O-8 THE CHAPARRAL LANDS CONSERVANCY

Comment Letter O-8

The Chaparral Lands Conservancy

PRESERVING CALIFORNIA'S SHRUBLAND ECOSYSTEMS

April 16, 2018

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Subject: Draft Environmental Report for the Otay Ranch Village 14 and Planning Areas 16/19; PDS2016-SP-16-002; PDS2016-GPA-16-008; PDS2016-REZ-16-006; PDS2016-TM-5616; PDS2016-STP-16-027; PDS2016-ER-16-19-006

Thank you for the opportunity to comment on the Draft Environmental Report for the Otay Ranch Village 14 and Planning Areas 16/19 (Otay Ranch project; DEIR). O-8-1

Introduction

The Chaparral Lands Conservancy (TCLC) is a non-profit environmental organization with a mission to protect shrubland ecosystems as an integral and beautiful feature of California's natural landscape through land preservation and stewardship. TCLC was founded in 2009 to advance the conservation of shrublands, related ecosystems, dependent plants and animals and especially endangered species through acquisition of land and/or management rights, habitat restoration and enhancement, stewardship, research, and education. O-8-2

In 2012, TCLC released its *Proctor Valley Vernal Pool Restoration Plan*, a document prepared by TCLC and contractor AECOM (Attachment 1). The purpose of the plan was to attempt to thoroughly document the distribution of vernal pools on public lands in Proctor Valley including the Otay Lakes Cornerstone Lands preserve, Rancho Jamul Ecological Reserve, and San Diego National Wildlife Refuge as well as to identify sites and opportunities for possible future vernal pool habitat restoration projects. The plan includes a discussion of past documented vernal pools and the results of vernal pool surveys in the 2011 water year, a period of above average rainfall. In some cases, vernal pools were also O-8-3

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mapped on Otay Ranch where surveyors were uncertain of the exact location of property lines during surveys on adjacent preserve properties. Wet season protocol fairy shrimp surveys were also conducted during 2011 water year with results presented in the plan and reported to the U.S. Fish and Wildlife Service in accordance with surveyor's fairy shrimp survey permits. GIS files containing TCLC vernal pool and fairy shrimp survey results have been provided to Otay Ranch project contractor Dudek and Associates for use in field work and preparation of the Otay Ranch project DEIR.

O-8-3 Cont.

Since the 2012 report, TCLC and contracting biologists have conducted a number of additional vernal pool and fairy shrimp surveys. These surveys were primarily conducted on the site of TCLC's *Proctor Valley ORV Site Vernal Pool and Uplands Habitat Restoration Project* on the City of San Diego's Otay Lakes Cornerstone Lands preserve bordering the Otay Ranch project (TCLC restoration project) as well as on a site used to monitor vernal pool control conditions located near the Otay Ranch project on the Rancho Jamul Ecological Reserve. The U.S. Geological Survey has also conducted surveys for Western spadefoot toads (*Spea hammondii*) on preserve lands in Proctor Valley and may have data available for consideration for the Otay Ranch project.

O-8-4

In 2012, after several years of planning, permitting, and fundraising, TCLC contractors began implementing the *Proctor Valley ORV Site A Vernal Pool & Uplands Habitat Restoration Project* on the City of San Diego's Otay Lakes Cornerstone Lands preserve west of the central Otay Ranch Village 14 development area and west of the current Proctor Valley Road (Attachment 2[1]). And in 2015 TCLC contractors began implementing the *Proctor Valley ORV Site B Vernal Pool & Uplands Habitat Restoration Project* just east of the current Proctor Valley Road and bordering the central Otay Ranch Village 14 development area (Attachment 3[2]). Altogether, TCLC's restoration projects will attempt to enhance or restore approximately one hundred vernal pools on ten acres, restore coastal sage scrub and native grasslands on nine additional acres surrounding the vernal pools, attempt to supplement or establish populations of appropriate listed and sensitive vernal pool species, and provide particular habitat elements suitable for several listed and sensitive upland species (e.g. artificial Burrowing owl burrows and host and food plant seed mix for Quino checkerspot butterfly). One longer term goal for the TCLC restoration project is to obliterate Proctor Valley Road and to restore vernal pools and uplands where the road currently bisects the TCLC restoration project sites A and B.

O-8-5

TCLC has also recently initiated planning and fundraising for the *Rancho Jamul Vernal Pool & Uplands Habitat Restoration Project* in partnership with the California Department of Fish and Wildlife to enhance and restore approximately seventeen vernal pools and surrounding upland vegetation and to

O-8-6

1. Please note that mapped vernal pool locations shown in Attachment 2 supersede vernal pool locations in the same area in Attachment 1.
2. Please note that mapped vernal pool locations and species shown in Attachment 3 supersede maps of the same area in Attachment 1.

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supplement or establish populations of appropriate listed and sensitive species on the Rancho Jamul Ecological Reserve. This restoration project would be located just north of the realigned Proctor Valley Road between Otay Ranch project Village 14 and Planning Areas 16/19 (Attachment 4). O-8-6 Cont.

Vernal Pools, Vernal Pool Sensitive Species, & Other Wetlands

Construction of the Otay Ranch project could result in significant direct and indirect impacts to vernal pools, vernal pool listed and sensitive species, and other wetlands that should be addressed with project design and/or mitigation. O-8-7

The Otay Ranch project DEIR appears to omit disclosure of a number of vernal pool areas on or near the Otay Ranch project, some of which were documented in a 1992 document, *Report on the Flora of Otay Ranch Vernal Pools, 1990 - 1991* prepared by Dudek and Associates (Dudek report; excerpted in Attachment 5). The DEIR also appears to omit the results of several protocol surveys conducted for fairy shrimp in Proctor Valley that are available from the U.S. Fish and Wildlife Service and that in turn show the locations of several more vernal pools supporting this species than are identified in the DEIR. And the DEIR appears to omit a number of vernal pools and floodplain scour pool wetlands identified in TCLC's *Proctor Valley Vernal Pool Restoration Plan*. O-8-8

In particular, the DEIR appears to entirely omit the "R2+" and "R4+" vernal pool areas identified in the Dudek report. The Dudek report identified nine basins in the R2+ vernal pool area, an area that still supports relatively undisturbed vernal pools on Otay Ranch property just east of the western Village 14 development area identified for construction of "Semi-Rural Ranchettes (4 ac min.)". Some of the R2+ pools could be directly or indirectly impacted by construction of the western Village 14 development area and associated rural residential road. The Dudek report also identified three basins in the R4+ vernal pool area located in the western portion of the western Planning Areas 16/19, all of which would be lost with proposed development of Planning Areas 16/19. O-8-9 O-8-10 O-8-11

The Dudek Report also identified three "R3+" vernal pools in the same area as seven "features" identified in the DEIR on the Rancho Jamul Ecological Reserve between Otay Ranch project Village 14 and Planning Areas 16/19. According to the DEIR, two of these features support San Diego fairy shrimp (*Branchinecta sandiegonensis*) and one supports Western spadefoot toads. But the Dudek report also identified a population of San Diego button-celery (*Eryngium aristulatum* var. *parishii*) at this site. TCLC uses this R3+ site to track control conditions for comparison to vernal pools on the TCLC restoration project and this is also the site of TCLC's planned *Rancho Jamul Vernal Pool & Uplands Habitat Restoration Project* (Attachment 4). From surveys associated with these activities, TCLC has identified a total of seventeen vernal pools at the R3+ site including seven pools supporting San Diego fairy shrimp, two supporting San Diego button-celery, and the same pool identified in the DEIR as supporting Western spadefoot toads (Attachment 4). These pools could be subject to indirect edge O-8-12 O-8-13 O-8-14

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effects from the construction of the nearby Village 14 and Planning Areas 16/19 as well as from construction and edge effects from the realigned Proctor Valley Road that would be located immediately south of the R3+ site. Mitigation for impacts to vernal pools on the Rancho Jamul Ecological Reserve or elsewhere on the Otay Ranch project could be accomplished in part with provision of funding to TCLC for the planned *Rancho Jamul Vernal Pool & Uplands Habitat Restoration Project* at the R3+ site.

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More vernal pools and listed and sensitive vernal pool species are located on the Otay Lakes Cornerstone Lands preserve just west of the central Village 14 development area. The Dudek report identified nineteen "R1" pools in this area and the DEIR identifies nearly the same number of "features". This is the same site as the TCLC restoration project where TCLC and biologist contractors have identified approximately forty-seven vernal pools west of the central Village 14 development area and east of the current Proctor Valley Road, thirteen of which support San Diego fairy shrimp, two that support vernal pool pincushion plant seeded as part of the TCLC restoration project, and two that support western spadefoot toads (Attachment 3).

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Also, as shown in the Attachment 6 map, the watershed for the R1 vernal pools located on the Otay Lakes Cornerstone Lands preserve and for the TCLC restoration project originates well inside the central Village 14 development area[3]. During higher rainfall events, TCLC staff have observed rainwater sheet flow from this watershed into a natural system of swales and vernal pools on the Cornerstone Lands preserve that in turn contributes to ponding of the R1 vernal pools. Evidence of such flows can be viewed near the property line between the Cornerstone Lands preserve and central Village 14 development area where sheet flows are partially intercepted and captured on old dirt roads and ORV tracks to form eroded gullies. Development of the central portion of Village 14 and resulting alteration of this vernal pool watershed could therefore result in significant indirect impacts to vernal pools, listed and sensitive vernal pool species, designated critical habitat, and the TCLC restoration project in this area. TCLC respectfully requests that Otay Ranch project impacts to this vernal pool watershed be mitigated in part by project design elements to provide filtered storm water runoff from the project into the adjacent vernal pool area. This could be accomplished with construction of a drainage system in the western portion of the central Village 14 development area to collect and direct storm water to a detention basin(s), through a gravity filtration system, and through a percolation area providing for dispersed discharge of filtered storm water at the property line with the Cornerstone Lands preserve in the vicinity of the "Scenic Park (P-3)" and adjacent "RMP Preserve Interface/Transitional Area" and just upslope of the R1 vernal pool area and the TCLC restoration project. TCLC respectfully requests additional mitigation for any impacts to vernal pools in this area with provision of funding to TCLC to restore vernal pools on the nearby section of Proctor Valley Road on the Cornerstone Lands preserve to be abandoned where it bisects the TCLC restoration project.

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3. This map was prepared as a condition of a permit from the U.S. Fish and Wildlife Service.

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Other additional vernal pools and possible vernal pools identified by TCLC and TCLC contractors are located on the Otay Lakes Cornerstone Lands preserve immediately west and south of the Otay Ranch project southern Village 14 development area with at least two pools supporting San Diego fairy shrimp (Attachment 1 figures 3d and 3f). Mapped possible vernal pools in this area should be surveyed for branchiopods, and these pools may be indirectly impacted by construction and edge effects from the southern Village 14 development area and realigned Proctor Valley Road. O-8-20 O-8-21

Several artificial vernal pools supporting populations of Western spadefoot toads and some species of fairy shrimp (identification unknown) as well as several unique flood plain scour pool wetlands were identified by TCLC and TCLC contractors on the Otay Lakes Cornerstone Lands preserve near the current Proctor Valley Road crossing of Proctor Valley Creek (Attachment 1 figures 3b and 3c). These vernal pools may be indirectly impacted by construction and edge effects from the Otay Ranch project and realigned Proctor Valley Road. And construction of the realigned Proctor Valley Road may directly and indirectly impact several of the floodplain scour pool wetlands. O-8-22

All Proctor Valley vernal pools omitted from the Otay Ranch project DEIR are not necessarily described in this text. Please see Attachments 1 through 6 for information on the location of all vernal pools, vernal pool species, and other wetlands documented by TCLC. O-8-23

Proctor Valley Creek Hydrology, Wetlands, and Wildlife Movement

Construction of several Otay Ranch project road crossings of Proctor Valley Creek and major tributaries could result in significant impacts to hydrology and wetlands on the Otay Lakes Cornerstone Lands preserve and Rancho Jamul Ecological Reserve that should be addressed with project design and/or mitigation. O-8-24

The Otay Ranch project would realign and construct Proctor Valley Road to cross the ephemeral Proctor Valley Creek on the City of San Diego's Otay Lakes Cornerstone Lands preserve southwest of the southern Village 14 development area. This area is important to the hydrologic function of Proctor Valley Creek, supports several unique flood plain scour pool wetlands (Attachment 1 figures 3b and 3c), and is an important wildlife movement corridor. Construction of the realigned Proctor Valley Road would directly and indirectly impact several of the flood plain scour pool wetlands and the hydrology of Proctor Valley Creek could be compromised depending on the type of crossing constructed in this location. Culverts or bridges that span just a primary creek channel can result in constriction of high flows upstream as water backs up behind the structure constricting the flood plain as well as in accelerated scouring flows downstream as water is forced through the constricting structure. At this road crossing, the entire floodplain of Proctor Valley Creek and not just the primary creek channel should be bridged to prevent alteration of hydrology, resulting channel modification, scouring, and erosion, and other potentially significant impacts to Proctor Valley Creek and wetlands upstream and downstream of O-8-25 O-8-26

the road crossing. A bridge spanning the entire flood plain would also minimize potentially significant impacts and maintain the function of this important wildlife corridor. The proposed realignment of the Proctor Valley Road crossing of Proctor Valley Creek at this location should also be adjusted to avoid impacts to the unique scour pool wetlands.

O-8-26 Cont.

Proctor Valley Road would also be realigned and constructed to cross a major ephemeral tributary to Proctor Valley Creek on the Otay Lakes Cornerstone Lands preserve between the southern and central Village 14 development areas. This tributary is important to the hydrologic function of Proctor Valley Creek and is another important wildlife movement corridor. At this road crossing, the entire floodplain of this tributary should be bridged to prevent alteration of hydrology, resulting channel modification, scouring, and erosion, and other significant impacts to this tributary and nearby Proctor Valley Creek. A bridge spanning the entire flood plain would also minimize potentially significant impacts and maintain the function of this important wildlife corridor.

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A "Rural Residential Road" would also be constructed to cross Proctor Valley Creek to access the western development area of Village 14 identified for construction of "Semi-Rural Ranchettes (4 ac min.)" This area is important to the hydrologic function of Proctor Valley Creek and is an important wildlife movement corridor. At this road crossing, the entire floodplain of Proctor Valley Creek and not just the primary creek channel should be bridged to prevent alteration of hydrology, resulting channel modification, scouring, and erosion, and other significant impacts to Proctor Valley Creek and wetlands upstream and downstream of the road crossing. A bridge spanning the entire flood plain would also minimize potentially significant impacts and maintain the function of this important wildlife corridor.

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Storm Water

The flow of storm water runoff from the Otay Ranch project onto the Otay Lakes Cornerstone Lands preserve and Rancho Jamul Ecological Reserve could result in erosion, pollution, and destruction of wetlands among other significant impacts that should be addressed with project design and/or mitigation.

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Please explain how storm water runoff flowing from Otay Ranch project areas onto preserve lands will be prevented or, if storm water runoff onto preserve lands will continue, how impacts from erosion, pollution, and effects of storm water runoff would be minimized to below a level of significance. In particular, how will storm water runoff from the "Single family 2" "R-5" and R-6" areas of Village 14 and water polluted with animal waste from the dog parks in the Scenic Park (P-3) be prevented from draining directly onto the adjacent, lower elevation vernal pool area and the TCLC restoration project on the Cornerstone Lands preserve? And how will modification of natural runoff in this area be prevented from harming vernal pool hydrology and the TCLC restoration project?

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Unauthorized Public Access

Unauthorized public recreation and vehicle access from Otay Ranch project development areas, roads, and legitimate trails could result in significant impacts to sensitive biological resources among others and should be addressed with project design and/or mitigation. O-8-33

Unauthorized off-road vehicle use is a long-standing problem in Proctor Valley and is likely to worsen with the addition of thousands of new residents seeking recreational activities along with construction of several new roads bordering the Otay Lakes Cornerstone Lands preserve, Otay Ranch open space, and the Rancho Jamul Ecological Reserve. O-8-34 Unauthorized mountain biking is also increasing and significant additional mountain bike use is likely with the addition of thousands of new residents to Otay Ranch. O-8-35

In particular, the height of the conceptual "5' Tubular Steel Perimeter Fence" at several "Public Parks" should be raised to 6ft. to reduce the likelihood that developed parks are used as gateways for unauthorized public recreation access to closed areas of the Otay Lakes Cornerstone Lands preserve, Otay Ranch open space, and Rancho Jamul Ecological Reserve. For example, the height of perimeter fence along the western edge of Scenic Park (P-3) should be raised to limit unauthorized, direct public access to the adjacent R1 vernal pool area and the TCLC restoration project on the Cornerstone Lands preserve as well as to nearby open space on Otay Ranch that could in turn be used to access the R1 vernal pool area and the TCLC restoration project. O-8-36

Taller tubular steel fence should also be used to prevent unauthorized public access from the "Community Pathway", "Park to Park Loop", and "DG Walkway" onto the Otay Lakes Cornerstone Lands preserve, Otay Ranch open space, and Rancho Jamul Ecological Reserve except where this would interfere with important wildlife movement corridors in which case more wildlife-friendly fencing should be used.

Fencing strong enough to resist vehicle access should also be used to prevent unauthorized vehicle access from Proctor Valley Road and any other Otay Ranch roads bordering the Cornerstone Lands preserve, Otay Ranch open space, and Rancho Jamul Ecological Reserve. In these areas, two layers of fencing may be necessary with tall tubular steel fence to limit non-motorized vehicle access (except where this would interfere with important wildlife movement corridors in which case more wildlife-friendly fencing should be used) and larger diameter tube steel vehicle barriers similar to those now in use along the current Proctor Valley Road installed along the realigned Proctor Valley Road where it crosses preserve lands as well as along Otay Ranch project roads bordering any preserve lands. O-8-37

All motorized off-road vehicles including electric mountain bikes should be prohibited on the Otay Ranch project "Community Pathway", "Park to Park Loop", "DG Walkway" and any other legitimate project paths or trails. O-8-38

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Mitigation for Project Impacts to Preserve Lands

Habitat restoration mitigation for impacts to biological resources resulting from construction of the realigned Proctor Valley Road on the Otay Lakes Cornerstone Lands preserve and Rancho Jamul Ecological Reserve should be located on the same preserves elsewhere in Proctor Valley. With two exceptions, in those areas where the current Proctor Valley Road on preserve lands will be abandoned for a new alignment, the old roadbed should be obliterated and habitat restored on the same preserve lands as part of mitigation for construction of the project's realigned Proctor Valley Road across preserve lands. Vehicle barriers, gates, rock rip rap, and wire fence should also be removed during obliteration of the abandoned sections of Proctor Valley Road with the exception of wire fence and worker access gates around the TCLC restoration project on the Cornerstone Lands preserve adjacent to the central Village 14 development area.

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For the two exceptions to obliteration of the old Proctor Valley Road, driveways and gates should be provided on either Otay Ranch development areas adjacent to the Rancho Jamul Ecological Reserve or from the realigned Proctor Valley Road where it crosses the Reserve to access the old Proctor Valley Road and two planned or possible vernal pool restoration sites on the Reserve near the old Road. Please see TCLC comments on Restoration Project Access below.

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Invasive Plant Weeds

The inevitable origin and spread of invasive plant weeds from the Otay Ranch project poses a significant threat to the ecology of the Otay Lakes Cornerstone Lands preserve, Rancho Jamul Ecological Reserve, and Otay Ranch open space and should be addressed with project design, conditions, and mitigation.

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To address this potentially significant impact, any invasive plants or potentially invasive plants identified by in the California Invasive Plant Council inventory should be prohibited from use anywhere in the Otay Ranch project area. The Otay Ranch project should also provide endowments for use by the California Department of Fish and Wildlife and City of San Diego Public Utilities Department adequate to fund in perpetuity at least one full-time staff position and expenses for each agency to control invasive plant weeds on preserve lands in Proctor Valley that will inevitably spread from the Otay Ranch project. A similar endowment should be established to fund invasive plant control and any other necessary stewardship management by the Otay Ranch Preserve Owner/Manager on Otay Ranch open space in Proctor Valley.

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Restoration Project Access

TCLC respectfully requests that the Otay Ranch project include driveways and gates in three particular areas to access current, planned, and possible vernal pool restoration projects from either Otay Ranch development areas bordering adjacent preserve lands or from the realigned Proctor Valley Road. O-8-45

TCLC requests a driveway and vehicle gate on the realigned Proctor Valley Road to provide official access to the Otay Lakes Cornerstone Lands preserve and the TCLC restoration project west of the central Village 14 development area. This access point could be located on Proctor Valley Road just south of the southwest corner of the central Village 14 development area in order to connect to one of two existing dirt roads in this area on the Cornerstone Lands preserve that in turn provide access to the TCLC restoration project site. O-8-46

TCLC requests a second driveway and vehicle gate along the edge of the "Village Core" area in the northern portion of the central Village 14 development area to connect to the old Proctor Valley Road and a possible vernal pool restoration site on the Rancho Jamul Ecological Reserve between the central and northern Village 14 development areas (Attachment 1 Figure 6g). O-8-47

TCLC requests a third driveway and vehicle gate from the northern portion of the northern Village 14 development area to connect to the old Proctor Valley Road and TCLC's planned *Rancho Jamul Vernal Pool & Uplands Habitat Restoration Project* at the R3+ vernal pool site on the Rancho Jamul Ecological Reserve between Village 14 and Planning Areas 16/19. O-8-48

Requested driveways and gates should provide space adequate for vehicles to safely park off Proctor Valley Road or Otay Ranch project streets while opening the gates. The gates should use tall tubular steel fence to limit unauthorized public access and the driveways should be graveled. Permission should be secured from preserve agency property owners prior to a final decision, location, and design of these requested official vehicle access points. O-8-49

Thank you for your consideration. Please contact David Hogan with any questions at 760 809-9244 or director@chaparralconservancy.org. O-8-50

Sincerely,

David Hogan, Executive Director

ATTACHMENT 1

O-8-51

PROCTOR VALLEY VERNAL POOL RESTORATION PLAN

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September 2012

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CHAPTER 1.0 – INTRODUCTION

1.1 PROJECT OVERVIEW

Several conserved properties in Proctor Valley have been identified as priority candidates for restoration of native habitat and sensitive species. In particular, Proctor Valley provides a unique opportunity to protect and restore one of California's rarest wetland ecosystems, vernal pools, amidst a large and relatively intact natural landscape. This *Proctor Valley Vernal Pool Restoration Plan* (Restoration Plan), prepared and funded by The Chaparral Lands Conservancy in cooperation with several property owner resource agencies, is intended to describe the extent of existing vernal pool resources and to recommend the technical details necessary to implement regional goals for restoration of vernal pools and dependent sensitive species as applied to several specific sites in Proctor Valley. This plan also addresses restoration of nearby upland vegetation in local vernal pool watersheds – coastal sage scrub, native grasslands, and chaparral. In addition to primary benefits for vernal pools and species, restoration of upland vegetation would directly incorporate and benefit numerous other sensitive species.

Proctor Valley is an integral component of an extensive tapestry of protected habitat land (Figure 4). Proctor Valley is considered a "biological core area" under the *San Diego Multiple Species Conservation Plan* (MSCP) and supports many sensitive habitats (e.g. coastal sage scrub, native grasslands, non-native grasslands, riparian scrub, vernal pools) and over twenty MSCP covered species. Following years of concerted efforts to acquire sensitive properties, the majority of Proctor Valley is now protected by several resource agencies: The City of San Diego Public Utilities Department (City) owns and manages MSCP "Cornerstone Lands" (Cornerstone Lands); the California Department of Fish and Game (CDFG) manages the nearby Rancho Jamul Ecological Reserve (RJER); and the U.S. Fish and Wildlife Service (USFWS) manages the San Diego National Wildlife Refuge (SDNWR). A designated hard-line preserve on the private Otay Ranch property in Proctor Valley (Otay Ranch Preserve) will eventually be managed by one or more of these resource agencies following dedication of mitigation land following development elsewhere on Otay Ranch.

