name	Control/Avoidance Strategy	Control Methods
<i>Cynodon dactylon</i>	Bermuda grass	Eradication/Suppression. Monitor year-round and treat as required.	<u>Pulling, Foliar Treatment:</u> For select occurrences, pull out entire plant and root and bag for proper disposal. For stands, spray with post-emergent, systemic, selective (Fluazifop-P-butyl) herbicide. After senescence, remove plants and bag for disposal.
<i>Dittrichia graveolens</i>	stinkwort	Eradication/Suppression. Monitor year-round and treat as required.	<u>Pulling, Foliar Treatment:</u> For select occurrences, pull out entire plant and root and bag for proper disposal. For stands, spray with post-emergent glyphosate or triclopyr herbicide. After senescence, remove plants and bag for disposal.
<i>Eucalyptus camaldulensis</i> , and other eucalyptus species	river red gum and other eucalyptus species	Suppression, Containment. Monitor for occurrence. May provide important habitat feature. Consult with biologist prior to removal. Remove occurrences without habitat value. Remove new saplings.	<u>Pulling, Digging, Cut Stump:</u> Pull/dig out seedlings and young trees. Cut mature trees and treat stump with herbicide.
<i>Foeniculum vulgare</i>	sweet fennel	Eradication/Suppression. Monitor between February and August and treat as required.	<u>Pulling, Trimming, Foliar Treatment:</u> For select occurrences, pull entire plant and root by hand or with weed wrench and bag for proper disposal. For stands, cut as low to the ground as possible and spray with post-emergent herbicide.
<i>Glebionis coronaria</i> (<i>Chrysanthemum coronarium</i>)	garland daisy	Suppression. Monitor for occurrence and treat in areas where habitat value is impacted.	<u>Pulling, Foliar Treatment:</u> For select occurrences, pull entire plant and root before seed pods develop and bag for proper disposal. For stands, apply post-emergent herbicide to leaves before flowering.
<i>Hirschfeldia incana</i> , <i>Brassica</i> spp.	Mediterranean mustard, other mustards	Suppression. Monitor for occurrence and treat in areas where habitat value is impacted.	<u>Pulling, Foliar Treatment:</u> For select occurrences, pull entire plant and root before seed pods develop and bag for proper disposal. For stands, apply post-emergent herbicide to leaves before flowering.
<i>Lepidium latifolium</i>	perennial pepper weed	Eradication. Monitor between March and July for occurrence and treat as required.	<u>Mechanical, Foliar, Cut Stump:</u> Herbicide treatment is the preferred method for this species because it easily resprouts from roots. Foliar can be used on young plants. Use cut stump on large or mature stands. Broad-leaf specific herbicides are more successful. Mechanical removal may be used in small, isolated population by ensuring that all plant material, especially roots, are dug up and removed.