The Conservancy has secured significant funding and is preparing to begin work on the first intensive vernal pool restoration project in Proctor Valley located at "ORV Site A" on City Cornerstone Lands. The Conservancy has planned and prepared the project in coordination and with permission of the property owner, the City of San Diego Public Utilities Department as well as the U.S Fish and Wildlife Service's Partners for Fish and Wildlife program. Technical aspects

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of the project such as grading, greenhouse propagation, weeding, seeding, and planting will be implemented by expert consultants. Technical work by the consultants will be complimented with non-technical volunteer labor organized by the Conservancy such as planting container upland plants, watering, and fence construction. This arrangement provides a collaborative model for vernal pool restoration at other sites in Proctor Valley where volunteers who directly assist with restoration work develop a valuable sense of protective "ownership" with the projects.

1.2 RESTORATION PLANNING AREA

Proctor Valley is located in rural southwest San Diego County east of the City of Chula Vista community of Rolling Hills Ranch, northeast of Upper Otay Lake, and west of the unincorporated community of Jamul (Figure 1). Vernal pools and recommended vernal pool restoration areas are distributed throughout Proctor Valley. The majority of Proctor Valley vernal pools are located in valley-bottom areas of Lower (southwestern) Proctor Valley. Other pools are located on hilltops and valley slopes in Upper (northeastern) Proctor Valley (Figures 2a and 2b).

1.3 SUMMARY OF RECOMMENDED RESTORATION ACTIVITIES

The following is a summary of recommended Proctor Valley vernal pool and upland vegetation restoration activities:

- Restore vernal pools and nearby upland watershed vegetation (coastal sage scrub, native grassland, chaparral)
- Directly increase populations of seven listed or sensitive vernal pool plants and animals
- Increase populations of eleven sensitive upland plants
- Indirectly benefit ten sensitive vernal pool and upland animals
- Install supplemental perimeter fencing and closure signs as needed at restoration sites
- Install vernal pool interpretive kiosks
- Organize volunteers to assist with non-technical restoration activities

Vernal pool restoration in Proctor Valley is considered a priority for several reasons. Vernal pool restoration would compliment and build on significant recent conservation investments in Proctor Valley including large conservation property acquisitions, construction of miles of fencing and new vehicle barriers, and increased patrols. Unlike many remnant vernal pools in San Diego County that have been severely isolated by development, those in Proctor Valley are still an integral component of a larger, interconnected natural open space preserve system under

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Figure 1
Regional Map

Proctor Valley Vernal Pool Management Plan
F:\2009\09080192 Carmel Mountain\5.0 Graphics (Non-CAD)\5.4 Proj_Graphics\Figures\Fig 1map.ai (augellop) 2/04/11

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the MSCP. Several imperiled vernal pool species persist in Proctor Valley despite significant past harm from off-road vehicle use, invasive weeds, dumping, grazing, and other activities. And resource agency property owners are eager to compliment land acquisition activities with restoration of specific sensitive resources like vernal pools consistent with goals of the MSCP.

Effective public outreach is one critical element of habitat restoration work. For vernal pool restoration in Proctor Valley, the Conservancy will conduct educational outreach to foster awareness of the importance of vernal pools in general and the restoration projects in particular. Interpretive kiosks would be constructed at the edge of restoration sites abutting Proctor Valley Road and will provide educational material on vernal pool ecology, conservation, and the restoration projects, and on prohibition of ORV activity and trash dumping in Proctor Valley. Educational work parties can be an effective means by which to generate a sense of protective "ownership" of sensitive habitat areas by nearby residents, businesses, schools, and community groups. The Conservancy's "Backyard Wilderness" educational work parties will be organized as part of restoration projects to provide short, interpretive nature walks and to generate volunteer assistance for restoration activities such as fencing construction, planting, watering, and installation of the signs among other activities. Over time, harmful activities are expected to decrease with increased public awareness of Proctor Valley resource values.

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1.4 REGIONAL CONSERVATION PLANNING CONTEXT

1.4.1 Federal Endangered Species Act

Vernal pools species in Proctor Valley are a priority for conservation under the Federal Endangered Species Act. Two federally listed endangered vernal pool species are currently present in Proctor Valley: San Diego fairy shrimp (*Branchinecta sandiegonensis*) and San Diego button-celery (*Eryngium aristulatum* var. *parishii*). Two other federally listed species – Orcutt's grass (*Orcuttia californica*; Endangered) and spreading navarretia (*Navarretia fossalis*; Threatened) – have been recorded from the same site immediately west of Proctor Valley according to Calflora[1]. The source of these record is unknown and these two species have not been reported in known survey records for Proctor Valley vernal pools (Table 1). However, some Proctor Valley vernal pool habitat does appear suitable for these two species.

The San Diego fairy shrimp was listed as endangered in 1997 and Critical Habitat was designated on December 12, 2007. A 5-year status review was completed by the USFWS on April 27, 2012. San Diego button-celery was federally listed as endangered on August 3, 1993.

1. This site may be in error with its mapped location on steep slopes of San Miguel Mountain at some distance from any documented vernal pools.

No critical habitat has been designated for San Diego button-celery. A 5-year status review was completed by the USFWS on September 1, 2010. Spreading navarretia was listed as threatened on October 13, 1998, Critical Habitat was revised on October 7, 2010, and a 5-year status review was completed on May 21, 2010. Spreading navarretia Critical Habitat includes eighty-eight acres in Lower Proctor Valley at the R1 and R2 complex pools on City Cornerstone Lands and the Otay Ranch Preserve. Designated Critical Habitat for the Quino checkerspot butterfly also overlaps vernal pool areas in several areas of Proctor Valley.

The U.S. Fish and Wildlife Service has prepared a *Recovery Plan for Vernal Pools of Southern California* (1998) (Recovery Plan) that describes measures which the agency considers necessary to protect and recover vernal pool species in San Diego County. According to the Recovery Plan, protection of the Proctor Valley R-Series vernal pools is necessary to stabilize populations of San Diego button-celery and spreading navarretia[2]. The USFWS also approved the MSCP in 1996, which outlines guidelines for resource management within the City of San Diego, City of Chula Vista, and County of San Diego. This Restoration Plan incorporates specific management recommendations for Proctor Valley vernal pools and species contained in the Recovery Plan and MSCP.

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1.4.2 California Endangered Species Act

Conservation regulations under the California Endangered Species Act extend to just one state-listed endangered species in Proctor Valley, the San Diego button-celery. The San Diego button-celery was listed as state Endangered in January 1989. CDFG regulates species listed as Endangered under the California Endangered Species Act (CESA). CDFG approved the MSCP in 1996, which outlines guidelines for resource management within the City of San Diego. Thus, conservation of San Diego button-celery must adhere to the guidelines outlined in the MSCP.

1.4.3 San Diego MSCP and City of San Diego Subarea Plan

Vernal pool preservation and restoration in Proctor Valley is a priority for resource management by the City of San Diego. The San Diego Multiple Species Conservation Plan provides an overarching framework for preserving and protecting sensitive habitats and species in southwestern San Diego County. The City of San Diego prepared a Subarea Plan (1997) to comply with the Federal Endangered Species Act and the California Natural Communities Conservation Planning Act (NCCP) and to implement MSCP conservation activities within its incorporated boundaries for the benefit of federal and state endangered, threatened, or sensitive species. The City's Subarea Plan also implements MSCP conservation measures on several large

2. The Recovery Plan considered data for San Diego fairy shrimp in Proctor Valley to be "incomplete".

properties near reservoirs in the unincorporated County of San Diego that are owned by the City of San Diego Public Utilities Department and known as Cornerstone Lands. Implementation strategies and management guidelines are also included in the MSCP.

As part of its subarea plan, the City, wildlife agencies, and stakeholders identified a "Multi-Habitats Planning Area" (MHPA, a.k.a the City's MSCP preserve) that delineates core biological resource areas and biological corridors targeted for conservation as well as allowing for limited development. The majority of Proctor Valley vernal pools and restoration sites are located on Cornerstone Lands within the City's MHPA preserve. Both the overarching MSCP and the City's Subarea Plan anticipate subsequent preparation of "Area Specific Management Directives" for specific species covered by the plans as well as particular areas of the MSCP preserve.

This Restoration Plan is intended to provide detailed recommendations for MSCP area specific management directives for Proctor Valley vernal pools, vernal pool species, and nearby upland covered species consistent with the MSCP. Please see Tables 2 - 4 for lists of MSCP covered species addressed by this Restoration Plan.

1.4.4 City of San Diego Vernal Pool Management Plan

The City of San Diego has also prepared a draft *Vernal Pool Management Plan* that addresses vernal pools located throughout the City, including Proctor Valley (2008). This document builds upon the *Vernal Pool Inventory* (City of San Diego 2004) which in turn updated historic surveys of vernal pools in the City of San Diego. The purpose of the City's *Vernal Pool Management Plan* is "to provide management strategies, directives, and recommendations" to preserve and restore vernal pools and dependant imperiled species within the City of San Diego. The plan is a valuable compilation of past surveys and reports including existing management requirements and recommendations from sources like U.S. Fish and Wildlife Service biological opinions for past projects impacting vernal pools. The plan is intended to guide vernal pool management on public, private, preserved and developable lands within the City of San Diego. The plan's description of history, issues, requirements, and goals for each site provide direction for public and private planners, environmental professionals, and others interested in land development and vernal pool conservation. This Restoration Plan incorporates specific Proctor Valley vernal pool restoration activities recommended in the City's *Vernal Pool Management Plan.*

1.4.5 City of San Diego Vernal Pool Habitat Conservation Plan

The City is currently preparing a *Vernal Pool Habitat Conservation Plan* to compliment the MSCP by extending conservation activities to vernal pools and providing regulatory assurances for the City and property owners. All listed or sensitive Proctor Valley vernal pool species

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recommended for restoration activities under this Restoration Plan are expected to become covered species under the *Vernal Pool Habitat Conservation Plan* (Vernal Pool HCP). Recommended restoration work would significantly advance the specific goals of both the existing MSCP and pending Vernal Pool HCP by including specific management actions consistent with the plans to advance the conservation of vernal pool wetlands and dependent species in Proctor Valley.

1.5 RESPONSIBLE PARTIES

Proctor Valley vernal pools and recommended restoration sites are located on four large conservation properties: City of San Diego Cornerstone Lands; Otay Ranch Preserve; Rancho Jamul Ecological Reserve; and the San Diego National Wildlife Refuge (Figure 4).

For the restoration areas that occur on City of San Diego lands, the City of San Diego will be responsible for authorization of any activities identified in this Restoration Plan in accordance with MSCP guidelines and the City's Subarea Plan. No new financial obligations are required of the City with acceptance or approval of this Restoration Plan.

For the restoration areas that occur on the RJER, CDFG will be responsible for authorization of any activities recommended in this Restoration Plan in accordance with the Fish and Game Code and the MSCP. No new financial obligations are required of CDFG with acceptance or approval of this Restoration Plan.

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For the restoration areas that occur on the SDNWR, the USFWS will be responsible for authorization of any activities recommended in this Restoration Plan in accordance with regulations governing management of National Wildlife Refuges, the Federal Endangered Species Act, and the MSCP. No new financial obligations are required of USFWS with approval of this Restoration Plan.

The Chaparral Lands Conservancy is solely responsible for any logistical activities to implement this Restoration Plan including but not limited to facilitation of review under any applicable laws and regulations, obtaining permits and right-of-entry permissions, planning and coordination with resource property owners, hiring and management of contractors, organizing volunteers, and any other restoration activities.

Several activities proposed under this Restoration Plan such as fencing and signing are resource stewardship activities that are typically conducted by resource managers over time. Traditional resource manager activities that are included in this Restoration Plan are directly related to implementation of recommend restoration activities for the benefit of specific vernal pool sites.

These activities would be carried out by consultants, Conservancy staff, and volunteers during project implementation and in strict accordance with this plan as approved by the resource agency property owners. Traditional stewardship of restoration areas by resource agency property owner managers would resume upon completion of each restoration project.

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CHAPTER 2.0 – EXISTING CONDITIONS

This section describes existing Proctor Valley vernal pool and upland habitat and species. This section also describes basic Proctor Valley vernal pool hydrology as well as disturbance to vernal pools, upland habitats, and associated species. Please see Figures 2 - 3o for locations of Proctor Valley Existing Pools.

2.1 VERNAL POOL HABITAT

Vernal pools are considered to be a sensitive habitat by local, state, and federal governments, and it has been estimated that over 95 percent of the vernal pool habitat in San Diego County has been lost to development, agriculture, and other impacts (Bauder 1986). Seven vernal pool species in San Diego County are listed by the Federal government and/or California and several other vernal pool species are highly sensitive and imperiled.

Past surveys for vernal pools in Proctor Valley appear to have been limited to easily accessible areas and particular properties planned for development or mitigation with relatively few vernal pools documented by scientists, agencies, and consultants. Vernal pool habitat was first identified in Proctor Valley during a regional vernal pool survey for CDFG in 1978 (Beauchamp and Cass 1978). This survey identified only one small complex, with little mousetail (*Myosurus minimus*) in at least one basin. Less than ten years later, Dr. Ellen Bauder at San Diego State University conducted a more detailed assessment of the vernal pool habitat in San Diego (Bauder 1986). Bauder described the "Proctor Valley R" complex as an "isolated grouping" of five pools close to Proctor Valley Road[3], two of which were found to support little mousetail. Six other vernal pool indicator plant species were identified for the Proctor Valley pools.

During a period between 1989 and 1991, a number of vernal pool surveys were conducted in Proctor Valley as part of a more complete vernal pool survey for the entire Otay Ranch (Dudek and Associates 1992). Dudek identified four vernal pool complexes in Proctor Valley. Two of these (R1 and R2+) were in Lower Proctor Valley and R1 is the same site identified earlier by Beauchamp and Cass and Bauder. Dudek identified two other complexes (R3+ and R4+) in Upper Proctor Valley that were newly recorded locations for vernal pool habitat. All together, Dudek found a total of thirty-six vernal pools in Proctor Valley and an additional four vernal

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3. Beauchamp and Cass' Proctor Valley vernal pools and Bauder's Proctor Valley R complex appear to be the same as the locations described in this Restoration Plan as ORV Site A and ORV Site B (Figure 3h and 6f).

pool indicator plant species, including the Federally listed San Diego button-celery (*Eryngium aristulatum* ssp. *parishii*).

The City of San Diego conducted surveys in 2002 and 2003 and identified eighteen pools on City Cornerstone Lands, all located at the one site identified in all previous surveys – Beauchamp and Cass's site, Bauder's R complex, and Dudek's R1 site. The City's surveys did not relocate little mousetail or other sensitive plant species – possibly as a result of several intervening years of extensive ORV activities at this site. But City surveys did document two new vernal pool indicator plant species, American pillwort (*Pilularia americana*) and Howell's quillwort (*Isoetes howellii*).

Besides the formal vernal pool surveys discussed above, AECOM biologist Scott McMillan has visited a number of the pools in Proctor Valley over the last several years and assisted with surveys for this Restoration Plan in 2010/2011. McMillan identified a number of additional indicator plant species in Proctor Valley vernal pools, including a small number of toothed calico-flowers (*Downingia cuspidata*) in one pool, a species that is nearly extirpated from southern San Diego County.

During the above-normal wet season of 2010/2011, the Conservancy and City of San Diego staff and biologists from AECOM conducted systematic surveys and mapping of vernal pools in Proctor Valley. These surveys identified a total of two hundred twenty-five (258) basins (Figures 2 - 3o), many of which were never previously documented. Of these, one hundred twenty-seven (127) have been identified as original natural vernal pools, nine (9) have been identified as floodplain scour pools, thirty-eight (38) have been identified as potential vernal pools, and another eighty-four (84) have been identified as artificial pools.

The majority of Proctor Valley vernal pools are located in Lower Proctor Valley on MSCP Cornerstone Lands and range in condition from excellent to poor condition. Many pools in this area are located near Proctor Valley Creek on alluvial benches primarily composed of Olivenhain soils. Olivenhain soils are one of a limited number of soils known to support vernal pool habitat (Bauder and McMillan 1998). One relatively well known Lower Proctor Valley pool area, the western portion of Bauder's R pools and Dudek's R1 pools, is described in this Restoration Plan as the ORV Site A (Figures 3h and 6f). Many pools at this site still support functional hydrologic and fauna conditions despite intense past ORV activity. Flora at this site has suffered significant impacts however and 2012 surveys did not relocate little mousetail, previously documented here by Beachamp and Cass and Bauder. Proctor Valley Road separates ORV Site B from the formerly contiguous ORV Site A with many pools in relatively good condition following recent weeding and seeding restoration work.

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Other pools are located on Olivenhain soils on hilltops in Upper Proctor Valley and range from excellent to moderate condition. One hilltop cluster of pools on the Rancho Jamul Ecological Reserve is highly disturbed by past dumping and vehicle tracks yet still supports relatively intact vernal pools and the only known populations of rare vernal pool plants remaining in the entire valley (Figures 3l and 6h). Only two clusters of pools in Proctor Valley are in excellent condition (but for limited populations of weeds): One is located on the Otay Ranch Preserve in Lower Proctor Valley (Figure 3i); The other is on the RJER in Upper Proctor Valley (Figures 3m and 6i). These relatively pristine pools typically only hold water in average or above average rainfall years. Many other Proctor Valley pools are clearly or likely of artificial origin with most of these located in old compacted dirt roads or ORV tracks.

Table 1 lists all of the vernal pool indicators plant species that have been recorded for Proctor Valley by Beauchamp and Cass, Bauder, Dudek, City of San Diego, McMillan, and AECOM.

2.1.1 Vernal Pool Sensitive Species

Several listed or otherwise sensitive vernal pool animal species have been documented in Proctor Valley: San Diego fairy shrimp (*Branchinecta sandiegonensis*), a Federal endangered species; and western spadefoot toad (*Spea hammondii*), a California species of concern. Two-striped garter snakes (*Thamnopsis hammondii*), also a state species of concern, have not been observed during recent surveys but are expected to be present.

Five listed or otherwise sensitive vernal pool plants have been documented or reported in Proctor Valley: Little mousetail (*Myosurus minimus*), Orcutt's grass (*Orcuttia californica*); San Diego button-celery (*Eryngium aristulatum var. parishii*), spreading navarretia (*Navarretia fossalis*), and toothed calico-flower (*Downingia cuspidata*). Only two of these have been identified during recent surveys: San Diego button-celery and toothed calico-flower.[4]

Of note in Proctor Valley is the status and management implications of two species of fairy shrimp, the Federal Endangered San Diego fairy shrimp and the "weedy" versatile fairy shrimp, as well as hybrids of the two species. The Chaparral Lands Conservancy contracted with Rocks Biological Consulting for systematic vernal pool fauna surveys in 2011/2012. The Branchiopod Research Group at the University of San Diego conducted more limited independent surveys during the same period. These surveys found versatile fairy shrimp and hybrids in a small number of highly disturbed pools on the Otay Ranch Preserve near the Corral Site (Figure 3f) and at the City's ORV Site B (Figure 3h). Despite an apparent association of versatile fairy

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4. At the Rancho Jamul Ecological Reserve.

Table 1.
Vernal Pool Indicator Plant Species Documented in Proctor Valley

Indicator Plant Species	Beauchamp 1979	Bauder 1986	Dudek 1992	City of SD 2003	AECOM 2006-2011
Callitriche marginata Common chaffweed			X	X	X
Centunculus minimus Common chaffweed					X
Crassula aquatica Vernal pool pygmy weed		X	X	X	X
Deschampsia danthonioides Annual hairgrass		X	X	X	X
Downingia cuspidata Toothed calico-flower					X
Elatine brachysperma Waterwort		X			X
Eleocharis macrostachya Pale sedge			X		X
Eryngium aristulatum ssp. *parishii* San Diego button-celery			X		X
Isoetes howellii Howell's quillwort				X	
Juncus bufonius Toad rush		X			X
Lilaea scilloides Flowering quillwort					X
Lythrum hyssopifolium Grass poly		X	X		X
Myosurus minimus Little mousetail	X	X			
Pilularia americana American pillwort				X	X
Plantago elongata Vernal pool plantain			X		X
Psilocarphus brevissiumus Woolly marbles		X	X	X	X

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shrimp with highly disturbed pools, no versatile fairy shrimp were found at the highly disturbed ORV Site A which is immediately adjacent to the versatile fairy shrimp-occupied pools on ORV Site B. No other versatile fairy shrimp populations were identified in Proctor Valley though many pools did not pond for a long enough duration to facilitate shrimp hatching and wet season surveys in the below-normal season of 2011/2012. Fairy shrimp surveys will continue in the future in an effort to more conclusively determine the presence or absence of versatile fairy shrimp, especially in advance of restoration activities at specific Proctor Valley vernal pool sites.

2.1.2 Vernal Pool Hydrology

Proctor Valley drains a relatively large watershed from the eastern and southern slopes of San Miguel Mountain and the western slopes of the Jamul Mountains. Lower Proctor Valley consists primarily of an expansive valley bottom bounded by hillside benches, mesas, and steep mountain slopes. Upper Proctor Valley has a more rugged topography consisting of higher elevation steep mountainsides, gentle hilltops, and narrow valleys.

Proctor Valley vernal pools do not fit any neat regional description and exhibit a high diversity of hydrologic conditions. They are neither the mesa pools typical for western San Diego County nor valley pools typical for inland areas although Proctor Valley pool have features in common with both types. One possible explanation for the uniqueness of Proctor Valley vernal pools is their formation in most cases on bedrock, a relatively rare condition in San Diego County where most pools are formed on sandstone or clay or a combination thereof. Proctor Valley also contains limited examples of pedogenic and alluviated vernal pools as defined in the *Draft Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Vernal Pool Depressional Wetlands in Southern California* (HGM Manual) (Bauder et al. 2009). Individual vernal pools are primarily formed by direct precipitation onto shallow saturated soils perched on this bedrock.

The majority of Proctor Valley vernal pools are located in the valley-bottom areas of Lower Proctor Valley on relatively flat benches near Proctor Valley Creek. Some interesting pools with vernal pool indicator plant species are located in old, scoured channels in the Lower Proctor Valley Creek floodplain where incision of the nearby existing creek bed may have lowered typical water tables below the bottom of the floodplain scour pools. Most other pools are located on small hilltops or hillside benches in Upper Proctor Valley where limited level terrain and Mima mounds provide for formation of vernal pool basins. The Rancho Jamul Site C (Figures 3m and 6i) is notable for its location on a relatively steep hillside amidst an open field of Mima mounds just above Proctor Valley Creek.

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Many Proctor Valley vernal pools such as those at the ORV sites A and B (Figures 3h and 6f) are part of locally connected vernal pool and swale hydrologic units that overflow from one pool to another and on into nearby Proctor Valley during periods of extreme precipitation. Some Proctor Valley vernal pools like those on the steep Mima mound hillside of Rancho Jamul Site C are both locally connected and isolated and only indirectly drain to nearby Proctor Valley Creek with little evidence of connecting swales or channels. Other Proctor Valley pools like those perched on a hilltop at the Rancho Jamul Site A (Figures 3l and 6h) are locally interconnected through subsurface flow or periods of extreme precipitation but are distant and seemingly isolated from Proctor Valley Creek.

The isolated and perched nature of many Upper Proctor Valley vernal pools may contribute to a lack of ponding in below-normal wet seasons. However, one pool in Upper Proctor Valley perched on the Rancho Jamul Site A hilltop is an anomaly as the deepest and longest standing original natural pool in the entire Valley. Lower Proctor Valley pools at the ORV sites A and B are connected by swales and routinely pond even in below-normal wet seasons. Most original natural Proctor Valley vernal pools require at least normal annual rainfall to pond and for dependent species to complete their life cycle. Surveys in the below-normal wet season of 2011/2012 showed that several nearly pristine original natural pools like those at Rancho Jamul Site C appear to require above normal rainfall to pond more than a few consecutive days unless below-normal seasonal rainfall is concentrated over a few short weeks. Many artificial pools in Proctor Valley are located in heavily impacted areas such as dirt roads or ORV tracks with compacted soils and were found to pond regularly even in below-normal wet seasons.