Scientific Name	Common Name	Control/Avoidance Strategy	Control Methods
<i>Marrubium vulgare</i>	white horehound	Eradication/Suppression. Monitor for occurrence between February and July and treat as required.	<u>Pulling, Hoeing, Foliar Treatment:</u> For select occurrences, hand pull or hand hoe entire plant and root before seed set and bag for proper disposal. For stands, spray with post-emergent herbicide when plant is actively growing.
<i>Medicago polymorpha</i>	California burclover	Suppression. Monitor for occurrence and treat in areas where habitat value is impacted.	<u>Pulling, Foliar Treatment:</u> For select occurrences, pull entire plant and root before and bag for proper disposal. For stands, spray with either pre-emergent or post-emergent herbicide.
<i>Mesembryanthemum crystallinum</i> , <i>M. nodiflorum</i>	crystalline iceplant, slender leaved iceplant	Suppression. Monitor for occurrence and treat in areas where habitat value is impacted.	<u>Pulling, Foliar treatment:</u> Small isolated patches can be pulled by hand during spring and early summer. Herbicide can be used to control dense patches and application is recommended before seed set.
<i>Nicotiana glauca</i>	tree tobacco	Suppression, Containment. Monitor for occurrence and treat in areas where habitat value is impacted. Eradicate new, small populations.	<u>Pulling, Digging, Cut Stump:</u> For seedling/smaller trees, pull, dig, or weed wrench by hand and bag for proper disposal. For larger trees, cut stems close to the ground surface and apply herbicide to cut stems.
<i>Pennisetum setaceum</i>	South African fountain grass	Eradication/Suppression. Monitor for occurrence year-round and treat as required.	<u>Digging, Foliar Treatment:</u> For select occurrences, cut close to the ground, and dig up tufts using hand tools or heavy equipment and bag for proper disposal. For stands; spray with foliar herbicide.
<i>Phoenix canariensis</i>	Canary Island date palm	Eradication/Suppression. Monitor for occurrence year-round and treat for eradication/suppression as required.	<u>Pulling, Digging, Cut Stump:</u> For saplings, pull/ dig up entire plant and root and bag for proper disposal. For larger trees, cut as low to the ground as possible and apply herbicide to cut stumps.
<i>Polypogon monspeliensis</i>	annual beardgrass	Eradication/Suppression. Monitor for occurrence between March and June and treat as required.	<u>Pulling, Digging, Foliar Treatment:</u> For select occurrences, pull/dig up entire plant and root when soils are moist/loose. For stands, spray with post-emergent herbicide.
<i>Raphanus sativus</i>	wild radish	Eradication/Suppression. Monitor for occurrence between January and June and treat as required.	<u>Pulling, Foliar Treatment:</u> For select occurrences, pull up entire plant and root prior to flowering and bag for proper disposal. For stands, spray with post-emergent herbicide.
<i>Ricinus communis</i>	castor bean	Eradication/Suppression. Monitor for occurrence year-round and eradicate if found.	<u>Pulling, Digging, Cut Stump:</u> For select occurrences, pull or dig up entire plant and root when soils are moist/loose and bag for proper disposal. For stands, cut near the crown and treat cut stems with foliar herbicide.

Scientific Name	Common Name	Control/Avoidance Strategy	Control Methods
<i>Schinus molle</i>	Peruvian peppertree	Suppression, Containment. Monitor for occurrence and eradicate if found. May provide important habitat feature. Consult with biologist prior to removal. Remove new, small saplings.	<u>Pulling, Digging, Cut Stump</u> : For small saplings, pull/dig up entire plant and root and bag for proper disposal. For larger trees, cut as low to the ground as possible and apply herbicide to cut stumps.
<i>Schinus terebinthifolius</i>	Brazilian peppertree	Suppression, Containment. Monitor for occurrence and eradicate if found. May provide important habitat feature. Consult with biologist prior to removal. Remove new, small saplings.	<u>Pulling, Digging, Cut Stump</u> : For small saplings, pull/dig up entire plant and root and bag for proper disposal. For larger trees, cut as low to the ground as possible and apply herbicide to cut stumps.
<i>Silybum marianum</i>	milk thistle	Eradication/Suppression. Monitor for occurrence year-round and treat as required.	<u>Pulling, foliar application</u> : mowing mature plants before flowers can help control stands. For foliar control, spray plants when in rosette stage or actively bolting with aminopyralid or clopyralid
<i>Sisymbrium irio</i>	London rocket	Eradication/Suppression. Monitor for occurrence between November and May and treat as required.	<u>Pulling, Foliar Treatment</u> : For select occurrences, pull out entire plant and root prior to seed set and bag for proper disposal. For monotypic stands, spray with post-emergent herbicide and remove plants after senescence.
<i>Tamarix ramosissima</i> , and other <i>Tamarix</i> spp.	saltcedar, and other tamarisk species	Eradication/Suppression. Monitor for occurrence between August and February and treat as required. May provide important habitat feature. Consult with biologist prior to removal.	<u>Pulling, Cut Stump</u> : For saplings, pull out entire plant and root. For mature trees, cut and apply herbicide to cut stem and spray new shoots.
<i>Washingtonia robusta</i>	Mexican fan palm	Suppression, Containment. May provide valuable habitat for roosting bats and nesting birds. Consult with biologist prior to removal. Remove new, small saplings.	<u>Pulling, Digging, Cut Stump</u> : For saplings, pull/ dig up entire plant and root and bag for proper disposal. For larger trees, cut as low to the ground as possible and apply herbicide to cut stumps.