Despite superficial scenic appearances, most Proctor Valley vernal pools have been heavily impacted by many anthropogenic activities including construction and use of Proctor Valley Road and other peripheral dirt roads, ORV use, and grazing, all of which remove both topsoil and vegetation and thereby alter micro-topography and vernal pool ecology. Consequently, some water flows have been redirected or channelized into unnatural patterns affecting water distribution and the amount of water captured in individual pools. In one example, pools at the ORV Site A may experience longer duration ponding as a result of soil compaction from past heavy ORV use, from greater amounts of water runoff from a seriously denuded local watershed, and because Proctor Valley Road has filled a former swale that ultimately drained this local pool hydrologic unit to Proctor Valley Creek. In addition, soil removal due to past road grading or maintenance may have deepened existing depressions or created new ones in road beds. Compacted soils from old roads may have redirected flows causing a subsequent increase in water to particular pools.

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2.1.3 Vernal Pool Disturbance

Proctor Valley vernal pools have been affected to varying degrees by pervasive anthropogenic disturbance including: Historic grazing; Historic homesteading; Dirt road grading, maintenance, and regular vehicle passage; ORV use; Trash and fill dumping; Reservoir flooding, and other activities. Many of these impacts took place prior to establishment of various Proctor Valley conservation areas but some harmful activities persist like ORV trespass and dumping albeit at much lower levels than in the past. Impacts from these disturbances range from insignificant to severe. ORV trespass denuded and compacted most of the ORV Site A. Past dumping of concrete and soil at the Rancho Jamul Site A partially filled the largest and deepest original natural vernal pool in Proctor Valley and the fill is now overgrown with weeds. A historic homestead was located immediately adjacent to and upstream of the Corral Site A (Figure 6d) and likely significantly altered the hydrology of downstream Corral Site pools. Upper Otay Lake once inundated vernal pools at Upper Otay Lake Site A (Figures 3a and 6a) at full reservoir levels prior to the lowering of the dam in the early 1980s for seismic safety. Also at Upper Otay Lake Site A an enormous artificial trench likely alters local pool hydrology and may have directly destroyed pools where it was cut in a possible effort to connect the two arms of Upper Otay Lake at full levels. Proctor Valley Road cuts through or dams several Corral Site A pools and may cause greater impoundment of pool water. And Proctor Valley is located immediately adjacent to two historic Mexican ranchos and was part of later ranches where heavy cattle grazing likely significantly reduced vegetation cover and altered hydrology.

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Impacts to pools have in turn impacted vernal pool species. Between pool surveys in the early 1990s and early 2000s, intense ORV use at the ORV Site A wiped out coastal sage scrub and native grasslands and may have been the cause of extirpation of little mousetail. At the Rancho Jamul Site A, weeds may be outcompeting toothed calico-flower where only a small number of plants remain. Disturbance of pool basins at the ORV Site B may have created conditions conducive to colonization by populations of weedy versatile fairy shrimp now found there. No vernal pool indicator plants whatsoever appear to persist at the Upper Otay Lake Site A despite the presence of well defined ponding basins, possibly as a result of past reservoir flooding. This Restoration Plan strives to identify and recommend solutions to restore and sustain the integrity of these and other significantly degraded Proctor Valley vernal pools.

2.2 UPLAND HABITATS

The dominant native vegetation types in Proctor Valley are coastal sage scrub, chaparral, and native grassland. Chaparral vegetation that is found on valley benches, hilltops, and slopes of San Miguel Mountain and the Jamul Mountains is unlike chaparral found in other parts of San Diego County. In some areas, this chaparral is dominated by Munz's sage (*Salvia munzii*) and

San Diego sunflower (*Viguiera laciniata*), with a mixture of flat-top buckwheat (*Eriogonum fasciculatum*) and chamise (*Adenostoma fasciculata*). This type of chaparral vegetation is also found south of the border in cismontane areas of northwestern Baja California, Mexico. Other chaparral areas are dominated by chamise. Patches of cryptogamic soils are found interspersed amidst the chaparral and consist of ashy spike-moss (*Selaginella cinerascens*) along with annuals like plantain (*Plantago erecta*), and goldfields (*Lasthenia californica*). Coastal sage scrub and native grasslands are highly limited and patchy amidst extensive non-native grasslands. Vegetation in Proctor Valley Creek is remnant willow scrub that was historically impacted by cattle grazing, incision, and other disturbance factors.

O-8-51
Cont.

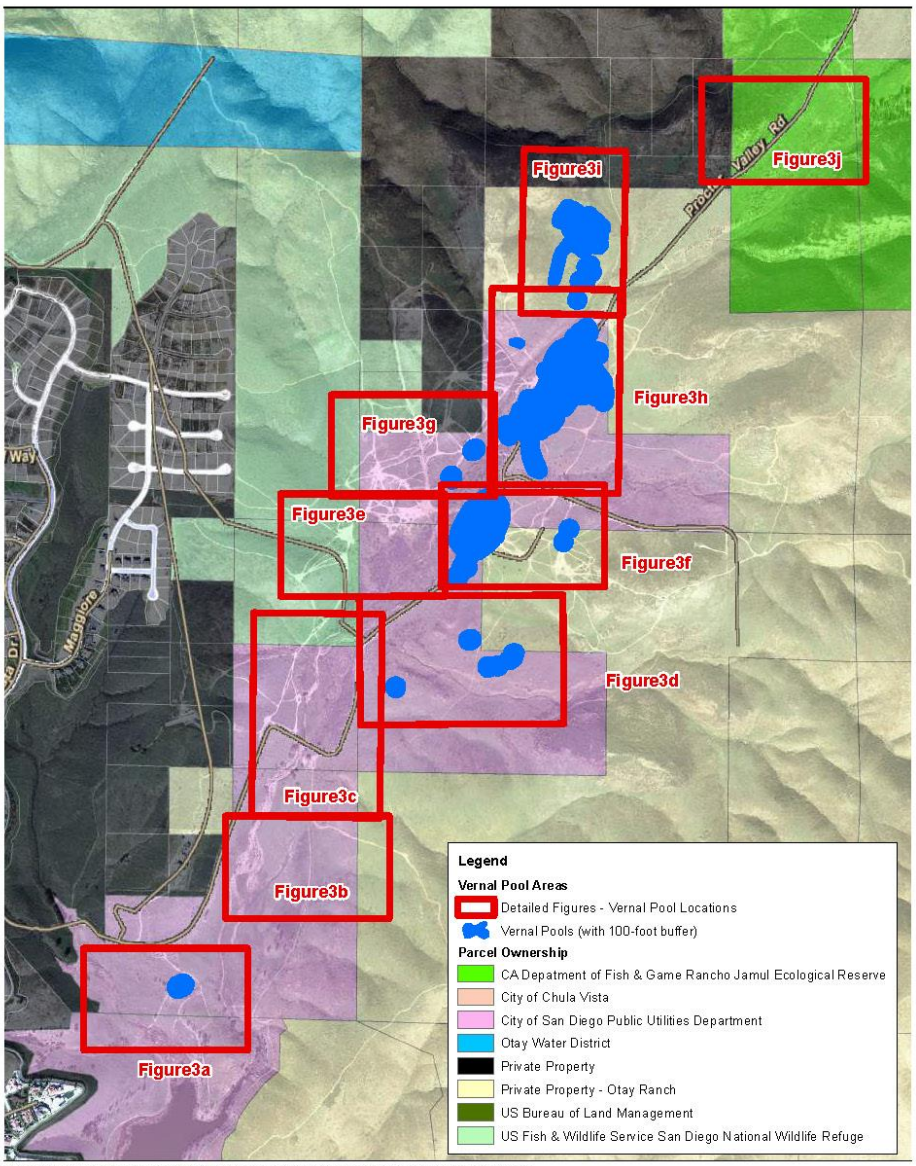

Figure 2a
Location of Vernal Pools in Proctor Valley and Vicinity Property Ownership (Lower Proctor Valley)

Proctor Valley Vernal Pool Management Plan

Available on disc through David Hogan of The Chaparral Lands Conservancy - File name: CEfig2_vp_overview; GIS Editing - Civic Blue, 4475 Dwight St. San Diego, CA (619) 618-6382

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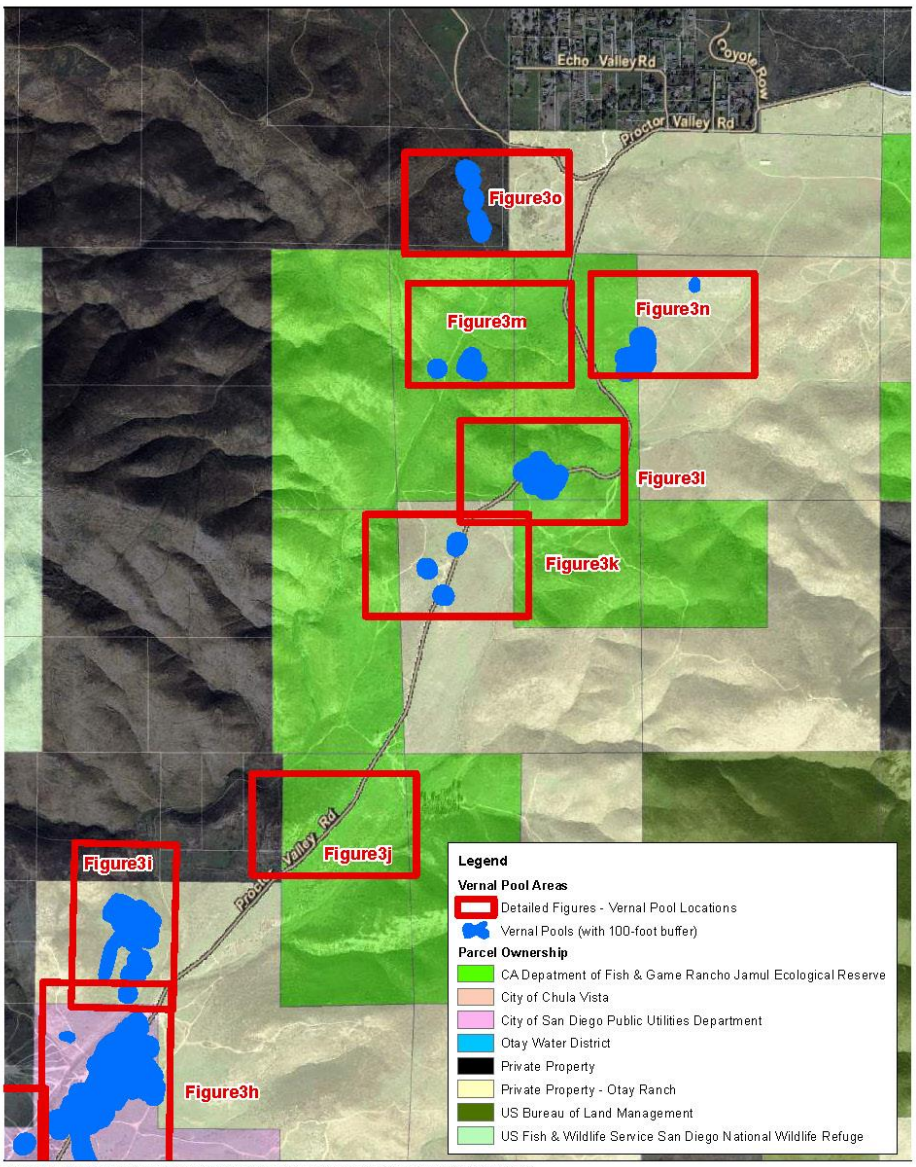

Figure 2b
Location of Vernal Pools in Proctor Valley and Vicinity Property Ownership (Lower Proctor Valley)

Proctor Valley Vernal Pool Management Plan

Available on disc through David Hogan of The Chaparral Lands Conservancy - File name: CEfig2_vp_overview; GIS Editing - Civic Blue, 4475 Dwight St. San Diego, CA (619) 618-6382

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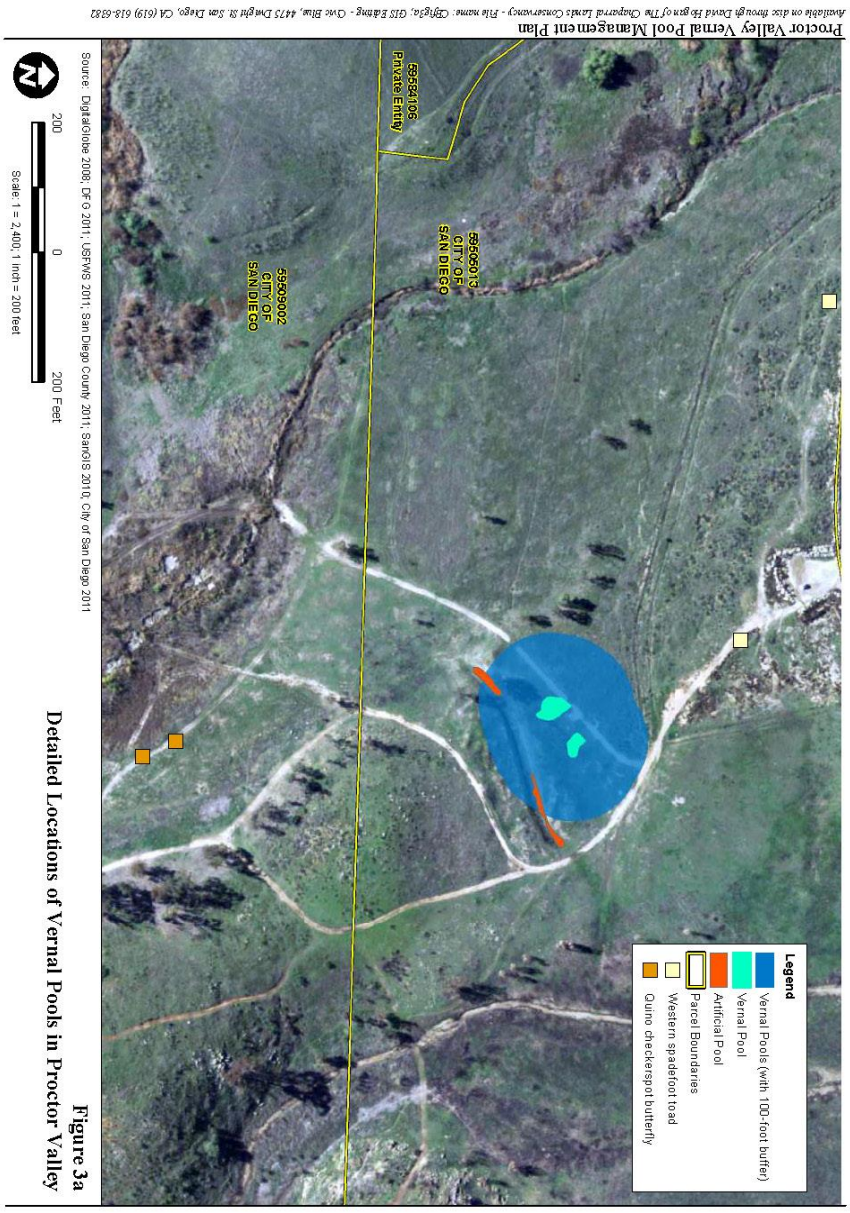

Figure 3a
Detailed Locations of Vernal Pools in Proctor Valley

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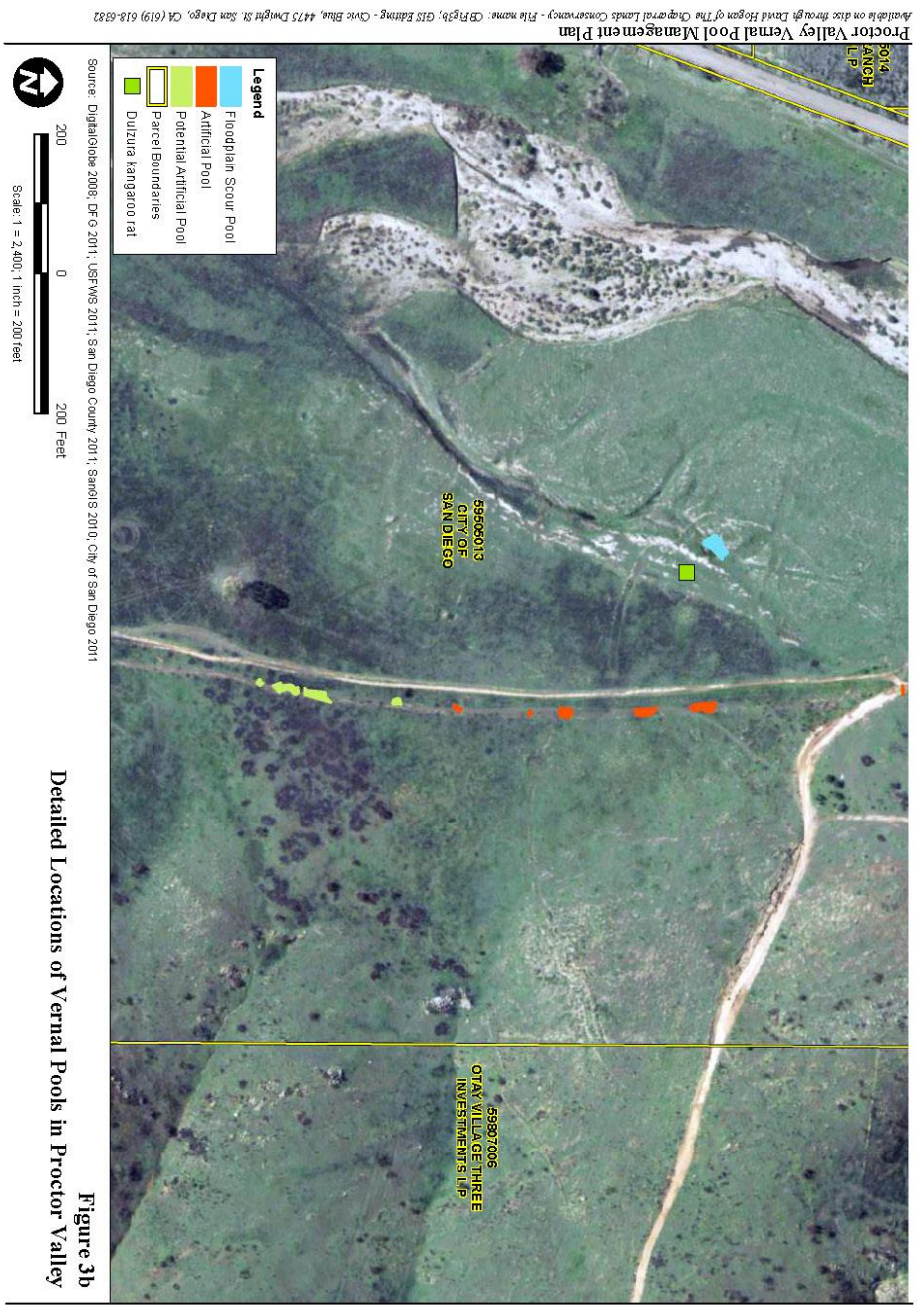

Figure 3b
Detailed Locations of Vernal Pools in Proctor Valley

O-8-51
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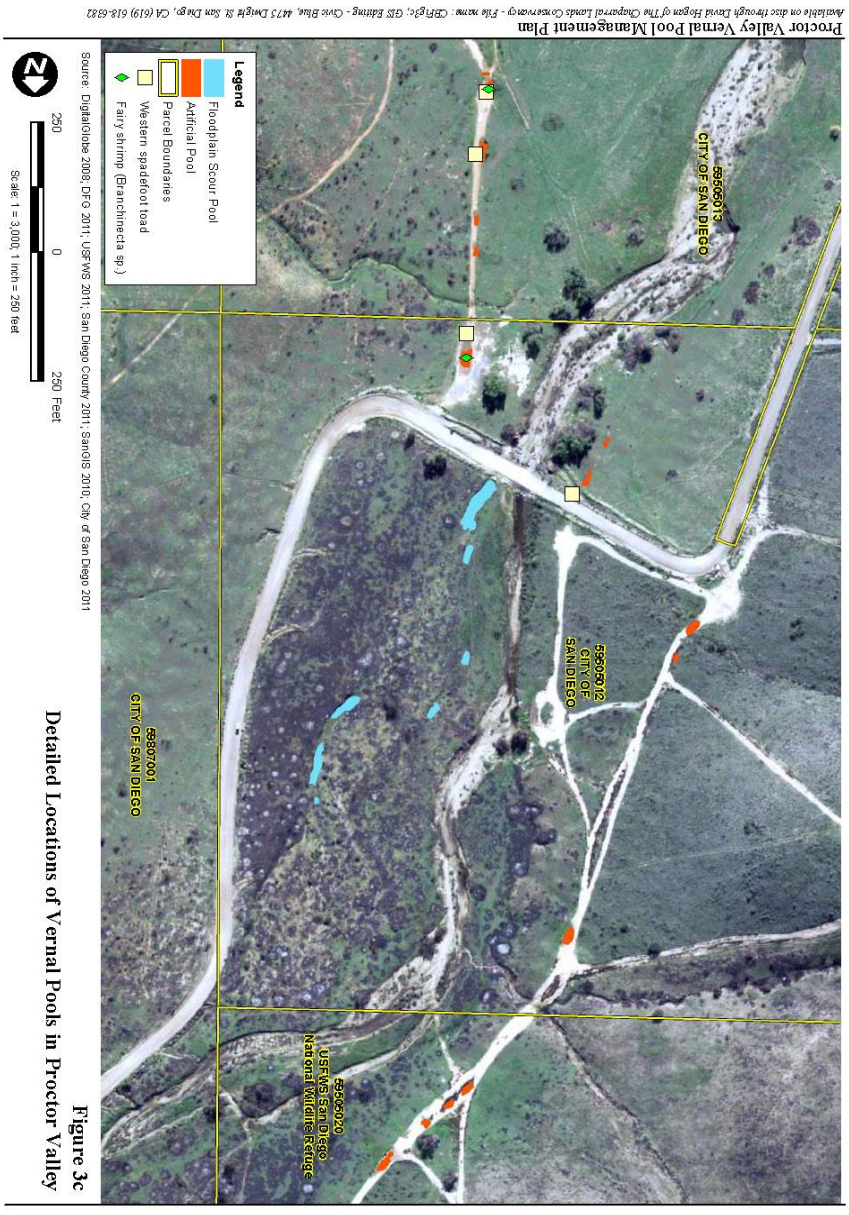

Figure 3c
Detailed Locations of Vernal Pools in Proctor Valley

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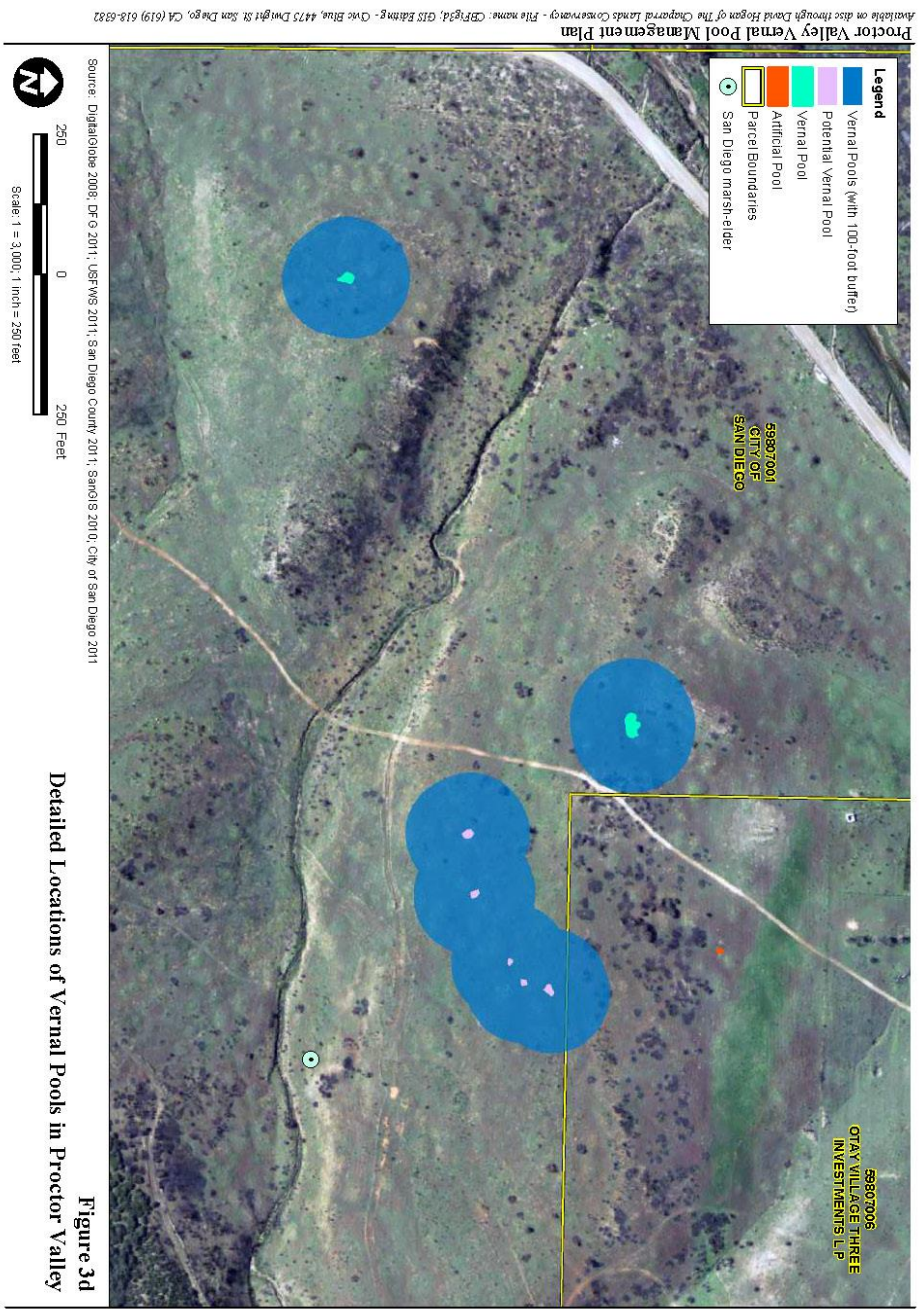