5.1.2 SUPPLEMENTAL WATERING

Irrigation may be used on sites where container plants or cuttings are installed (if container planting occurs). Irrigation and supplemental watering will be considered in conjunction with other restoration treatments on a site-by-site basis. Germination at seeded areas will rely on natural precipitation. Where irrigation is needed, accessible sites will have either overhead, drip- or bubbler-type irrigation systems installed that will be fed by either on-site water connection, tanks, or a water truck connection. Hand watering may also occur in small sites or sites with difficult access. Specific schedules and quantities of irrigation will depend on weather patterns and site conditions.

5.1.3 EROSION CONTROL

Temporary disturbance areas will be monitored for erosion. Any erosion issues observed will be immediately reported for remediation and repair by maintenance crews. Also, installed erosion control devices such as fiber rolls will be routinely inspected and maintained, as needed, to maintain efficacy. If still needed, degraded erosion control devices will be replaced. Erosion control during the maintenance period may involve recontouring, installation of additional fiber rolls, gravel bags, and/or jute materials, and potentially reseeding.

5.1.4 TRASH/DEBRIS REMOVAL

Trash will be removed from the restoration areas by hand during routine maintenance visits. Trash consists of all human-made materials, trash, or debris dumped, thrown, washed, or blown, and come to lay within the restoration areas. Deadwood and leaf litter of native trees and shrubs will not be removed. If illegal dumping within the site becomes a recurring issue, additional measures to prevent trespassing may be recommended, such as signage or fencing to protect the restoration area.

5.2 MONITORING AND REPORTING ACTIVITIES AND SCHEDULE

Monitoring and annual assessments will be carried out under the direction of the restoration specialist for each project phase implemented. Monitoring will begin the first spring after each phase of restoration and continue annually to assess whether the success criteria have been achieved and whether corrective measures need to be employed. To ensure the successful establishment of the sites, monitoring may be conducted more frequently as deemed appropriate for site-specific situations and during the initial establishment period. Restoration and revegetation sites will be monitored for up to three years, or less, until established success criteria are met (whichever is first). Monitoring will include an assessment of the progress and identification of potential problems with the revegetated site. If necessary, remedial action, such as additional planting, invasive non-native plant removal, supplemental watering, or erosion control, will be taken. If the restored habitat mitigation does not meet the established performance criteria after a three-year maintenance and monitoring period, then monitoring may extend beyond the three-year period until the criteria are met. The suggested monitoring schedule is presented in Table 16, *Monitoring Schedule*.

**Table 16
MONITORING SCHEDULE**

Monitoring Frequency	Submittals
Year 1-2 Qualitative assessments monthly during the growing season (November through June) and every other month during the dry season (July through October). No quantitative Monitoring unless Success Criteria (Section 5.2.6) is predicted to have been achieved by Year 2	Assessment Report
Years 3 Biannual qualitative assessments Quantitative monitoring will be conducted in spring as the restoration sites begin approaching final Success Criteria (Section 5.2.6).	Annual Report

5.2.1 DOCUMENT PRE-INSTALLATION SITE CONDITIONS

Prior to the start of installation of each project phase, the restoration specialist will document existing site conditions by taking photographs, listing all plants and animals present within the areas proposed for restoration, and noting any special conditions within the proposed restoration areas. To document the progress of the restoration effort, the restoration specialist will identify photographic documentation locations. Photo stations will be mapped with a sub-meter accuracy Global Positioning System (GPS) and plotted on a map. Photos will be used for future comparison with post-installation and annual assessment photos.