Figure 3d
Detailed Locations of Vernal Pools in Proctor Valley

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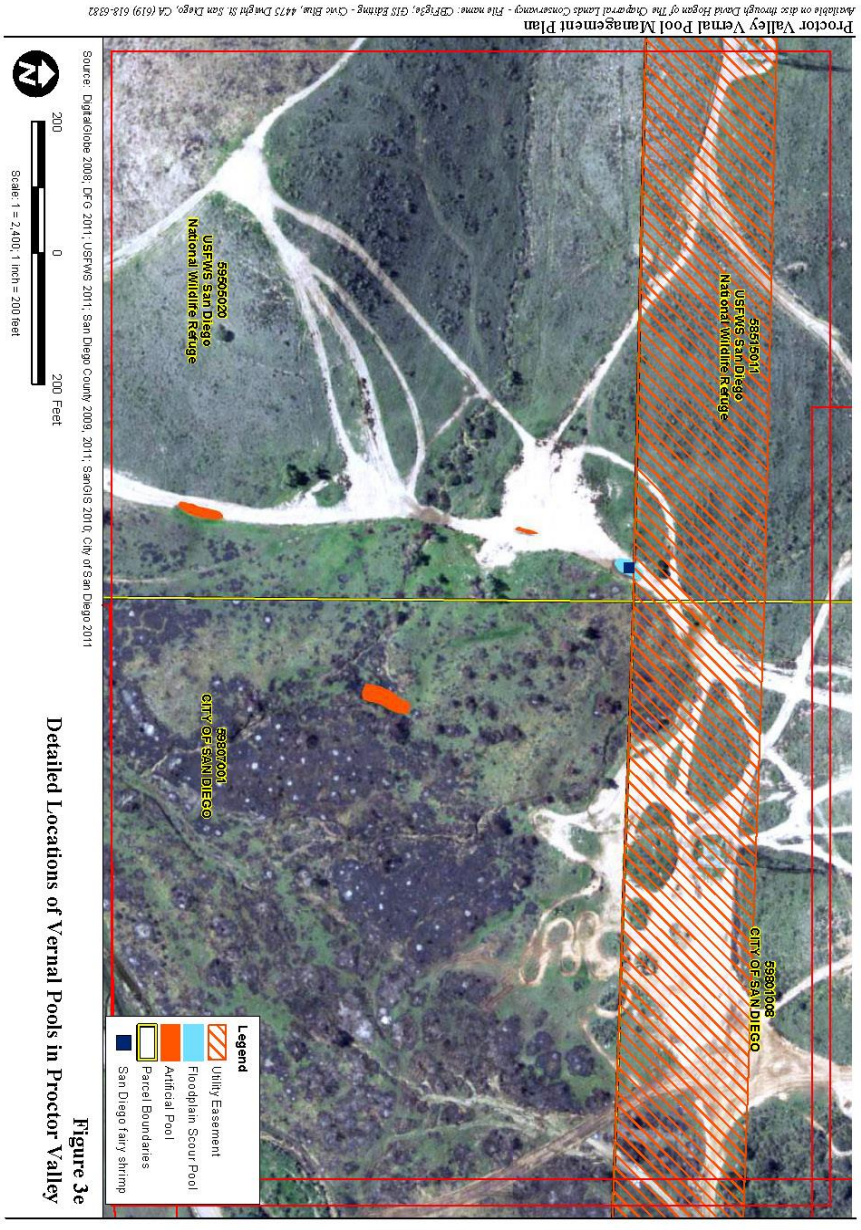

Figure 3e
Detailed Locations of Vernal Pools in Proctor Valley

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Cont.

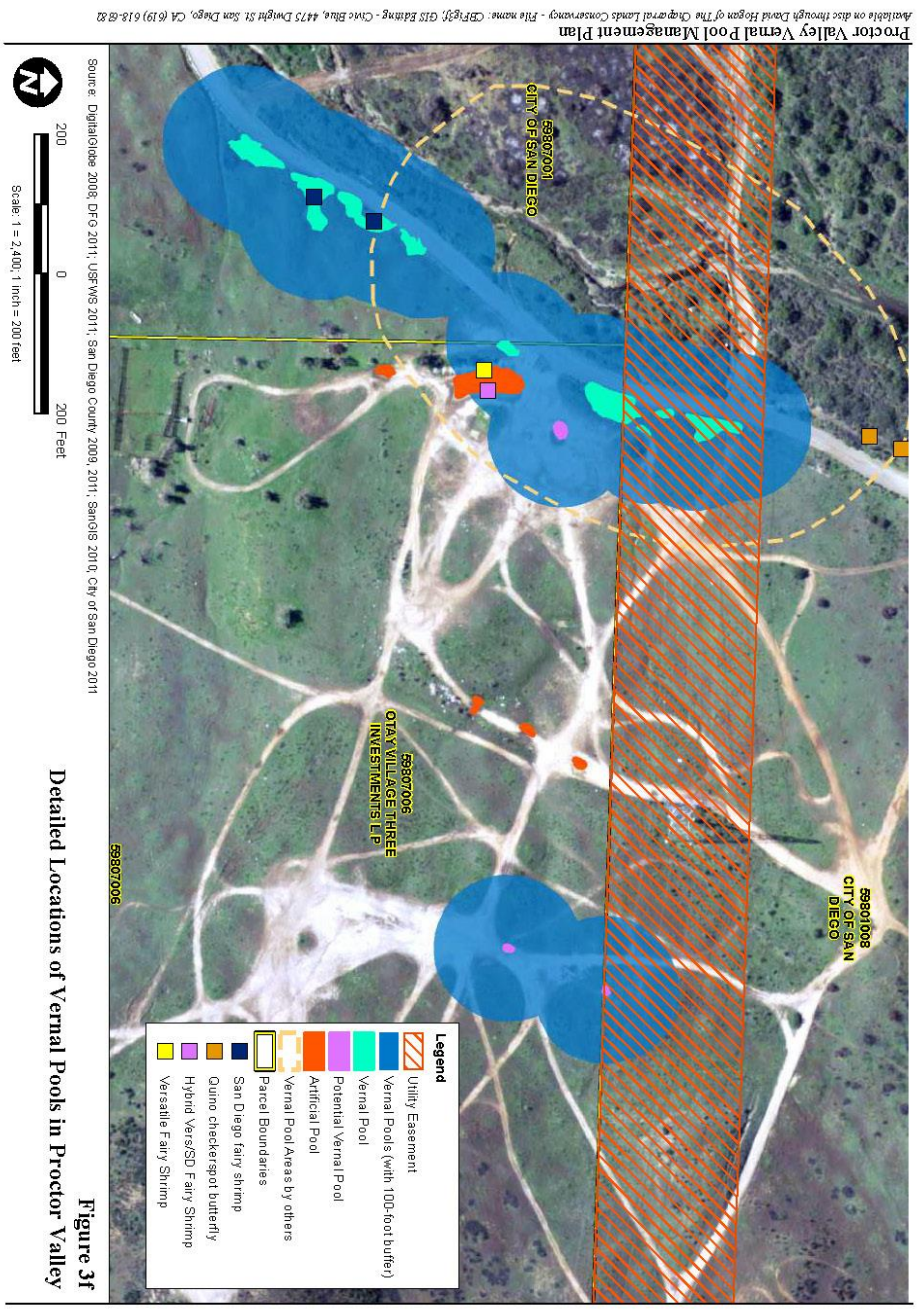

Figure 3f
Detailed Locations of Vernal Pools in Proctor Valley

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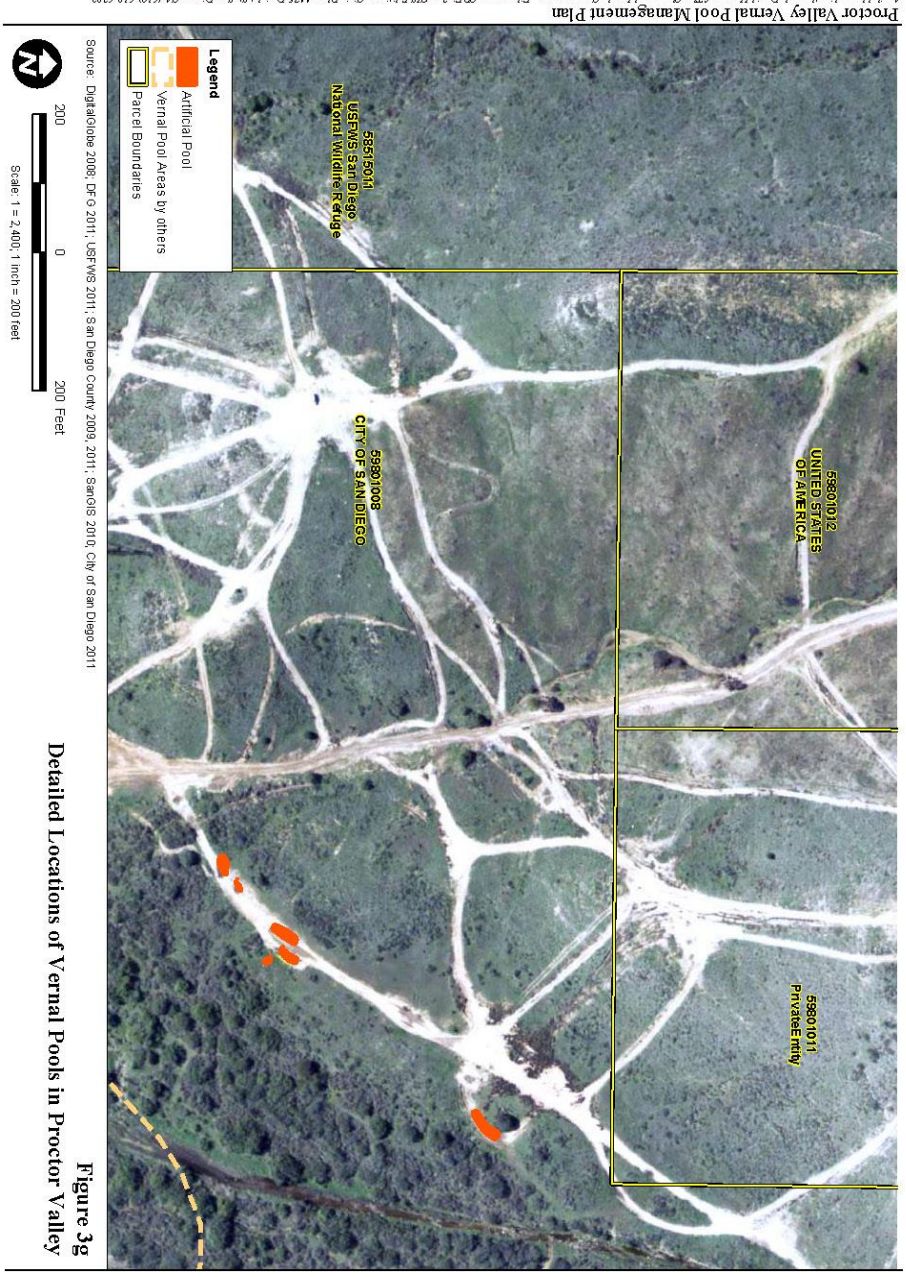

Figure 3g
Detailed Locations of Vernal Pools in Proctor Valley

O-8-51
Cont.

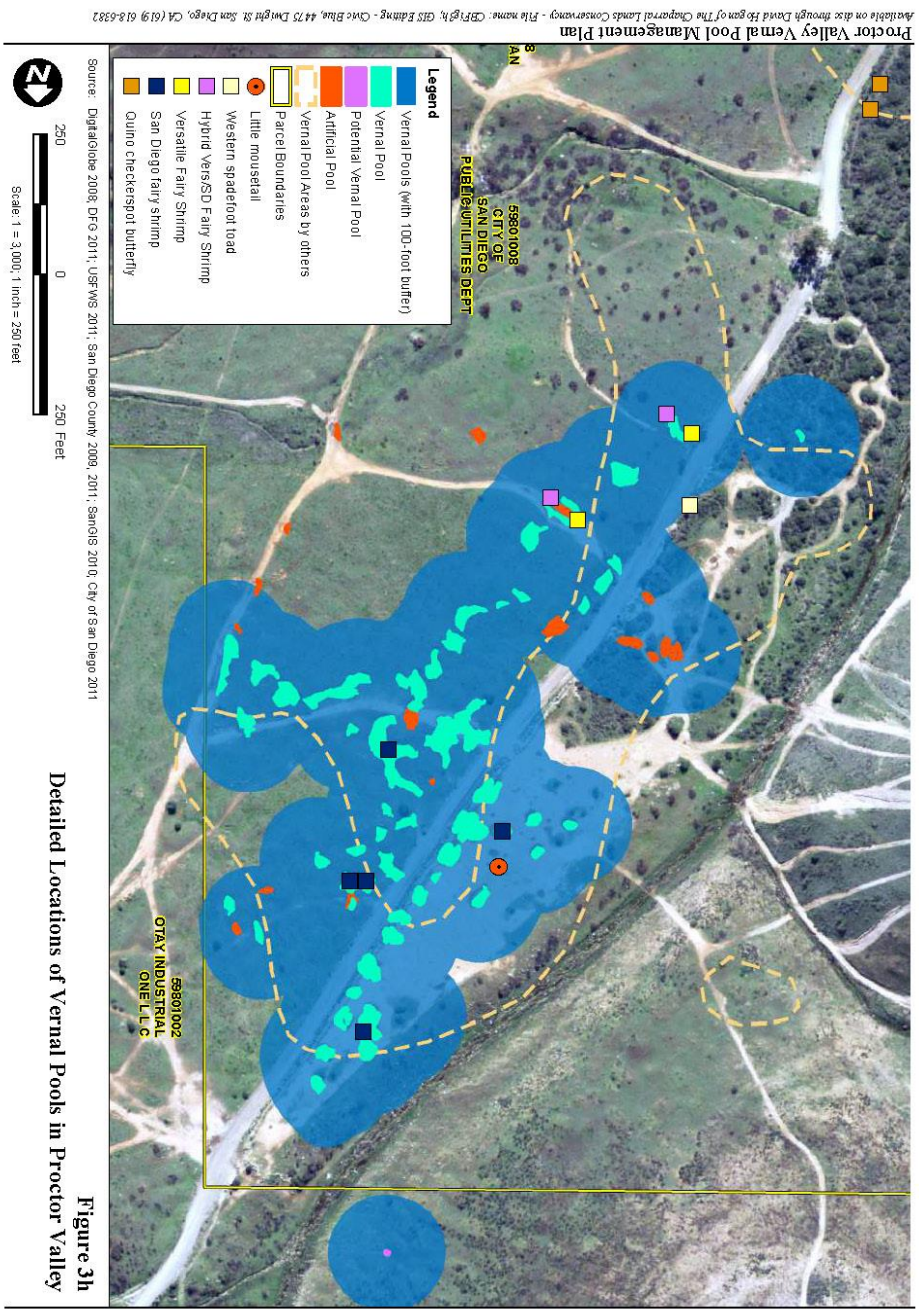

Figure 3h
Detailed Locations of Vernal Pools in Proctor Valley

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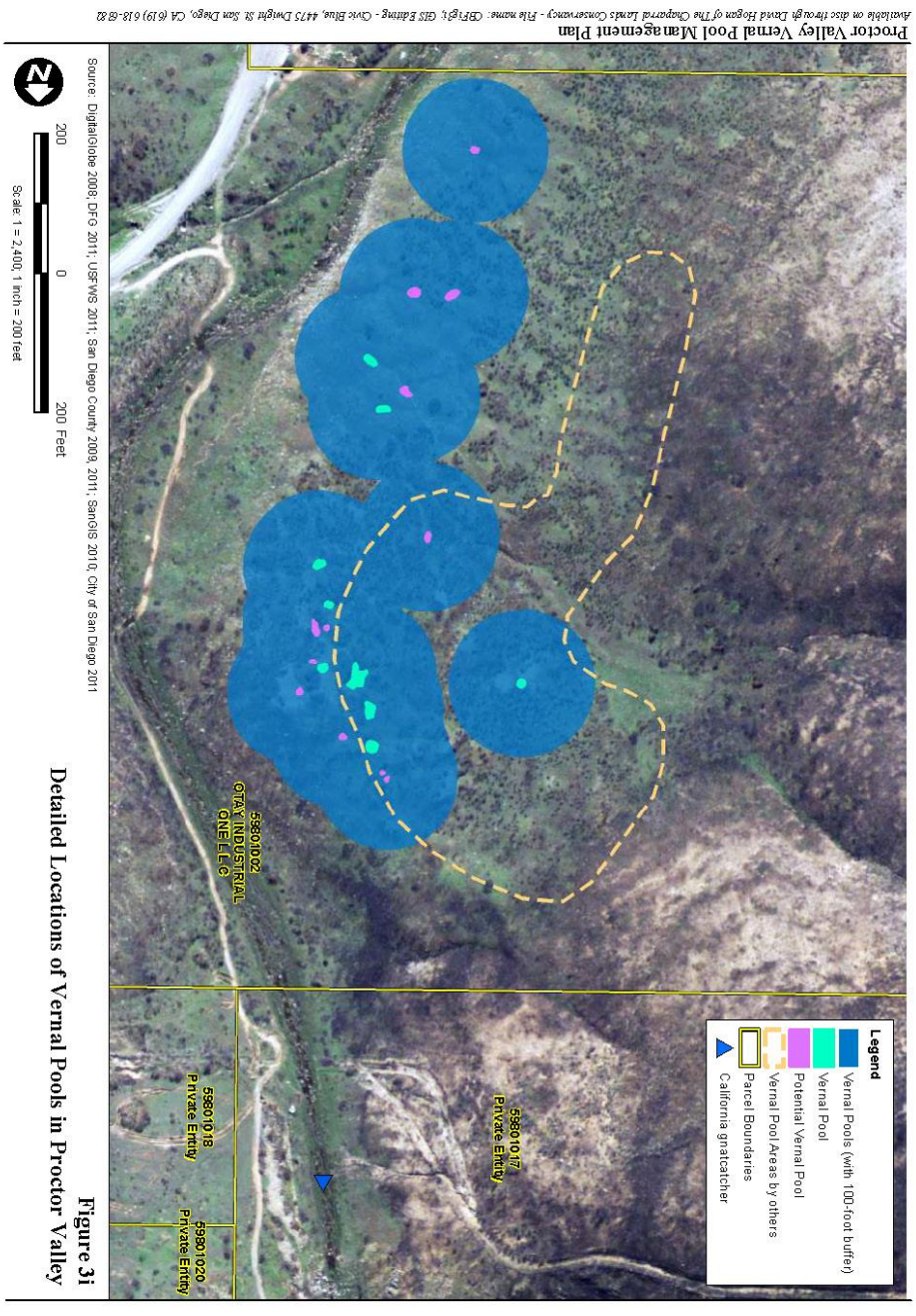
Proctor Valley Vernal Pool Management Plan
Available on disc through Land Steam of The Chapparal Lands Conservancy - File name: GBFig1i_GIS Editing - Civic Blue, 4475 Dwight St. San Diego, CA (619) 618-8382
Legend
Vernal Pools (with 100-foot buffer)
Vernal Pool
Potential Vernal Pool
Vernal Pool Areas by others
Parcel Boundaries
California gnatcatcher
558010.02
OTAY INDUSTRIAL ONE L L C
558010.17
Private Entity
558010.18
Private Entity
558010.20
Private Entity
Source: DigitalGlobe 2008; DFG 2011; USFWS 2011; San Diego County 2009, 2011; SanGIS 2010; City of San Diego 2011
200
0
200 Feet
Scale: 1 = 2,400, 1 inch = 200 feet
Figure 3i
Detailed Locations of Vernal Pools in Proctor Valley

O-8-51
Cont.

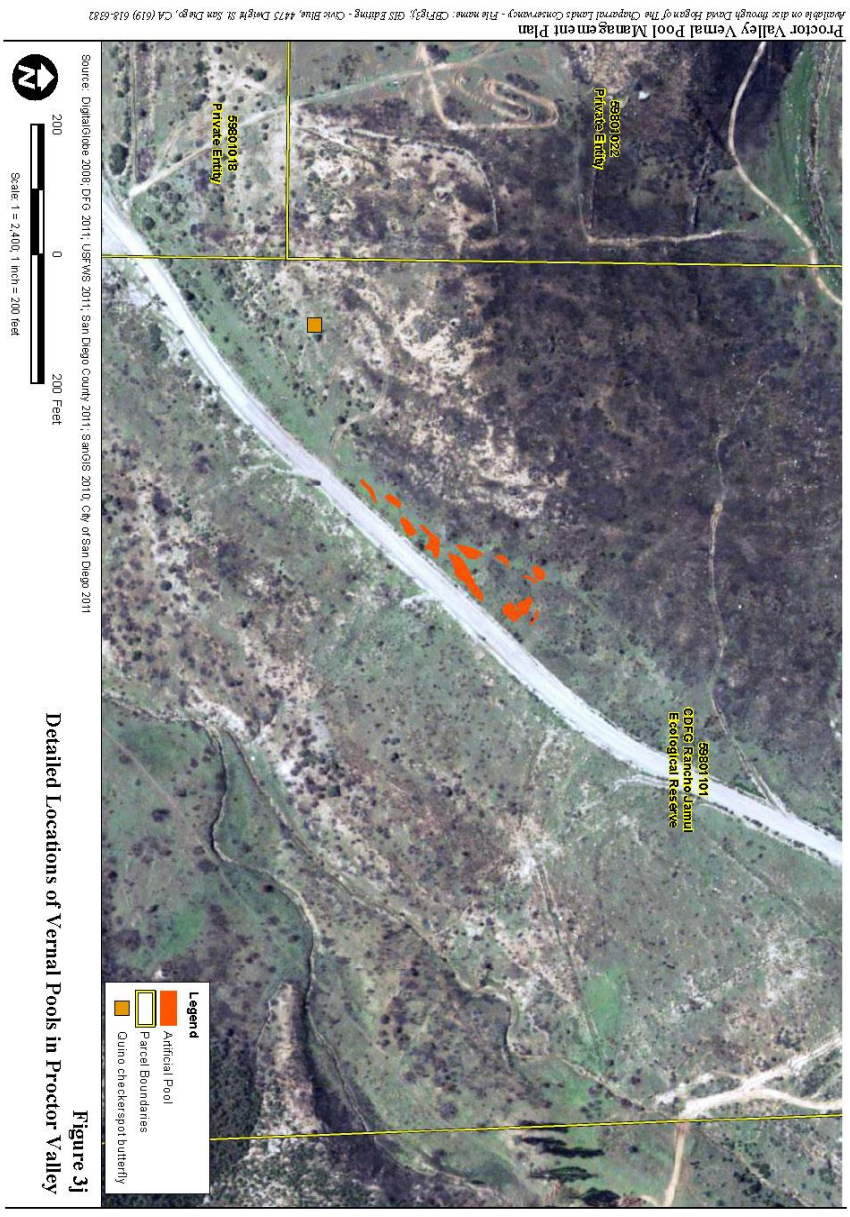

Figure 3j
Detailed Locations of Vernal Pools in Proctor Valley

O-8-51
Cont.

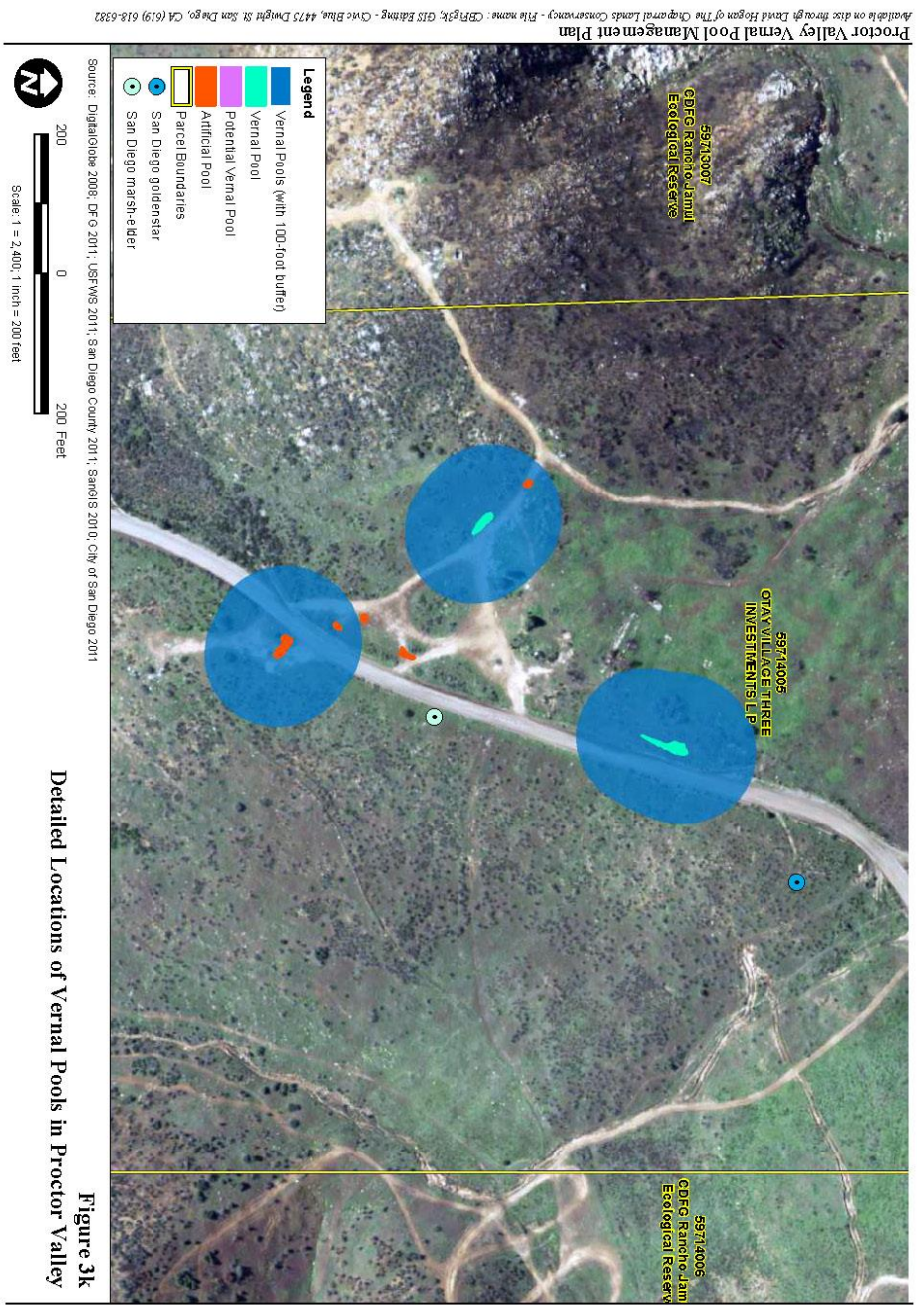

Figure 3k
Detailed Locations of Vernal Pools in Proctor Valley

O-8-51
Cont.

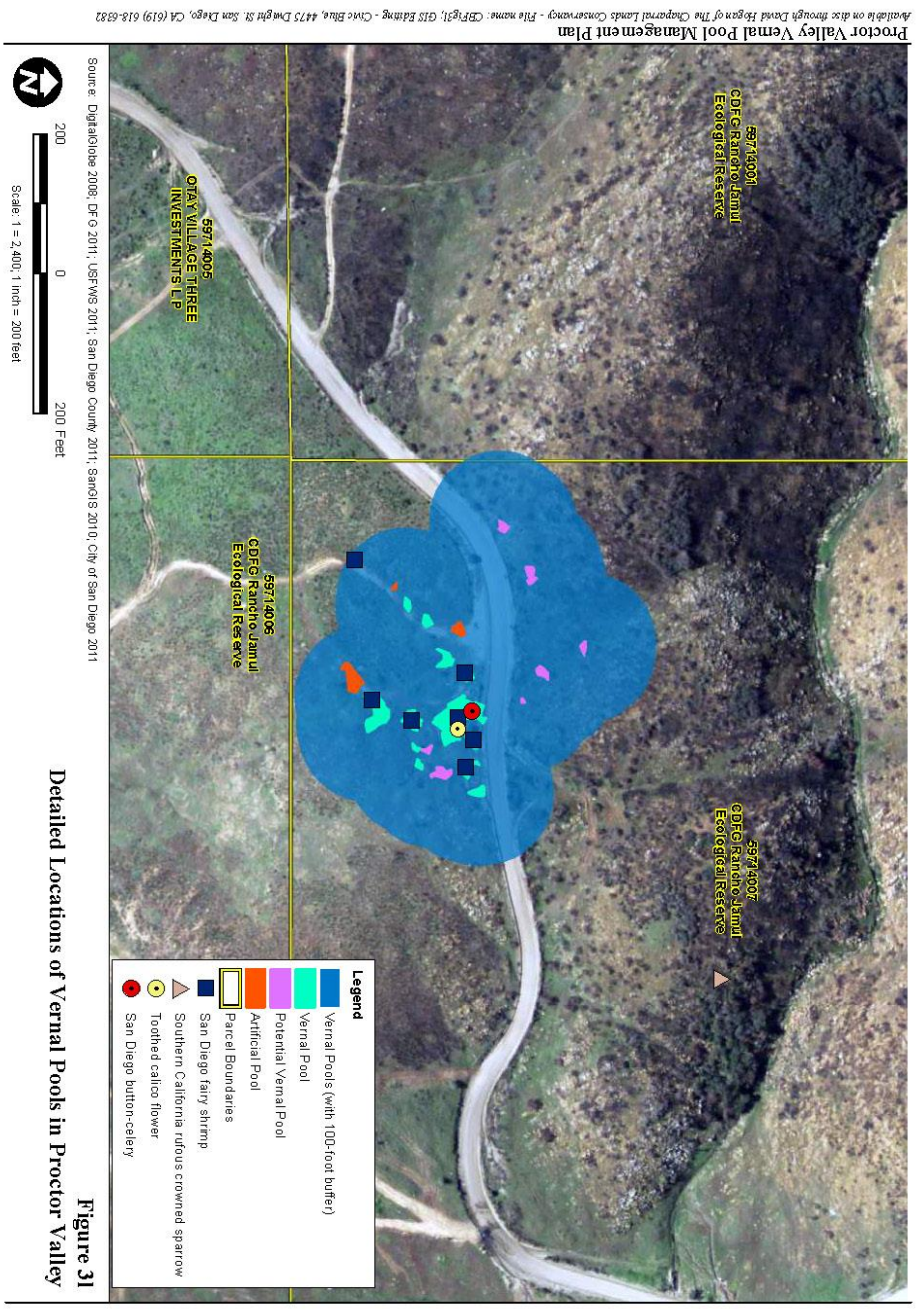

Figure 31
Detailed Locations of Vernal Pools in Proctor Valley

O-8-51
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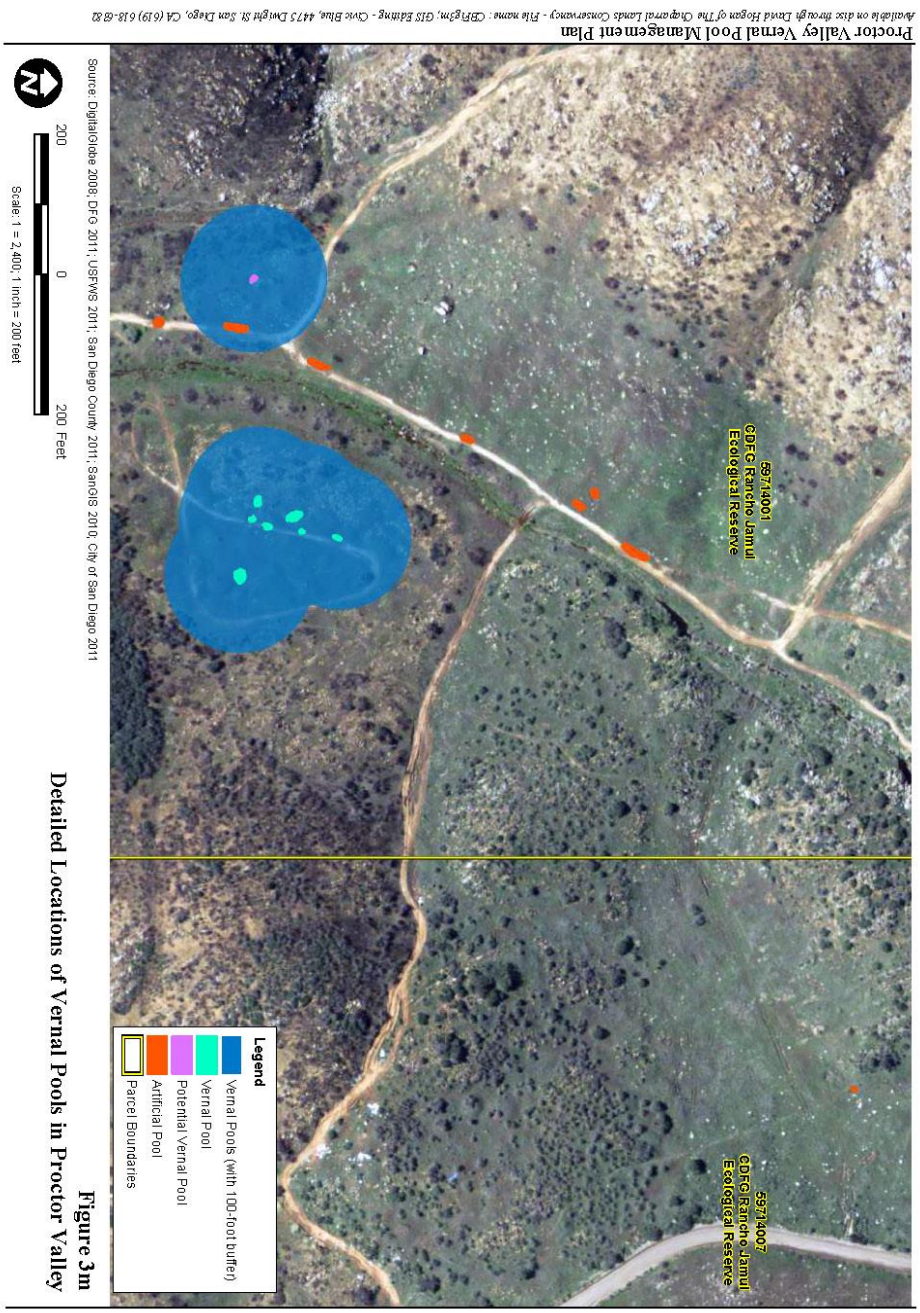
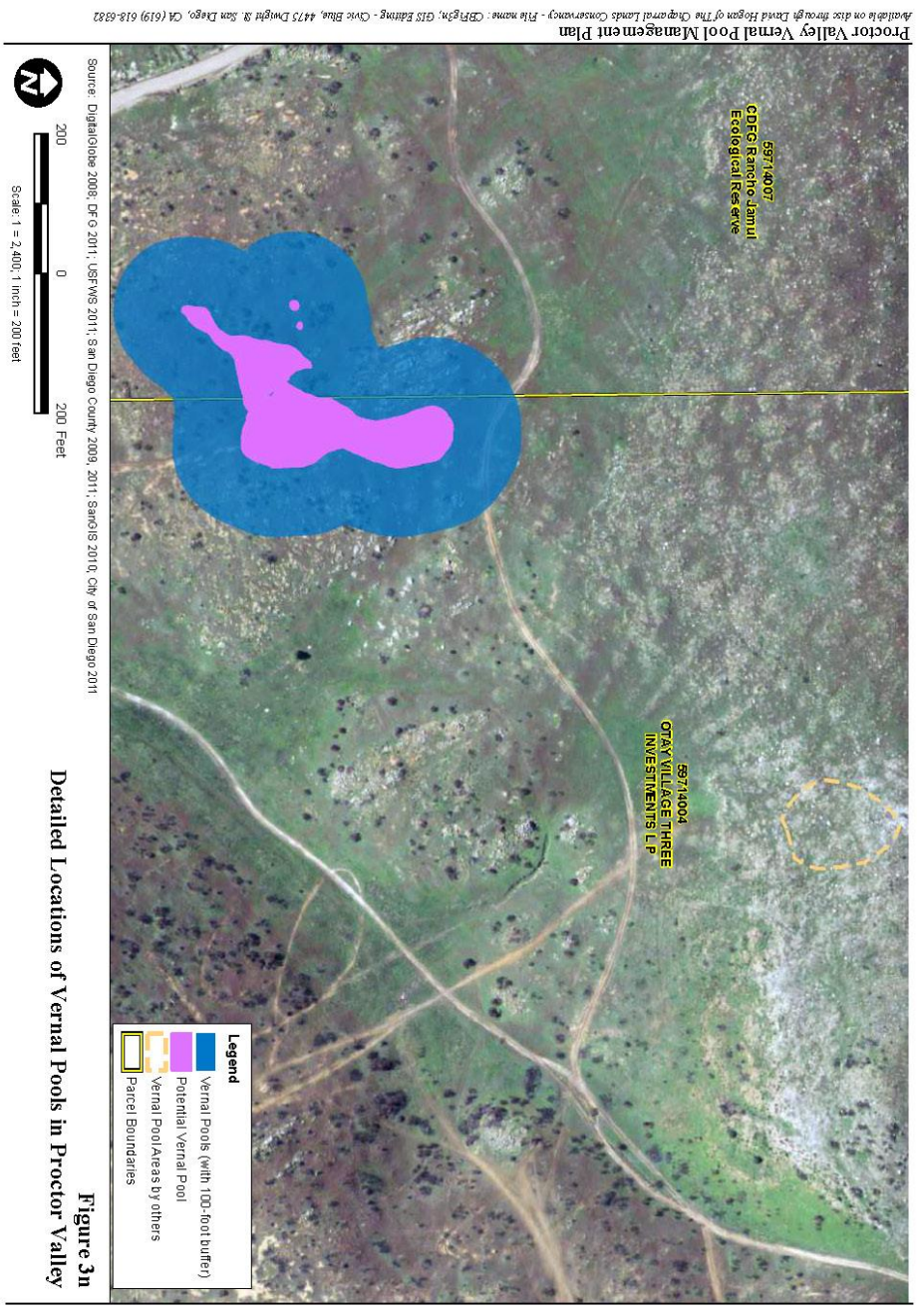

Proctor Valley Vernal Pool Management Plan
Available on disc through Dana Hogan of The Chaparral Lands Conservancy - File name : CBR3m, GIS Editing - Civic Blue, 4475 Dwight St. San Diego, CA (619) 618-8881
CDFG Rancho Jamul Ecological Reserve
5571400?
CDFG Rancho Jamul Ecological Reserve
5571400?
Legend
Vernal Pools (with 100-foot buffer)
Vernal Pool
Potential Vernal Pool
Artificial Pool
Parcel Boundaries
Source: DigitalGlobe 2008; DFG 2011; USFWS 2011; San Diego County 2011; SanGIS 2010; City of San Diego 2011
200
0
200 Feet
Scale: 1 = 2,400; 1 Inch = 200 feet
Figure 3m
Detailed Locations of Vernal Pools in Proctor Valley

O-8-51
Cont.


Proctor Valley Vernal Pool Management Plan
Available on disc through Dana Hogan of The Chapparal Lands Conservancy - File name : CBRgis: GIS Editing - Civic Blue, 4475 Dwight St. San Diego, CA (619) 618-6382
597-14007
CDFG Rancho Jamul Ecological Reserve
597-14004
OTAY VILLAGE THREE INVESTMENTS L P
Legend
Vernal Pools (with 100-foot buffer)
Potential Vernal Pool
Vernal Pool Areas by others
Parcel Boundaries
Source: DigitalGlobe 2008; DFG 2011; USFWS 2011; San Diego County 2009, 2011; SanGIS 2010; City of San Diego 2011
200 0 200 Feet
Scale: 1 = 2,400; 1 inch = 200 feet
Figure 3n
Detailed Locations of Vernal Pools in Proctor Valley

O-8-51
Cont.

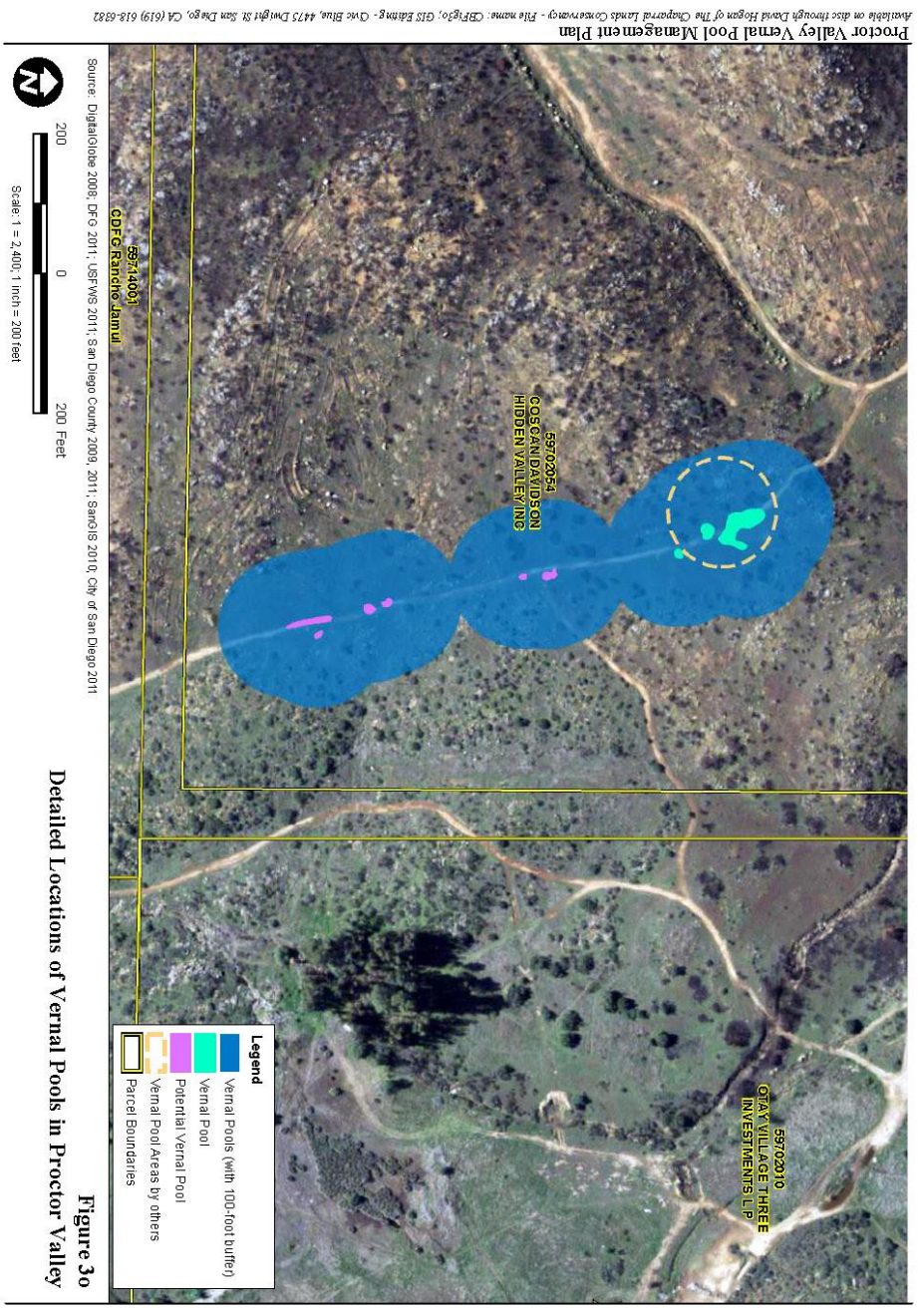


Figure 3o
Detailed Locations of Vernal Pools in Proctor Valley

O-8-51
Cont.

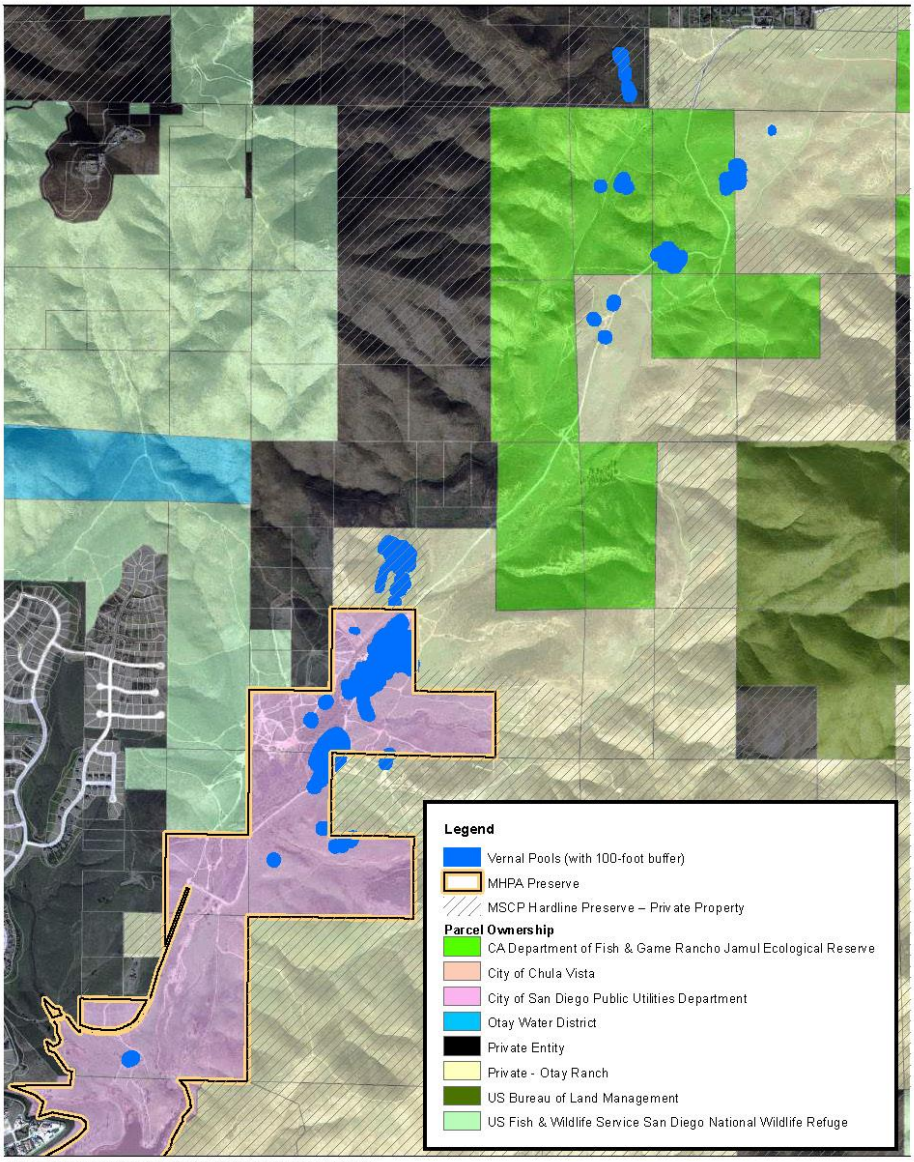


Figure 4
Conserved Lands and Vernal Pools in Proctor Valley

Proctor Valley Vernal Pool Management Plan

Available on disc through David Hogan of The Chaparral Lands Conservancy - File name: CEfig4_ConservedLands; GIS Editing - Civic Blue, 4475 Dwight St. San Diego, CA (619) 618-6382

O-8-51
Cont.