5.2.2 SITE PREPARATION/INSTALLATION MONITORING

The restoration specialist will coordinate with the installation contractor of each phase regarding all plant and seed orders and any necessary contract growing.

Prior to the start of installation, the restoration specialist will delineate the designated restoration areas in the field using a GPS with submeter accuracy to determine restoration area limits and conduct a contractor education session during the pre-construction meeting to address the sensitivity of the Project Area's resources.

To ensure that restoration is being conducted per this Plan, the restoration specialist will inspect the restoration area before installation (to authorize planting), on the first day of planting, and after all installation has been completed.

5.2.3 DOCUMENT POST-INSTALLATION SITE CONDITIONS

Following installation, the restoration specialist will document post-installation site conditions of each phase by taking photographs, listing all plants and animals present within the restoration site, and noting any special conditions within the proposed restoration site. To document the progress of the restoration effort, the restoration specialist will take photos from the previously identified photographic documentation locations. Photos will be used for future comparison with post-installation and annual assessment photos. The restoration specialist will prepare a brief as-built report summarizing any deviations from the Execution Plan and the as-built status of the restoration site.

5.2.4 MAINTENANCE MONITORING

Maintenance monitoring on each phase of the restoration area will consist of general site inspections focused on visual observations of native plant establishment and growth and other site conditions (e.g., presence of non-native plants, erosion, etc.). Monitoring memos noting any issues with plant establishment, irrigation, sediment control, etc., will be provided following each monitoring visit to the maintenance contractor and the County DPR.

5.2.5 YEAR THREE TECHNICAL MONITORING

Prior to site disturbance, the absolute cover of native perennial species from a nearby reference site will be measured for each habitat type being restored and each project phase. Year 3 technical monitoring sampling will occur by relevé, which will include approximately two percent of the work area. If the

reference data from a prior project phase is applicable to the current project phase, the same data may be used.

Technical monitoring of each restoration site will include qualitative and, in Year 3, quantitative sampling. In Years 1 and 2, sampling will include assessments of container plant survivorship, visual estimates of native cover, non-native plant cover, target invasive plant cover, and native plant recruitment, as well as lists of all plant species observed on-site. In addition, wildlife observed or detected during the annual assessment will be documented. The success of the restoration effort will be evaluated by comparing the habitat development with the established success criteria. If final performance criteria are predicted to have been achieved by the end of Year 2, a final technical quantitative monitoring may be performed.

In Year 3, quantitative sampling of vegetation cover will be used to determine cover and the percent contribution of a species to plant community composition. Species data will be collected along each transect using the point intercept line transect or relevé sampling method (California Native Plant Society's Field Sampling Protocol; Sawyer and Keeler-Wolf 1995). Locations and numbers of relevé points and line transects will be pre-determined using stratified random selection with Geographic Information Systems and marked in the field with PVC pipes. If the number and/or location of sampling relevés or transects do not provide an accurate representation of the vegetation on-site, as determined by the restoration specialist conducting the sampling (i.e., the site contains some native perennial species, but none of the stratified randomly located relevé points/transects contain the native perennial species), then the method will be adjusted using professional judgment to sample locations that accurately represent the site conditions. The sampling restoration specialist will use the data gathered in transect and relevé sampling to estimate the percent cover of native and invasive non-native vegetation for each subsequent site.

In addition to the quantitative sampling, qualitative notes will be taken, as necessary, such as the majority of native annual species or invasive non-native plant species, species recruitment, or recommended adaptive measures to facilitate achieving success criteria. Observations of wildlife within the restoration area will be documented and included in each annual report. No focused wildlife surveys will be conducted. The photo documentation stations established at the start of the restoration effort will be re-photographed each year during the annual assessment to further document the development of the restoration area.

5.2.6 SUCCESS CRITERIA AND ADAPTIVE MANAGEMENT

Monitoring and adaptive management of each revegetation site are necessary to ensure long-term native plant community establishment. Data collected prior to site development will support the long-term evaluation of revegetation targets and results.