CHAPTER 3.0 –
VERNAL POOL RESTORATION

3.1 INTRODUCTION

3.1.1 Vernal Pool Restoration Site Locations

The Conservancy has identified eleven potential intensive vernal pool restoration sites in Proctor Valley containing concentrations of pools and nearby uplands suitable for restoration (Table 2). These areas are identified as "Proposed Intensive Vernal Pool and Upland Work Areas" with an identifying site name in Figures 5a - 6j). These eleven sites represent a combined total of approximately 37.58 acres and are recommended for restoration based on field surveys, suitable soils and ecological conditions. Several other small potential vernal pool restoration areas contain isolated individual pools and nearby uplands for a total of approximately five acres (Figures 5a - 6j). Eight recommended intensive restoration sites areas are concentrated in Lower Proctor Valley on Cornerstone Lands. Three sites on the Rancho Jamul Ecological Reserve in Upper Proctor Valley also provide excellent restoration opportunities. No vernal pool clusters were identified on the San Diego National Wildlife Refuge. However, the SDNWR does provide opportunities for restoration of individual pools. One additional concentrated vernal pool site suitable for intensive restoration is located on the Otay Ranch Preserve contiguous with the City's Corral Site and could be pursued for restoration with permission of the property owner.

O-8-51
Cont.

In addition to the concentrated vernal pool areas recommended for intensive restoration activities, the Conservancy has identified a number of isolated vernal pools that would also benefit from restoration work. These pools represent a combined total of 4.88 acres are identified as "Proposed Other Vernal Pool and Upland Work Areas" in Figures 5a - 6j.

3.1.2 Terminology

- Artificial Pools – Artificial Pools have clearly been created by recent and historic anthropogenic activity (e.g. compaction or trenching from dirt road or ORV use) where there is no evidence of the presence of an original natural pool prior to disturbance. The Conservancy has identified approximately eighty-four Artificial Pools in Proctor Valley.
- Existing Pools – All existing regularly ponding areas in Proctor Valley including all original natural vernal pools and Artificial Pools. Sometimes Existing Pools have been impacted to such an extent that it is impossible to conclusively determine whether any given pool was an original natural vernal pool.

O-8-51
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Table 2.
Summary of Recommended Intensive Vernal Pool Restoration Sites

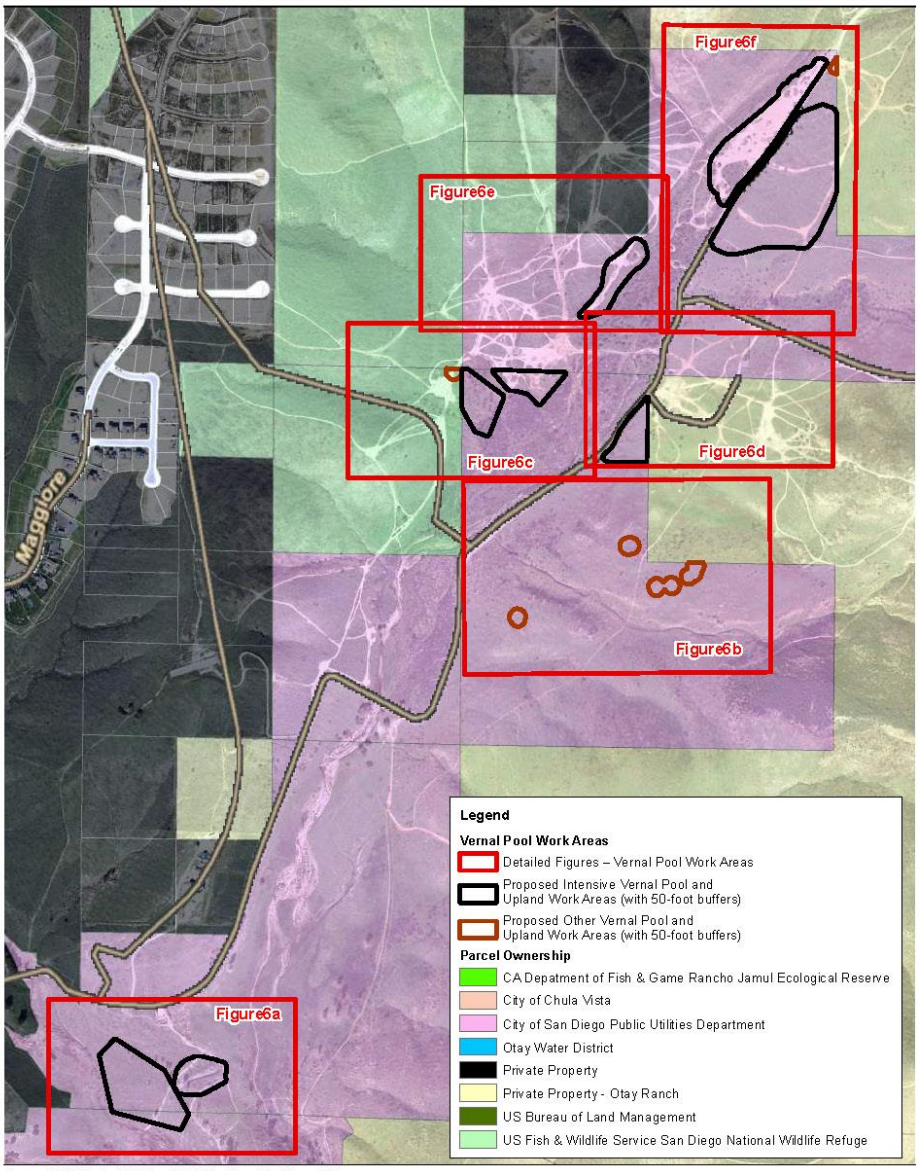
Intensive Restoration Site	Property Owner	Size (Acres)	Beneficiary Sensitive Vernal Pool Species	Impacts & Restoration Rationale
Corral Site A	City of San Diego Public Utilities Department	1.91	Species Group A[5]	Existing Pools impacted by Proctor Valley Road maintenance and weeds. Disturbed areas appear suitable for Newly Constructed Pools.
ORV Site A	City of San Diego Public Utilities Department	4.87	Species Group A	Existing Pools impacted by Proctor Valley Road maintenance, past heavy ORV use, old dirt roads, and weeds. Heavily disturbed, denuded, and compacted area appear suitable for Expanded Pools and Newly Constructed Pools.
ORV Site B	City of San Diego Public Utilities Department	13.1	Species Group B[6]	Existing Pools impacted by Proctor Valley Road maintenance, old dirt roads, ORV tracks, and weeds. Versatile fairy shrimp and hybrids present. Several large, heavily disturbed extended duration Existing Pools appear suitable for Riverside fairy shrimp and Orcutt's grass. Original natural topography and species composition otherwise intact – No species introduction outside of large pools at this site.
Power Line Site A	City of San Diego Public Utilities Department	1.65	Species Group A	No apparent Existing Pools. Site impacted by past heavy ORV use and weeds. Heavily disturbed Mima mound area and soils appears suitable for Newly Constructed Pools.
Power Line Site B	City of San Diego Public Utilities Department	2.12	Species Group B	Existing Pools impacted by weeds. Disturbed areas appear suitable for Newly Constructed Pools. One large, extended duration Existing Pool appears suitable for Riverside fairy shrimp and Orcutt's grass.
Power Line Site C	City of San Diego Public Utilities Department	2.23	Species Group A	Existing Pools impacted by old dirt roads, ORV tracks, and weeds. Disturbed areas appear suitable for Expanded Pools and Newly Constructed Pools.

5. Species Group A: San Diego fairy shrimp; Little mousetail; San Diego button-celery; Spreading navarretia; Toothed calico-flower
6. Species Group B: Riverside fairy shrimp; San Diego fairy shrimp; Little mousetail; Orcutt's grass; San Diego button-celery; Spreading navarretia; Toothed calico-flower

O-8-51
Cont.

Intensive Restoration Site	Property Owner	Size (Acres)	Beneficiary Sensitive Vernal Pool Species	Impacts & Restoration Rationale
Rancho Jamul Site A	CDFG	2.12	Species Group A	Existing pools impacted by Proctor Valley Road maintenance, old dirt roads, ORV tracks, old fill and trash dumping, and weeds. Disturbed and filled areas appear suitable for Expanded Pools and Newly Constructed Pools. Site supports only existing Proctor Valley populations of San Diego button-celery and toothed calico-flower. Original natural species composition intact – No species introduction at this site.
Rancho Jamul Site B	CDFG	1.11	Species Group B	Existing Pools impacted by old dirt roads, trash dumping and weeds. Heavily disturbed, denuded, and compacted Existing Pools and nearby area appears suitable for Expanded Pools and Newly Constructed Pools.
Rancho Jamul Site C	CDFG	1.11	TBD	Existing Pools impacted by old ORV tracks and weeds. Original natural topography and species composition appears intact – No Expanded Pools, Newly Constructed Pools, or species introduction at this site.
Upper Otay Lake Site A	City of San Diego Public Utilities Department	1.86	Species Group A	Existing Pools impacted by old dirt roads, weeds, reservoir inundation prior to dam lowering, and old large trench. Heavily disturbed area appears suitable for Newly Constructed Pools.
Upper Otay Lake Site B	City of San Diego Public Utilities Department	5.49	Species Group A	No apparent Existing Pools. Site impacted by old dirt roads, weeds, and reservoir inundation prior to dam lowering. Mima mound area and soils appear suitable for Newly Constructed Pools.

Comment Letter O-8



Source: DigitalGlobe 2008; SanGIS 2010; City of San Diego 2011

1,000 0 1,000 Feet

Scale: 1:12,000; 1 inch =1,000 feet

Figure 5a
Location of Proposed Vernal Pool and Upland Work Areas and Vicinity Property Ownership (Upper Proctor Valley)

Proctor Valley Vernal Pool Management Plan

Available on disc through David Hogan of The Chaparral Lands Conservancy - File name: CEfig5a; GIS Editing - Civic Blue, 4475 Dwight St. San Diego, CA (619) 618-6382

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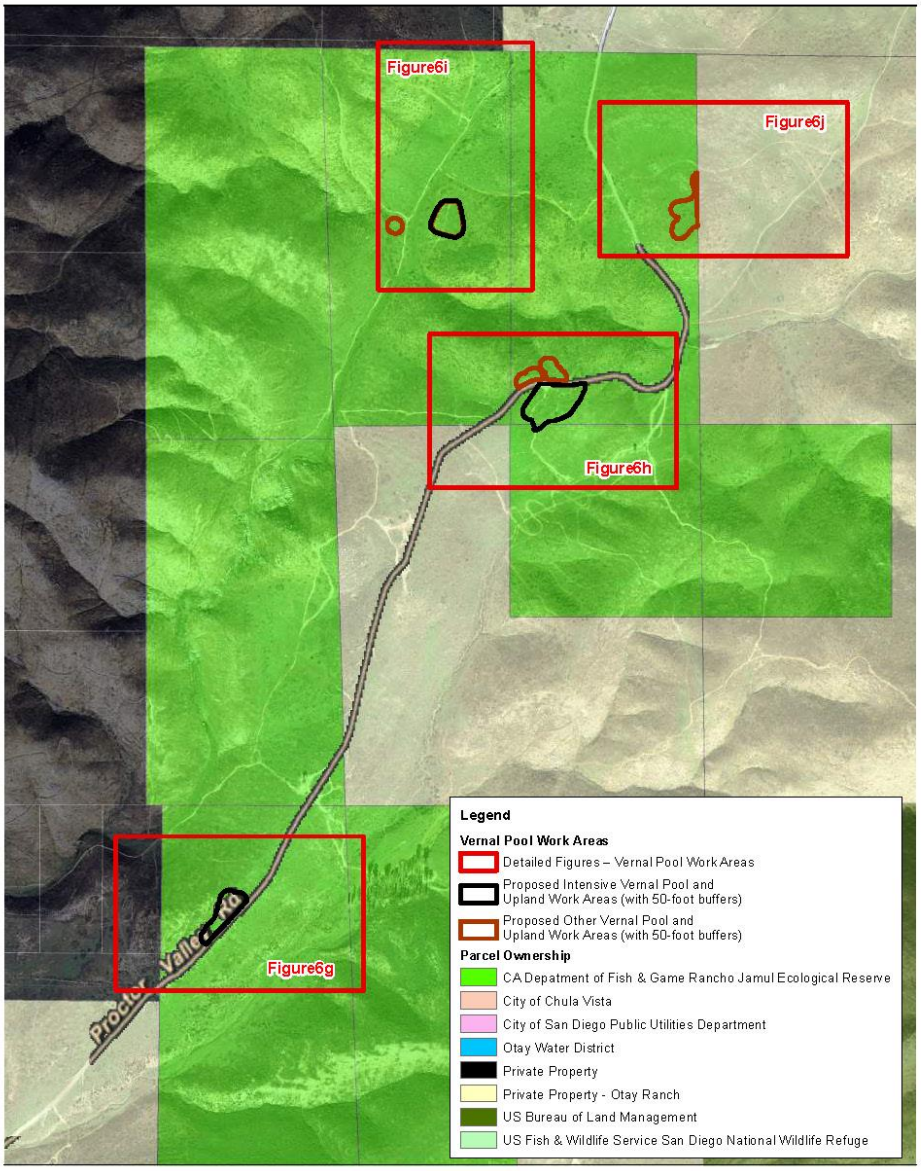

Figure 5b
Location of Proposed Vernal Pool and Upland Work Areas and Vicinity Property Ownership (Upper Proctor Valley)

Proctor Valley Vernal Pool Management Plan

Available on disc through David Hogan of The Chaparral Lands Conservancy - File name: CEfig5b_vicinity_ownership; GIS Editing - Civic Blue, 4475 Dwight St. San Diego, CA (619) 618-6832

O-8-51
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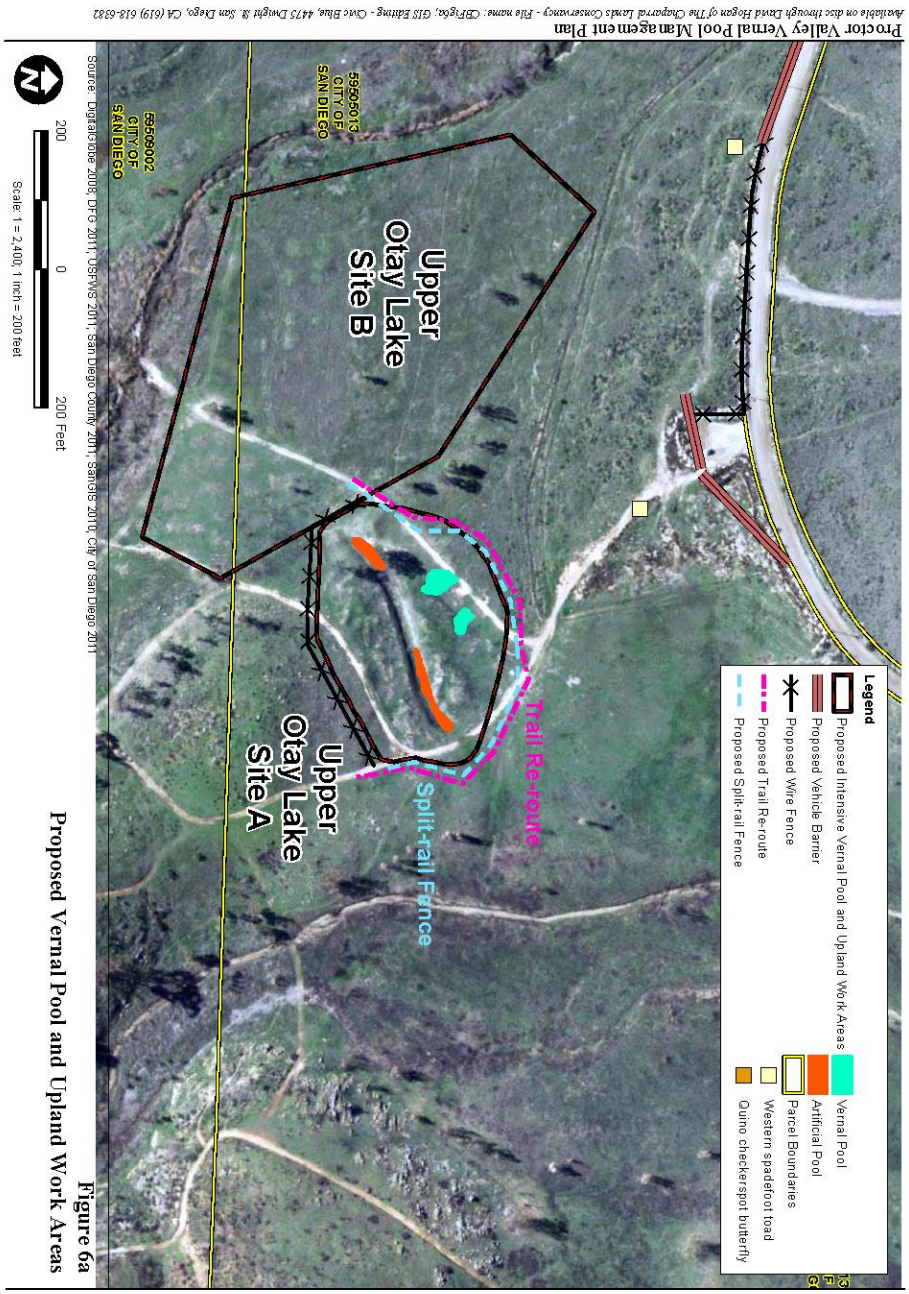

Figure 6a
Proposed Vernal Pool and Upland Work Areas

O-8-51
Cont.

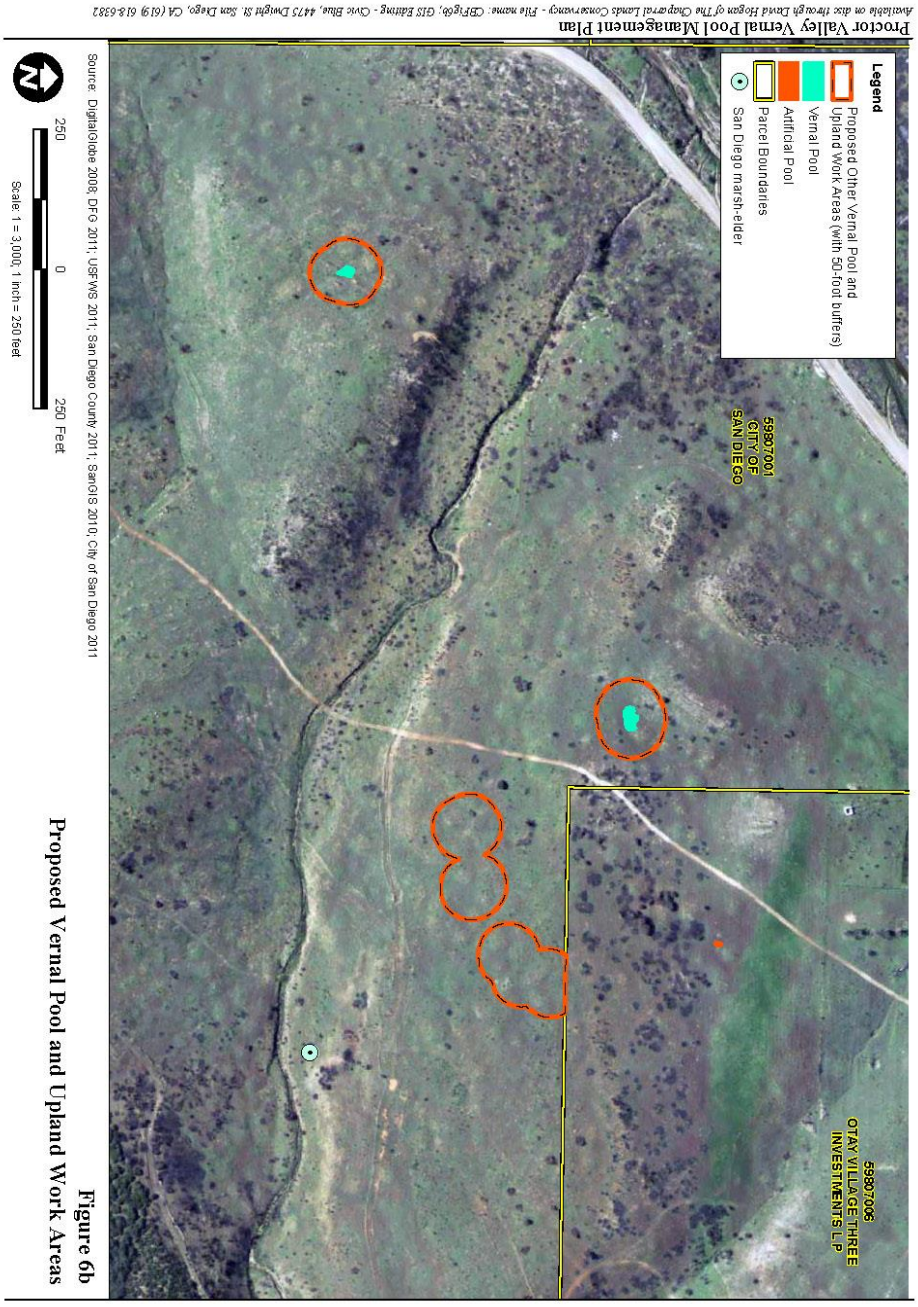

Figure 6b
Proposed Vernal Pool and Upland Work Areas

O-8-51
Cont.

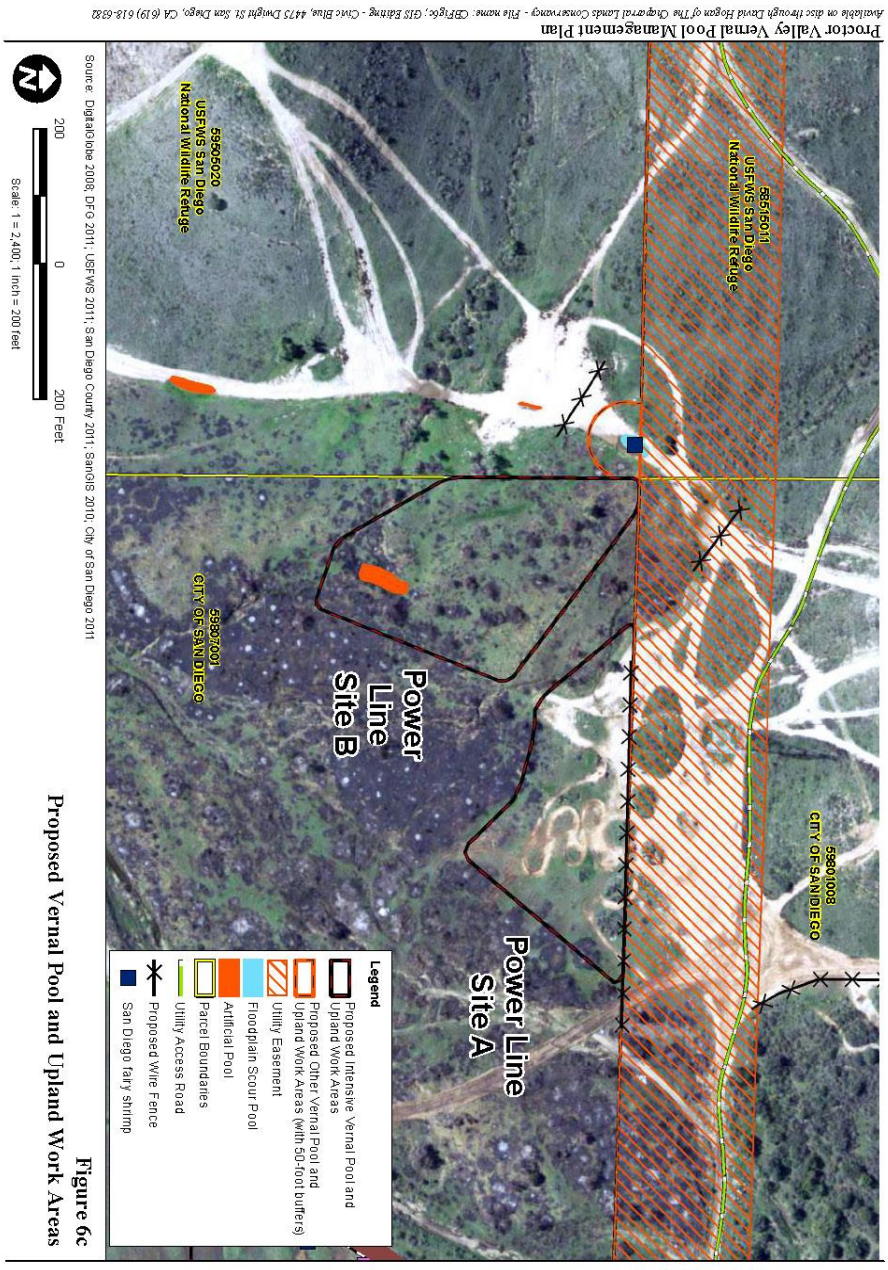

Figure 6c
Proposed Vernal Pool and Upland Work Areas

O-8-51
Cont.