Plant communities cannot be immediately revegetated to target mature vegetation communities with equivalent composition; therefore, the criteria for revegetation success needs to be established based on *successional* plant associations rather than mature climax vegetation (CH2M 2008). Successional stages can be identified to the extent that the initial stage of colonization, intermediate successional stage(s), and final stage or climax vegetation are predictable.

This means that instead of planning for climax vegetation that physically cannot become established and mature for some time, successional plant communities composed of species native to the area will be

the preferred target for success. By accelerating a restoration site’s initial establishment and growth in terms of diversity, density, and stature, a restoration site may be set on the correct trajectory to achieve target mature vegetation communities over a greater timeframe than the restoration program. Therefore, even when revegetation is successful, plant communities established are typically composed of pioneer and successional species adapted to disturbed substrate.

The initial species richness (often called “diversity”) of the revegetated sites will generally not be as great as any reference site. Success will be realistically linked to seedling establishment and survival, increase in the cover and species richness of perennial shrubs, and evolution of the site toward a “mature” community dominated by late-successional plant species.

Table 17, *Success Criteria for Restored/Revegetated Project Temporary Disturbance Areas*, presents the success criteria for restoration/revegetation of the Project Area for up to a three-year monitoring period. An explanation of the success criteria follows Table 17.

Table 17
SUCCESS CRITERIA FOR RESTORED/REVEGETATED PROJECT TEMPORARY DISTURBANCE AREAS

Vegetation Type	Success Criteria			
	Native Vegetation	Absolute Native Plant Cover	Native Shrub/ Tree Species Density	Maintenance
Giant reed dominated Salt cedar dominated Annual invasive non-native plant dominated Temporary disturbance areas that cannot be effectively revegetated	Native perennial species should be established with increasing total cover each year.	NA	NA	Perennial invasive non-native plant species should be reduced to less than five percent total cover. Annual invasive non-native plant species should be reduced to less than 20 percent of total relative cover. Patches of non-native species should not exceed 200 square feet.
Disturbed native habitats	80 percent of vegetation cover shall be native species that occur naturally in local native habitats. Criteria will be adjusted to account for pre-disturbance non-native grass cover.	40 percent of reference vegetation	40 percent of reference vegetation	The site shall have persisted successfully without irrigation or remedial planting for a minimum of one year prior to completion of monitoring.
Southern willow scrub	80 percent of vegetation cover or equivalent to pre-disturbance or reference cover, whichever is greater, shall be native species that occur naturally in local native habitats.			
Southern cottonwood willow riparian forest				
Southern riparian Woodland				
Mulefat scrub				
Coastal and valley freshwater marsh				
Valley sacaton grassland				

Vegetation Type	Success Criteria			Maintenance
	Native Vegetation	Absolute Native Plant Cover	Native Shrub/ Tree Species Density	
Native upland habitats (Diegan coastal sage scrub, Maritime succulent scrub, Southern maritime chaparral)				

The intent of the success criteria is to (1) prevent the sites from becoming overrun by invasive non-native plants, and (2) set meaningful and feasible criteria for replacement of native plant species (and the associated habitat values). Both criteria are based on aerial cover estimates where the sum of native plant cover, non-native plant cover, and bare ground is 100 percent (however, it should be noted that some vegetation sampling methods can produce total cover values greater than 100 percent).

The first criterion (Native vegetation) refers to the relative amounts of native and non-native cover within a given revegetation area. The criterion requires that native species make up the majority (80 percent) of vegetation cover while recognizing the fact that invasive non-native plant species will invade the site and will realistically comprise a portion (limited to 20 percent or less) of the total cover. This criterion compares native and non-native cover within a site, but it does not compare a revegetation site to reference sites or pre-disturbance conditions. However, it allows for adjustment in disturbed plant communities, where the pre-disturbance condition is dominated by non-native species.

For example, if a 10,000-square-foot revegetation site has a total (i.e., absolute) vegetation cover of 60 percent (i.e., 6,000 square feet [about twice the area of a tennis court] of the site covered by plants), comprising 4,800 square feet (about the area of a basketball court) of native plants and 1,200 square feet of non-native plants, this criterion would be met.

The second criterion (Absolute Native Plant Cover) refers to the absolute native plant cover and density within the site, as compared to reference sites or pre-disturbance conditions. It requires that native plant cover in revegetation sites reach 40 percent of the pre-disturbance or reference native plant cover, and that the density (i.e., number per acre extrapolated from a sample) of native shrubs and trees reach 40 percent. This criterion requires that revegetated sites provide meaningful native habitat values and native species cover (compared to the reference or pre-disturbance condition), while recognizing that more stringent requirements (e.g., 80 percent or higher) may not be feasible.

For example, if the pre-disturbance or reference condition is 80 percent native plant cover, with the remaining 20 percent comprised of non-natives or bare ground, the example above would apply. The revegetation site must achieve 40 percent of 80 percent (i.e., 32 percent) cover of native plants. Using the example above, a 10,000-square-foot revegetation site should have 3,200 square feet covered by native plants. Additionally, if the reference site supports 1,000 native shrubs per acre (Native Tree / Shrub Species Density), then the revegetation site must support 40 percent of that density (i.e., 400 native shrubs/acre). The site may also include some cover of non-native plants, per the first criterion, but the non-natives do not count toward the native plant cover and must not exceed 800 square feet of the site.

Together the two criteria ensure that revegetation is deemed successful when sites have (1) at least 40 percent native species cover and density compared to pre-disturbance or reference vegetation, and (2) no more than 20 percent relative cover of non-native plants within the site.

Table 18, *Success Criteria Scenarios*, includes example scenarios of the success criteria calculations.

**Table 18
SUCCESS CRITERIA SCENARIOS**

Revegetation Site Absolute Cover			
Reference Site Absolute Native Cover	Total Absolute Cover ²	Required Minimum Native Cover (40% x Reference Native Cover)	Maximum Non-Native Cover ¹
100%	50%	40%	10%
90%	45%	36%	9%
80%	40%	32%	8%
70%	35%	28%	7%
60%	30%	24%	6%
50%	25%	20%	5%
40%	20%	16%	4%
30%	15%	12%	3%
20%	10%	8%	2%
10%	5%	4%	1%

¹ Assumes minimum required native cover from column 2.

² Assumes minimum native cover + 20% max non-native relative cover. For all rows, the ratio of native to non-native cover is 80:20.

Impacted areas will be inspected for species on the Cal-IPC list of invasive non-native plants. If found, measures will be implemented to ensure they are treated and removed.

If plant survival or vegetation cover is not meeting success criteria, remedial planting, and maintenance measures, such as irrigation or weeding, will occur.

During the initial establishment period, erosion-control measures may be implemented. The measures are incorporated as part of the overall restoration plan; however, inspections and repairs may be necessary and should be completed as soon as problems occur.

If the restoration efforts fail to meet the success criteria, adaptive management may be required. Adaptive management may include re-planting/reseeding, drainage repairs, adjustments to irrigation or weeding schedule, or extension of maintenance beyond the original schedule to repair or remediate sites not on track to meet, or not meeting, success criteria by the end of the monitoring period. Any sites not meeting success criteria within three years will be evaluated for alternative actions.

Additional reference data may be collected and analyzed throughout the duration of the monitoring period and the results applied to modify restoration techniques or success criteria as a component of the adaptive management approach as appropriate.

Though the ultimate long-term goal will be to re-establish native perennial species in scrub or woodland habitats, the cover of woody perennial species (especially in arid environments) can be slow to increase. As such, if a site is not meeting the quantitative success standard listed in Table 18 at the end of the

monitoring period, the site may be evaluated using additional measures to determine if the site has achieved a positive trajectory toward a stable, native community. For example, if shrub cover is low but the density of shrub seedlings indicates species are becoming established, then the site may be considered on a trajectory toward success. Remedial measures may be needed, and the monitoring period will be extended until the site achieves success. In herbaceous vegetation (but not shrubland or woodland vegetation), if native annual species cover is high and stays high for well after the initial seeding, then the site may be considered successful as it has reached an early successional status of native species that are successfully regenerating.