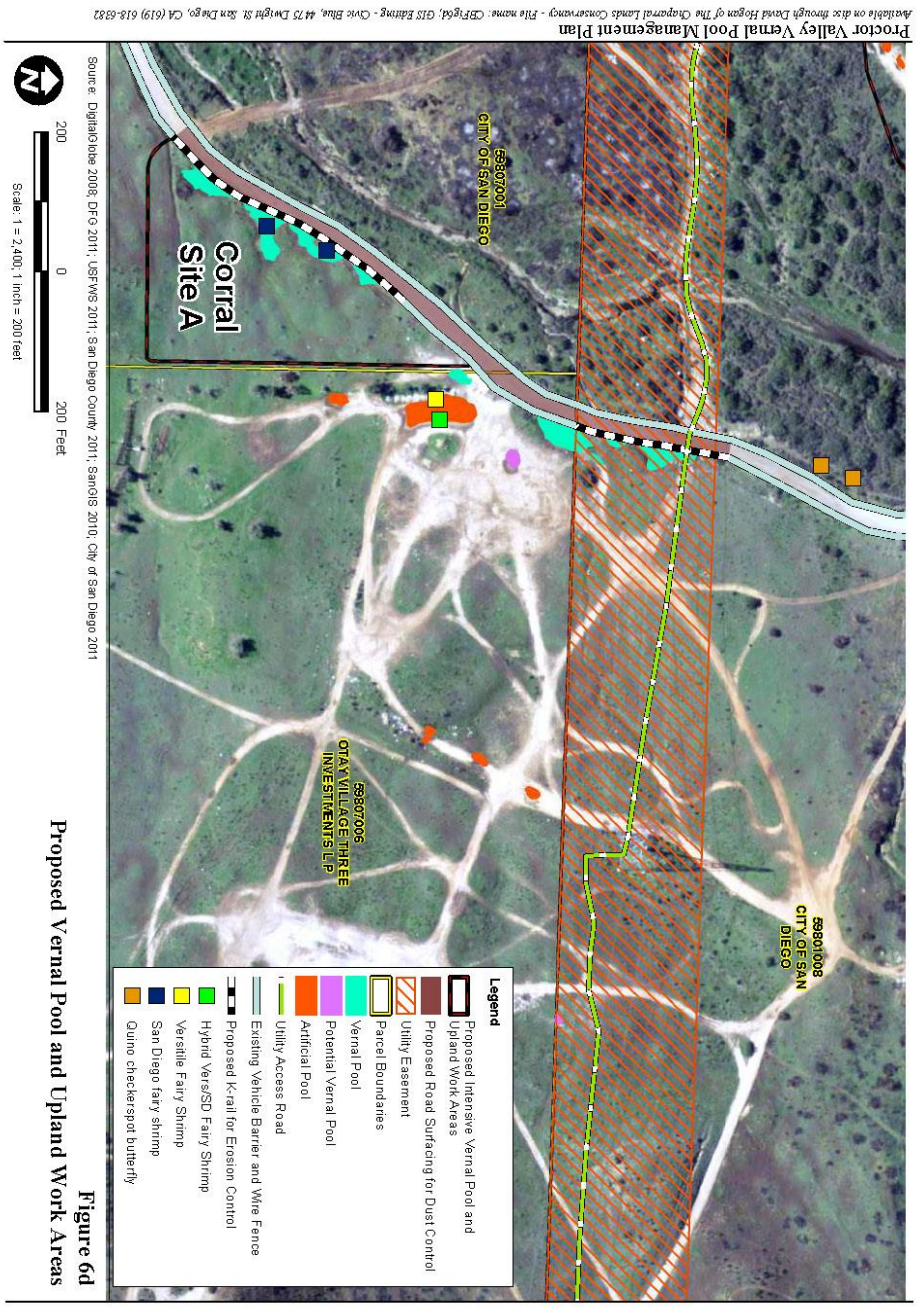

Figure 6d
Proposed Vernal Pool and Upland Work Areas

O-8-51
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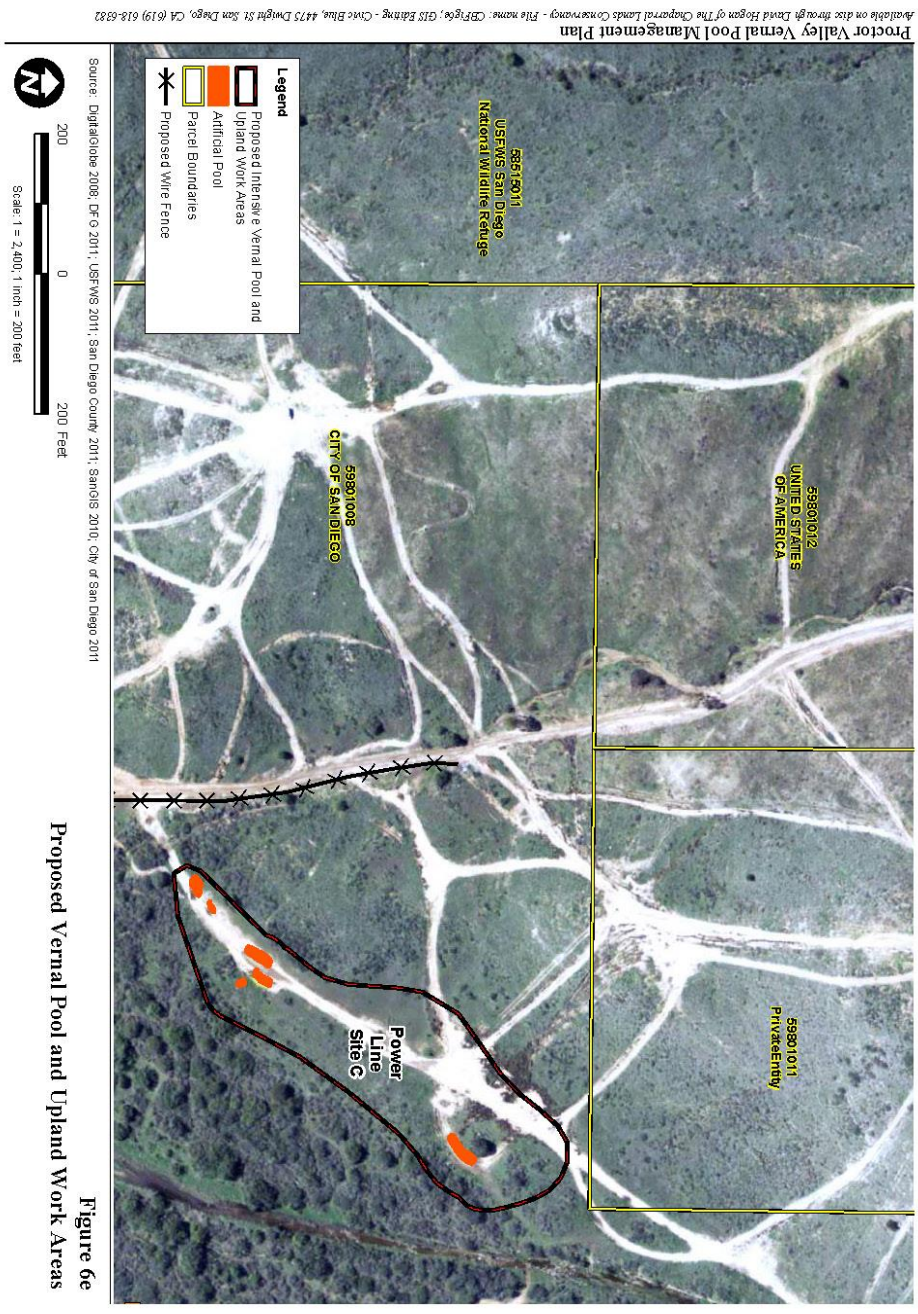

Figure 6e
Proposed Vernal Pool and Upland Work Areas

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Cont.

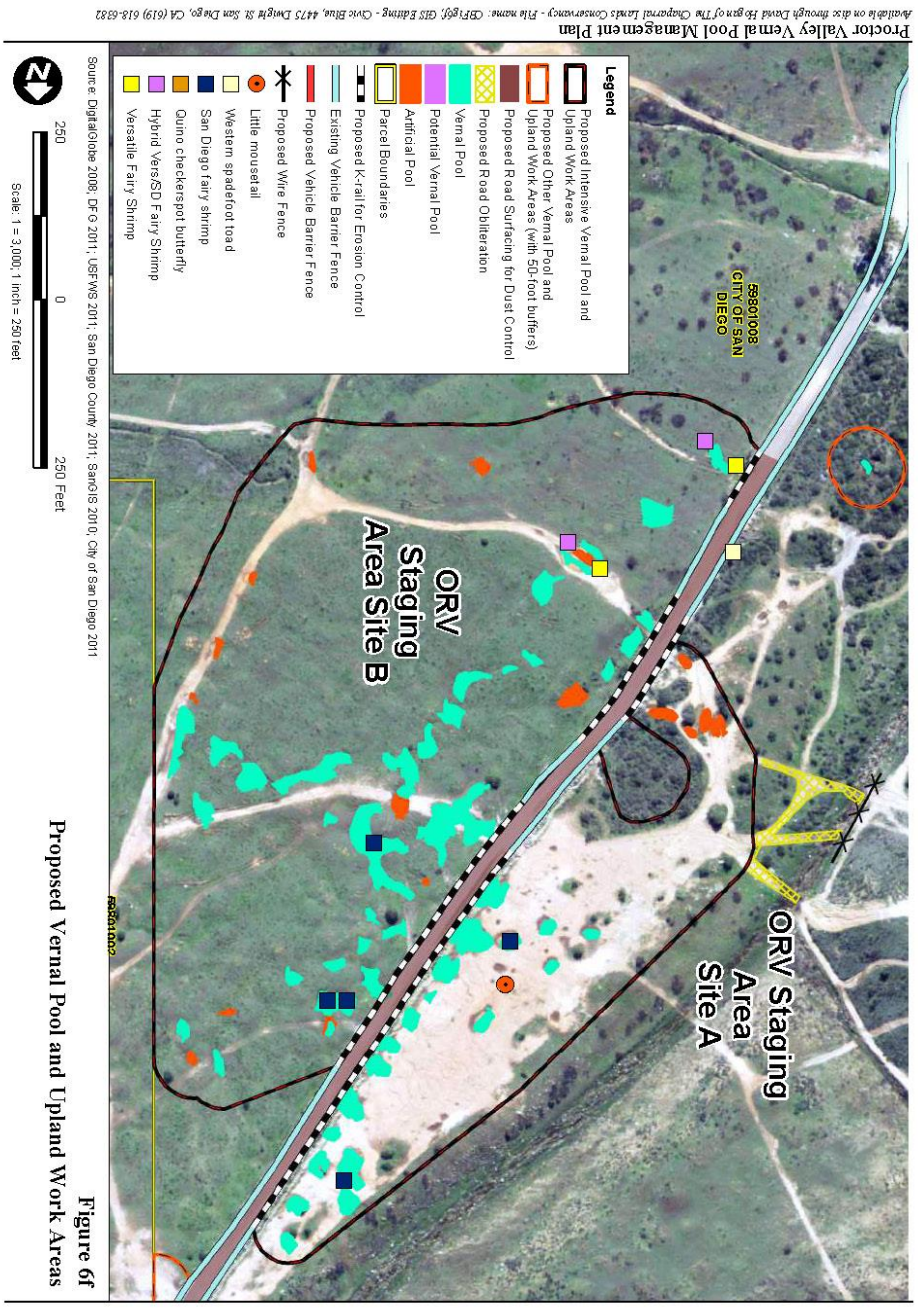

Figure 6f
Proposed Vernal Pool and Upland Work Areas

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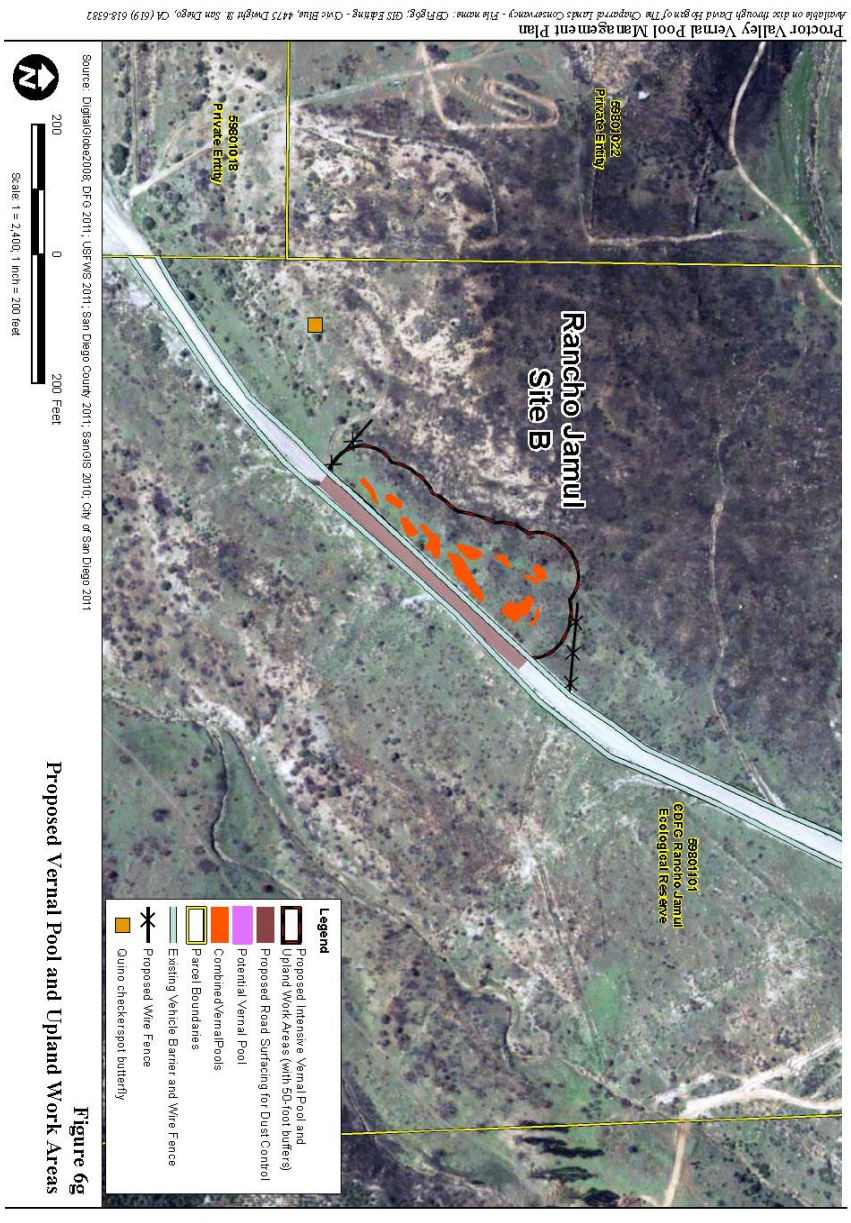
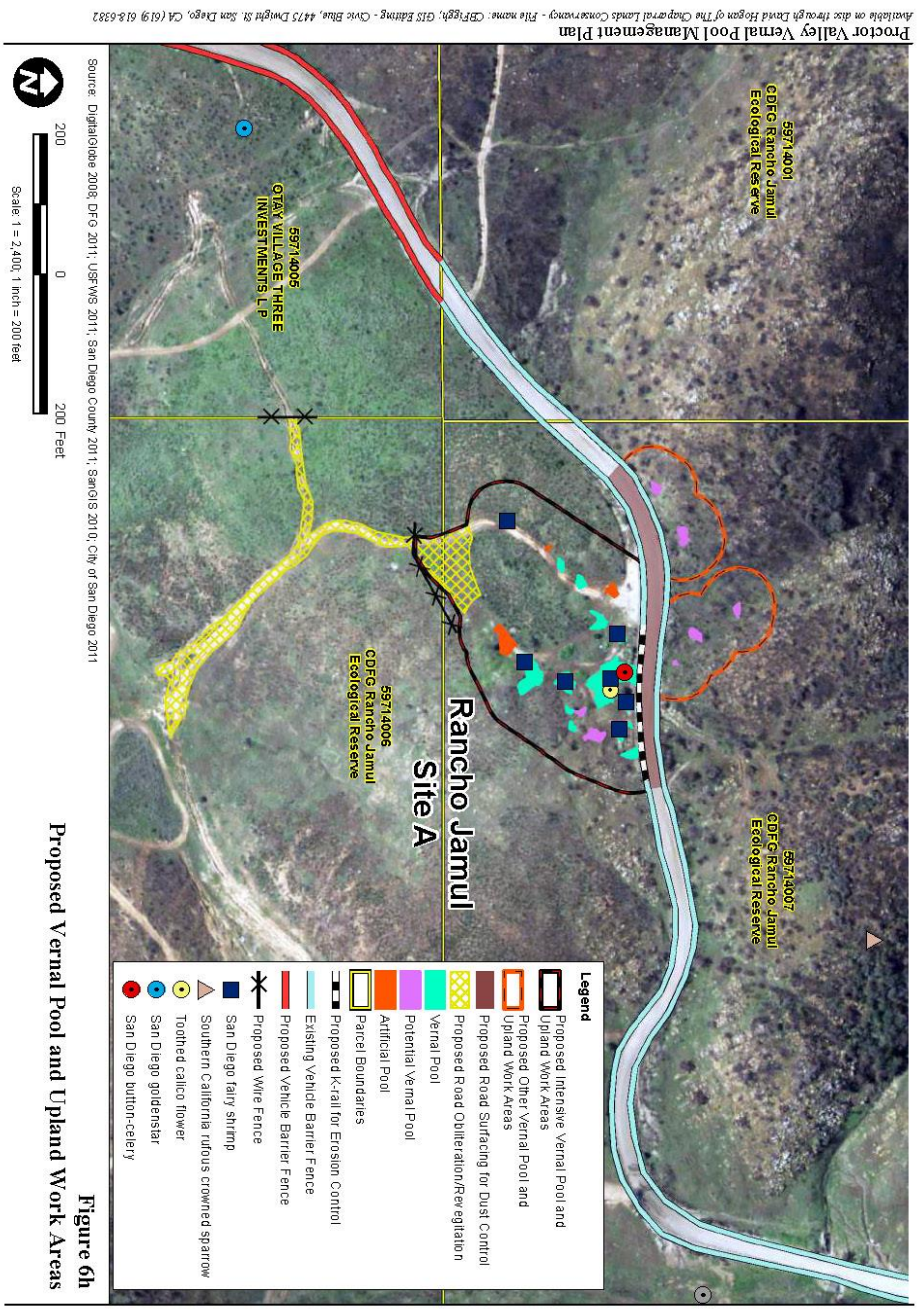

Proctor Valley Vernal Pool Management Plan
Rancho Jamul
Site B
5380122
Private Entity
5380101B
Private Entity
5380101
CDFG Rancho Jamul
Ecological Reserve
Legend
Proposed Intensive Vernal Pool and Upland Work Areas (with 50-foot buffers)
Proposed Road Surfacing for Dust Control
Potential Vernal Pool
CombinedVernalPools
Parcel Boundaries
Existing Vehicle Barrier and Wire Fence
Proposed Wire Fence
Quino checkerspot butterfly
Source: DigitalGlobe2008; DFG 2011; USFWS 2011; San Diego County 2011; SanGIS 2010; City of San Diego 2011
200
0
200 Feet
Scale: 1 = 2,400, 1 inch = 200 feet
Figure 6g
Proposed Vernal Pool and Upland Work Areas

O-8-51
Cont.


Proctor Valley Vernal Pool Management Plan
Available on disc through David Hogan of The Chaparral Lands Conservancy - File name: CBFlegh; GIS Editing - Civic Blue, 4475 Dwight St. San Diego, CA (619 618-6382
Rancho Jamul
Site A
CDFG Rancho Jamul Ecological Reserve
597140001
CDFG Rancho Jamul Ecological Reserve
597140007
OTAY VILLAGE THREE INVESTMENTS, L.P.
597140005
CDFG Rancho Jamul Ecological Reserve
597140006
Legend
Proposed Intensive Vernal Pool and Upland Work Areas
Proposed Other Vernal Pool and Upland Work Areas
Proposed Road Surfacing for Dust Control
Proposed Road Obliteration/Revegitation
Vernal Pool
Potential Vernal Pool
Artificial Pool
Parcel Boundaries
Proposed K-rail for Erosion Control
Existing Vehicle Barrier Fence
Proposed Vehicle Barrier Fence
Proposed Wire Fence
San Diego fairy shrimp
Southern California rufous crowned sparrow
Toothed calico flower
San Diego goldenstar
San Diego button-celery
Source: DigitalGlobe 2008; DFG 2011; USFWS 2011; San Diego County 2011; SanGIS 2010; City of San Diego 2011
Scale: 1 = 2,400; 1 Inch = 200 feet
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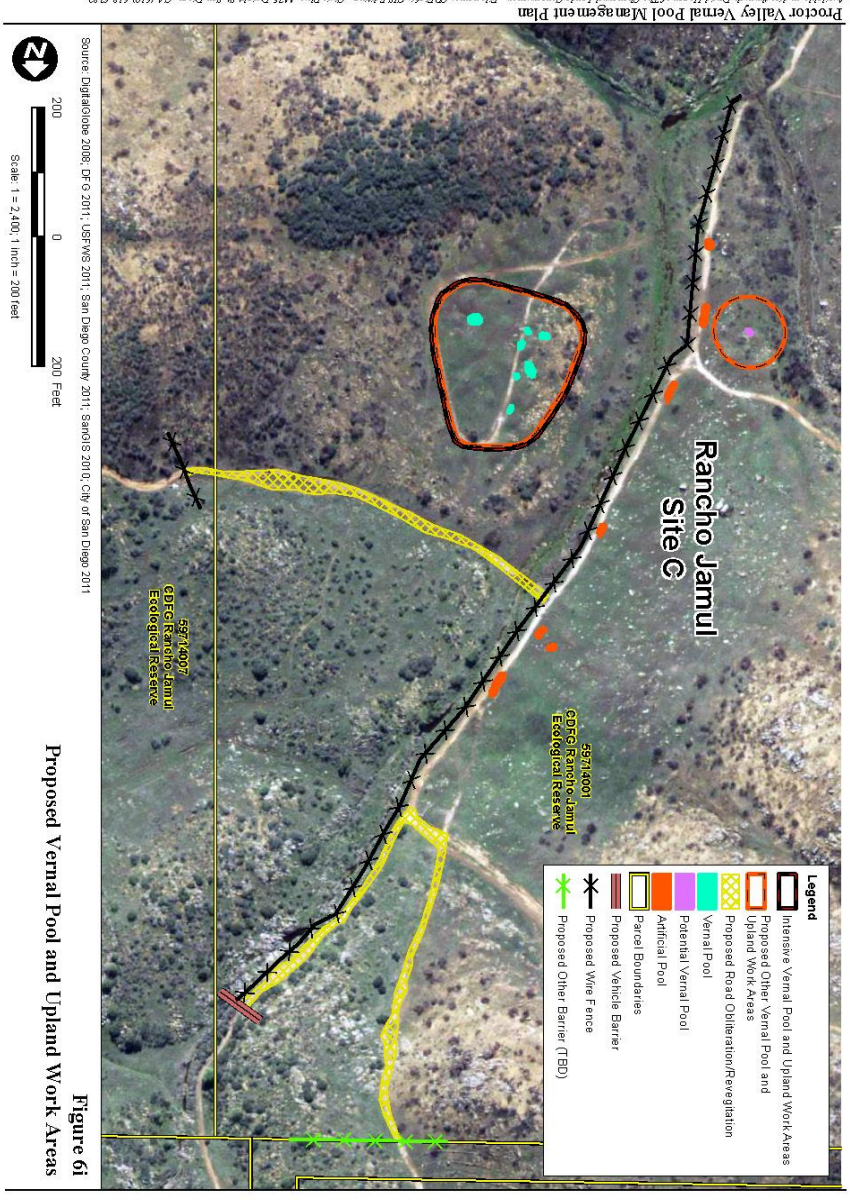
0
200 Feet
Figure 6h
Proposed Vernal Pool and Upland Work Areas

O-8-51
Cont.