For herbaceous habitats being restored within a matrix of non-native species, establishing native perennials can be difficult even under the best circumstances. If a site is not meeting the relative cover criteria but has an absolute cover of all plant species (including non-natives present in the undisturbed community, but not including invasive non-native species targeted for control) that is near the absolute cover of the adjacent or reference community, then it may be considered successful.

For all revegetation or restoration areas, if a fire, flood, or other disturbance beyond control damages a revegetation area within the monitoring period, then the County DRP shall be responsible for a one-time replacement. If a second event occurs, then no replanting is required, unless the event is caused by the County's activity (based upon the maintenance of erosion control measures; fencing, gates, or other site control; or investigation by a firefighting agency).

5.2.7 REPORTING

The restoration specialist will document each phased restoration effort in a post-installation letter report, maintenance monitoring memos during the maintenance/monitoring period, and in up to three annual reports.

The post-installation letter report will describe site preparation, installation methods, and the post-installation status of the restoration areas. To document the implementation of the HRP and baseline site conditions, the letter will include a graphic or an aerial photo base, as well as photos taken from the designated photo stations before and after restoration activities have been conducted. It will be submitted to County DPR within six weeks of the completion of installation.

Maintenance monitoring memos will summarize all maintenance and monitoring dates, activities, and observations, will include recommendations, if needed, to keep the restoration on track to meeting final success criteria, and will include a photo log. Memos will be submitted following monitoring events. If any issues are observed during monitoring events, they will be communicated to County DPR and the maintenance contractor within a few days of the site visit via email. Any significant issue or contingency that arises on the job site (e.g., major plant survival issues, fire, or flooding) shall be reported in writing to County DPR within two weeks from the date of the incident. If necessary, County DPR and the restoration specialist will prepare a plan for remediation, including an implementation schedule and monitoring schedule.

A single annual report will be prepared and submitted to the County within 90 days (about three months) after completion of each year of revegetation and restoration work, which would then be submitted to the pertinent regulatory agencies. The first year of site development will generally be defined as when the site has completed a full growing season (spring through summer for riparian habitats and fall to spring for upland habitats). Each annual report will include results of quantitative and

qualitative monitoring efforts for all active phases and address success standards and measures to correct underperformance, as needed.

The annual monitoring reports will be based on field observations and measurements and will record the condition of the restoration and revegetation areas. The monitoring period will begin after the completion of the revegetation effort. The monitoring reports will include, but may not be limited to, the following information:

- Total vegetation acreage subject to temporary disturbance.
- Dates and descriptions of reclamation, revegetation, and monitoring activities conducted during the reporting period, including the timing and frequency of data collection, invasive non-native plant control, and maintenance activities.
- Description of the general health and vigor of the plants.
- Description of any pests or circumstances affecting the plants.
- Description of any changes in the physical environment of the plants since the end of the previous reporting period and since the beginning of the monitoring period.
- Presentation of monitoring data and discussion of whether success criteria for the year were met.
- If it is determined that the restoration has not been successful, then the suspected causes of failure and identification of any adaptive management measures necessary for the success of the restoration effort will be noted.

5.2.8 NOTIFICATION OF COMPLETION AND AGENCY CONFIRMATION

Restoration activities will be considered complete when the final success criteria have all been met according to each project phase. The County DPR will be notified of the completion of each phase of the habitat restoration effort through the submittal of a final (Year 3) monitoring report by the restoration specialist, which will then be submitted to the pertinent regulatory agencies. After receipt of the final monitoring report, County DPR and regulatory agencies may inspect the habitat restoration area to determine the success of the restoration effort, which will be based on the restoration area meeting all success standards included in this Plan. If these standards are not met by the end of Year 3, the maintenance and monitoring program may be extended until the standards are met, subject to County DPR discretion. Specific remedial measures (approved by County DPR and regulatory agencies) will be used during any extension. Monitoring extensions will be done only for restoration areas that fail to meet final success criteria. This process will continue until all Year 3 success criteria are attained or until County DPR and regulatory agencies determine that remedial measures are appropriate. Should the habitat restoration effort meet all goals prior to the end of an up to three-year monitoring period, County DPR and regulatory agencies, at their discretion, may terminate the maintenance and monitoring effort. If requested, a site visit may be conducted with County DPR and regulatory agencies to verify site conditions.

Criteria to evaluate such sites may include qualitative observations such as whether the soils are stable and weeds are under control, signs of successful natural recruitment such as perennial seedlings that may not provide significant cover but are becoming established and will eventually provide higher cover, successful establishment of native annual populations that appear self-sustaining, or other potential measures. For these sites, remedial measures will be taken as needed using adaptive-management

strategies. The monitoring periods will be extended as needed to document the achievement of the established success criteria.

6.0 CONTINGENCY MEASURE

6.1 INITIATING CONTINGENCY MEASURES

Where adaptive management has tightly structured measures to be implemented based upon observed results, contingency measures are more loosely structured changes in project direction. Contingency measures may be warranted in order to address changed circumstances within a project phase or changed circumstances over several project phases. For instance, in the event of a disease or insect outbreak, such as the rapid explosion of KSHB within the Tijuana River Valley (Section 2.5), the County DPR may change courses and take measures to restore defoliated forest habitat by reprioritizing funds for forest restoration or tree thinning in lieu of planting and weed control.

If County DPR determines upon receipt of any of the annual monitoring reports that the habitat restoration effort is not meeting success standards due to changed circumstances, they may discuss the implementation of contingency measures with the restoration specialist.

6.2 FUNDING

County DPR shall be responsible for all costs associated with any remedial measures beyond the grant budget.

7.0 LONG TERM MANAGEMENT

Following completion of the Project, long-term maintenance and management of the restoration site will be executed by County DPR. Specifically, the site will be part of the DPR Preserve, and as such, will be patrolled regularly by County DPR rangers. Park rangers may hand pull any invasive non-native plants in the early stages of growth that are observed during patrols and communicate observations of new or problematic invasive non-native plant species infestations to County DPR district managers and/or Resource Management Division staff. Follow-up treatment will then be organized and implemented through coordination with the County of San Diego Department of Agriculture, Weights, and Measures, which has licensed invasive non-native plant control staff.

8.0 LIST OF PREPARERS

Aaron Brownwood	B.S., City and Regional Planning, California Polytechnic State University, San Luis Obispo, 2005
Justin Fischbeck	B.S., Biology, Emphasis in Ecology Behavior and Evolution, University of California, San Diego, 1998
Yara Fisher	M.S., Urban and Regional Planning, University of California, Irvine, 1998 B.S, Political Science, University of California, San Diego, 1995
Linda Garcia	M.A., English, Nation University, San Diego, 2012 B.A., Literatures in English, University of California, San Diego, 2003
Rebecca Kress	B.A., Geography, State University of New York, Geneseo, 1999
Thomas Liddicoat	B.S., Biology, Emphasis in Ecology, San Diego State University, 2005
Lauren Mignea	B.S., Environmental Science, University of California, Los Angeles, 2015
Karl Osmundson	B.S., Wildlife, Fish, and Conservation Biology, University of California, Davis, 2003
Benjamin Rosenbaum	B.S., Biology, Emphasis in Ecology, San Diego State University, 2009
Pete Tomsovic *†	B.S., Ecology and Systemic Biology, California Polytechnic State University, San Luis Obispo, 1997
Stacie Wilson	M.S., Applied Geographical Information Science, Northern Arizona University, 2008 B.S., Biological Psychology, University of California, San Diego, 2001 B.A., Anthropology, University of California, San Diego, 2001

*Primary report author

†County-approved Revegetation Planning Consultant

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