Proctor Valley Vernal Pool Management Plan
Available on disc through Land Hogan of The Chaparral Lands Conservancy - File name: C:\Fig6i. GIS Editing - Civic Blue, 4475 Dwight St. San Diego, CA (619) 618-6381
Rancho Jamul
Site C
CDFG Rancho Jamul
Ecological Reserve
5571-4001
CDFG Rancho Jamul
Ecological Reserve
5571-4007
Legend
Intensive Vernal Pool and Upland Work Areas
Proposed Other Vernal Pool and
Upland Work Areas
Proposed Road Obliteration/Revegetation
Vernal Pool
Potential Vernal Pool
Artificial Pool
Parcel Boundaries
Proposed Vehicle Barrier
Proposed Wire Fence
Proposed Other Barrier (TBD)
Source: DigitalGlobe 2008; DFG 2011; USFWS 2011; San Diego County 2011; SanGIS 2010; City of San Diego 2011
200 0 200 Feet
Scale: 1 = 2,400; 1 inch = 200 feet
Figure 6i
Proposed Vernal Pool and Upland Work Areas

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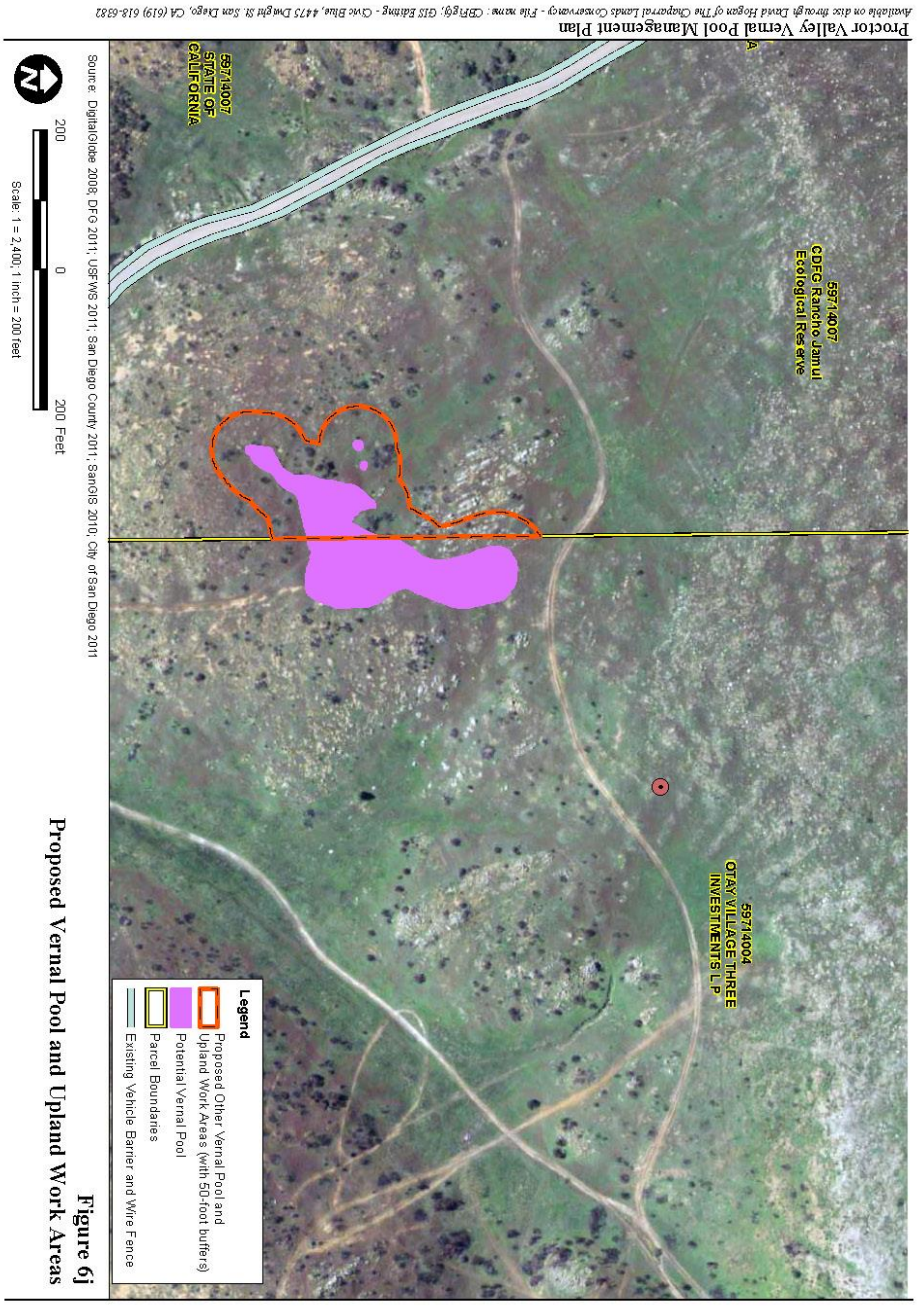

Figure 6j
Proposed Vernal Pool and Upland Work Areas

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- Expanded Pools – Existing Pools in Proctor Valley that would be expanded as part of restoration activities.
- Newly Constructed Pools – Entirely new pools to be constructed as part of restoration activities. Newly Constructed Pools would be located near Existing Pools on suitable soils that may have supported original natural vernal pools prior to disturbance.
- Reference/Control Pools – Four Reference/Control Pools have been identified in Proctor Valley to assist with monitoring of comparative conditions and progress towards restoration goals at any restoration site. The four Reference/Control Pools are located on the Otay Ranch Preserve and Rancho Jamul Ecological Reserve. The Reference/Control Pools are some of the least disturbed, original natural vernal pools in Proctor Valley and provide a variety of ecological and hydrological conditions representative of the variety of local vernal pool conditions.
- Restoration Site Pools – The total number of pools at any given recommended intensive Proctor Valley vernal pool restoration site upon completion of restoration grading and include Existing Pools, Expanded Pools, and Newly Constructed Pools.

3.1.3 Goals and Objectives of Vernal Pool Restoration

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The goals of this Restoration Plan with respect to vernal pools include protecting pools from disturbance, improving the function of vernal pool habitat (including hydrology and ecology), and increasing the size and extent of populations of vernal pool dependent sensitive species. Specific project objectives are as follows:

- Limit Future Harm – Limit future anthropogenic disturbance to sensitive uplands through fencing, signing, planting and vegetative camouflage of old dirt roads and paths, and public educational outreach.
- Improve Existing Pools – Improve hydrogeomorphic and ecological conditions in degraded Existing Pools consistent with conditions in Reference/Control Pools including restoration of micro-topography (e.g. removal of erosion fill, smoothing of degraded edges and tire ruts); restoration of native flora (container planting, seeding, and weeding), and restoration of native fauna (inoculation).
- Expand Vernal Pool Habitat – Construct new pools and expand some degraded Existing Pools to establish new vernal pool habitat consistent with hydrogeomorphic and ecological conditions in Reference/Control Pools. Expansion would be limited to Artificial Pools, and to original natural Existing Pools degraded by erosion fill, tire trenching, and other altered microtopography. Original natural Existing Pools with intact

topography would not be expanded. Newly Constructed Pools would be located near Existing Pools on suitable soils that may have supported original natural vernal pools prior to disturbance.

- Increase Diversity of Vernal Pool Flora and Fauna – Increase native plant and animal species diversity in all restored pools consistent with conditions in Reference/Control Pools and predicted historic species composition.

Increase populations of imperiled vernal pool species – Establish new refugia populations of seven imperiled vernal pool species in restored pools as appropriate considering existing populations, historic reports, species' existing ranges, and suitable habitats (Table 3). Depending on the particular restoration site, species appropriate to Proctor Valley would include: Riverside fairy shrimp; San Diego fairy shrimp; Little mousetail; Orcutt's grass; San Diego button-celery; spreading navarretia; and toothed calico-flower.7 Sensitive vernal pool species that would indirectly benefit from restoration include the two-striped garter snake (Thamnopsis hammondii), a state species of concern, and western spadefoot toad (Spea hammondii)8.

- Prevent introduction or spread of undesirable vernal pool flora and fauna – Attempt to control versatile fairy shrimp (*Branchinecta lindahli*) and/or hybrid San Diego fairy shrimp/versatile fairy shrimp in Existing Pools where practicable. Prevent spread of versatile fairy shrimp and/or hybrids to unoccupied pools. Prevent introduction and spread of exotic invasive plants and reduce existing populations.

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Recommended vernal pool restoration is proactive and not a mitigation project. It is the intent of the Conservancy to carry out proposed restoration activities to achieve stated goals and will endeavor to secure additional funding and/or carry out additional restoration work in the event project goals are not achieved. However, in the event that goals are not met, no remedial action will be *required* after the project implementation period. Neither the Conservancy nor the agencies property owners are bound to fund and/or implement any restoration activities beyond project implementation periods.

3.2 PERMITTING

3.2.1 Right-of-Entry Permits

Permission to conduct recommended vernal pool restoration activities must be obtained from the agency property owner of any given restoration site. Formal permission is expected to be

7. Not all recommended Proctor Valley vernal pool species are suitable for every site (Table 3).
8. These species are expected to independently colonize restored vernal pools.

obtained in the form of right-of-entry permits following agency review and approval of this plan and completion of review under the California Environmental Quality Act and National Environmental Policy Act.

3.2.2 California Environmental Quality Act

Review of proposed vernal pool restoration activities under the California Environmental Quality Act (CEQA) would be completed by the City of San Diego and California Department of Fish and Game to support right-of-entry permits for any restoration activities on Cornerstone Lands or the Rancho Jamul Ecological Reserve, respectively. Recommended restoration activities should qualify for a CEQA Notice of Exemption for the following reasons: Recommended projects meet the criteria set forth in CEQA Section 15304 which allows for the minor alternation of land to improve wildlife habitat or Section 15333 which allows for small habitat restoration projects; Recommended projects are entirely focused on enhancing and stewarding sensitive habitat; Recommended projects would be reviewed for consistency with the California Fish and Game Code and City of San Diego's Environmentally Sensitive Lands Regulations and are expected to be exempt from a City Site Development Permit pursuant to Section 143.0110(c)(6) of the Land Development Code; All work would occur within the City's MHPA but would not result in direct impacts requiring mitigation; and the applicant will implement the MHPA Land Use Adjacency Guidelines applicable to any recommended project site including the provision that no work with motorized equipment would occur during the breeding bird season (March 1 – August 15).

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3.2.3 Endangered Species

Five federal and/or state listed endangered or threatened vernal pool species would be included in recommended restoration activities with permission of the City of San Diego, CDFG, and USFWS. These species include the Federal endangered Riverside fairy shrimp, San Diego fairy shrimp, and spreading navarretia, and California and Federal endangered Orcutt's grass and San Diego button-celery. The donation sites for these species would be occupied Existing Pools in Proctor Valley, Lower Otay Lake, Otay Mesa, and Sweetwater Reservoir. Permission and permits to collect and/or introduce these listed species would be required from the following agencies and property owners: The City of San Diego Public Utilities Department as property owner of the Cornerstone Lands and Otay Lake donor site; CDFG as property owner of the RJER and the permitting authority for state listed plants; the Sweetwater Authority as property owner at the Sweetwater Reservoir donor site; and the USFWS as the property owner or the San Diego National Wildlife Refuge and permitting authority for the five federally listed species. Other anticipated endangered species permitting is described below.

3.2.3.1 Federal Endangered Species Act

Permission for vernal pool restoration activities impacting federally listed species is required from the USFWS under the Federal Endangered Species Act. Activities potentially subject to Federal ESA permitting include: Incidental impacts to San Diego fairy shrimp in Existing Pools; Collection of seeds of listed plants and San Diego fairy shrimp soil inoculum; Greenhouse growing of listed plants in containers and seed bulking; and Seeding, container planting, and introduction of San Diego fairy shrimp soil inoculum to pools. Designated critical habitat in Proctor Valley for spreading navarretia and the Quino checkerspot butterfly may also be subject to Federal ESA permitting.

Permission under the Federal ESA is anticipated to be provided through a USFWS internal formal Section 7 consultation and Biological Opinion triggered by a grant (for the pending ORV Site A restoration project) and technical support from the agency's Partners for Fish and Wildlife Program to support proposed restoration activities and by Clean Water Act permitting by the U.S. Army Corps of Engineers (ACOE). The USFWS has prepared a Biological Opinion for the Proctor Valley ORV Site Vernal Pool Restoration Project and conservation conditions from that document have been fully integrated into this Restoration Plan.

For any given restoration site, The Conservancy will submit a final restoration plan, or a detailed work plan to supplement the restoration plan, to the Service for approval within 30 days of the receipt of the biological opinion, or at least 10 days prior to project implementation, whichever comes first. The final plan will include the following information and conditions:

- Implementation of the restoration will be conducted under the direction of a qualified project biologist (vernal pool restoration specialist) with at least three years of vernal pool restoration experience, to be approved by the USFWS.
- Restoration activities will include addition of vernal pool plant species and addition of coastal sage scrub and native grassland plant species in nearby uplands. All plant material used would be collected from areas identified in this work plan.
- A map depicting the locations of on- and off-site reference/control pools and a table detailing basin size, average depth, ponding duration, native cover, nonnative cover and presence of listed species for each pool.
- A detailed work map and associated table of information will be prepared showing several elements of proposed vernal pool restoration activities and pool hydrology including the following elements: The furthest perimeter of vernal pool and upland work areas; Existing Pools, proposed Expanded Pools, and proposed Newly Constructed Pools;

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The direction of any overland water flow in vernal pool areas; Existing mapped topography from submeter GPS data collected on the sites during the past year using 0.25 foot contours for the vernal pools and the areas adjacent to the pools and 1 foot contours for areas more distant from the vernal pools; The location of existing vernal pools and proposed new or expanded vernal pools including the deepest and shallowest points, any points where water enters or exits existing pools; The location of pools in relation to watershed topography, surface water flow, and hydrologic connection between the pools; Cross-section drawings for an example Expanded Pool and an example Newly Constructed Pool; A table showing dimensions for each proposed Expanded Pool and proposed Newly Constructed Pool including existing and proposed elevations, lengths of long and short axes, and final slopes.

3.2.3.2 California Endangered Species Act

Permission for proposed vernal pool restoration activities is anticipated to be required from the CDFG under the California Endangered Species Act and Fish and Game Code. Activities potentially subject to permitting under the California ESA include: Collection of seeds of listed plants; Greenhouse growing of listed plants in containers and seed bulking; and seeding and container planting at the ORV Site. Permission under the California ESA is anticipated to be provided through a Research and Management Permit under Section 1907(a) and Section 2081(a) of the Fish and Game Code.

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3.2.4 National Environmental Policy Act

A review of proposed activities under the National Environmental Policy Act (NEPA) is expected to be required by the USFWS to support Federal ESA permitting and funding by the Partners for Fish and Wildlife program. Alternative NEPA compliance may be available through the ACOE Nationwide Permits program. NEPA compliance is expected to be obtained concurrent with any USFWS internal formal Section 7 consultation or ACOE Nationwide permitting. NEPA Categorical Exclusions are anticipated for recommended restoration activities given the purpose of the projects to improve habitat conditions and benefit imperiled species with no harm to significant biological or cultural resources.

3.2.5 Federal Clean Water Act and California Porter-Cologne Water Quality Control Act

Federal Clean Water Act permits for vernal pool restoration are expected to be required by the U.S. Army Corps of Engineers (ACE) and the San Diego Regional Water Quality Control Board (RWQCB). The ACE requires permits for any impacts to "Waters of the United States" under Section 404 of the Clean Water Act. The RWQCB administers Section 401 of the federal Clean

Water Act as well as the California Porter-Cologne Water Quality Control Act and requires permits to protect water quality in Waters of the U.S. and State. Proctor Valley vernal pools do not appear to meet the definition of Waters of the U.S. based on current regulations and legal decisions. However, the process to prove that a water body is not a Water of the U.S. is highly technical, time consuming, and expensive. Because of this, some project applicants elect to use a "Preliminary Jurisdictional Determination" to request that the ACE recognize their affected water bodies as Waters of the U.S. to expedite permitting and reduce costs.

The Conservancy and agency property owners would likely file Preliminary Jurisdictional Determinations with the ACE requesting that the ACE and RWQCB accept jurisdiction and consider Proctor Valley vernal pools to be Waters of the U.S. for the purpose of permitting vernal pool restoration projects under the Clean Water Act and Porter-Cologne Water Quality Control Act. Project related impacts to vernal pools are beneficial in that they are solely intended to improve habitat conditions and they are not mitigation for harm to vernal pools elsewhere. As such, the vernal pool restoration projects would qualify for a Clean Water Act Section 404 Nationwide Permit 27, "Aquatic Habitat Restoration, Establishment, and Enhancement Activities". Projects would also qualify for permitting by the RWQCB in accordance with the *State Water Resources Control Board General 401 Water Quality Certification Order for Small Habitat Restoration Projects*. This in turn would facilitate simultaneous permitting by the RWQCB under the California Porter-Cologne Water Quality Control Act.

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3.3 IMPLEMENTATION OF VERNAL POOL RESTORATION

The following sections provide detailed recommendations for vernal pool restoration activities in Proctor Valley but are not specific to any particular recommended restoration site. Detailed work plans will be prepared applying this overarching Restoration Plan to each specific intensive Proctor Valley vernal pool restoration site. Please see Appendix A for a flow chart of related restoration and monitoring activities. Proposed restoration of associated upland vernal pool watershed vegetation is described in Chapter 3.

3.3.1 Summary of Recommended Vernal Pool Restoration Activities

The following is a summary of recommended specific vernal pool restoration activities:

- Enlarging some highly disturbed vernal pools and constructing new vernal pools in highly disturbed areas to expand available vernal pool species habitat
- Smoothing perimeters and tire trenching in some highly disturbed vernal pools to provide improved topography conducive to colonization by vernal pool plant species

- Seed collection for vernal pool plants
- Greenhouse growing of container vernal pool plants and seed bulking
- Container planting and seeding of vernal pool plants
- Soil inoculum collection and introduction for San Diego fairy shrimp and other vernal pool fauna
- Weeding as needed to reduce competition with native vernal pool plants
- Closing, fencing, revegetating, and otherwise restoring and camouflaging unauthorized ORV tracks paths through vernal pool restoration areas
- Installing educational and closure signage in vernal pool restoration areas

3.3.2 Endangered Species Introduction and Supplementation

One recommended restoration project activity is the introduction or supplementation of seven imperiled vernal pool species (Table 3). Three listed or sensitive vernal pool species are already present in Proctor Valley – San Diego fairy shrimp has been documented in many Proctor Valley vernal pools while San Diego button-celery and toothed calico-flower are only known from the Rancho Jamul Site A. One and possibly three other listed or sensitive plants were previously present in Proctor Valley – Little mousetail at the ORV Site A and Orcutt's grass and spreading navarretia at the same unknown site. One other endangered species has never been documented in Proctor Valley but occurs in similar, relatively nearby vernal pools – Riverside fairy shrimp. Donor sites for all seven species would be located either in Proctor Valley or at similar, relatively nearby sites at Lower Otay Lake, Otay Mesa, and Sweetwater Reservoir (Table 3). Proctor Valley is located within the existing range of all seven species and, in light of past losses of nearby vernal pools, all seven species would benefit from establishment of expanded or new refugia populations as appropriate and in suitable habitat in Proctor Valley.

Use of the plant seed and fairy shrimp soil inoculum from the closest possible donor sites is expected to maintain existing genetic conditions. Vernal pools at the ORV Site, RJER, Lower Otay Lake, and Sweetwater Reservoir are very similar based on pool hydrologic conditions, ecology, and soil type (all sites are on Olivenhain Cobbly Loam). Pools at both the ORV Site and RJER pond water due to the subsurface presence of impermeable bedrock. Vernal pool hydrology at the ORV Site appears well suited to support all five imperiled species as well as more common vernal pools plants and animals. Please see Table 3 for a complete list of recommended Proctor Valley vernal pool restoration species, historic and current presence or absence, donor sites, and other information.

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Table 3.
Proctor Valley Vernal Pool Restoration Sensitive Species

NOTE – All Proctor Valley vernal pool intensive restoration sites are on hardpan bedrock Olivenhain Cobbly Loam soils with the exception of the Rancho Jamul Site C on Friant Rocky Fine Sandy Loam

Species	Current Proctor Valley Presence / Absence	Historic Proctor Valley Presence / Absence	Proposed Donor Sites	Donor Site Justification and Other Notes
ANIMALS *Streptocephalus woottoni* Riverside fairy shrimp (Federal Endangered)	Absent	Unknown	Otay Mesa, Exact Site TBD	Otay Mesa is the closest existing population at 7 miles[9] with similar hydrologic and ecological conditions. Proctor Valley is within the historic range of Riverside fairy shrimp – Populations are widely but sparsely distributed in suitable habitat from Riverside County to Northern Baja California.
Branchinecta sandiegonensis San Diego fairy shrimp (Federal Endangered)	Present[10]	Present	N/A	N/A
PLANTS *Downingia cuspidata* Toothed calico-flower	Present	Present	CDFG Rancho Jamul Ecological Reserve (RJER) City Cornerstone Lands[11]	RJER is closest current known population at 1 mile in hardpan bedrock pools, Olivenhain Cobbly Loam with similar hydrologic and ecological conditions.
Eryngium aristulatum var. parishii San Diego button-celery (Federal Endangered; California Endangered)	Present	Present	Rancho Jamul Ecological Reserve	RJER is closest recorded population at 1 mile in hardpan bedrock pools, Olivenhain Cobbly Loam with similar hydrologic and ecological conditions.

9. Mileage is from approximate center of Proctor Valley at ORV Site A/B.
10. 2011/2012 surveys.
11. One plant photographed at ORV Site B (John Martin pers. comm.) but not observed recently.

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Species	Current Proctor Valley Presence / Absence	Historic Proctor Valley Presence / Absence	Proposed Donor Sites	Donor Site Justification and Other Notes
Myosurus minimus Little mousetail	Absent	Present[12]	Lower Otay Lake (LOL), TBD Spring 2013	LOL is closest recorded population at 3.5 miles on Olivenhain Cobbly Loam with similar hydrologic and ecological conditions but current presence there is unknown. Next closest reported sites are Otay Mesa, Marron Valley, and Chula Vista.
Navarretia fossalis Spreading navarretia (Federal Threatened)	Absent (Designated Critical Habitat Present)	Unknown, Reported near Proctor Valley[13]	Lower Otay Lake; Sweetwater Reservoir (SR)	LOL and SR are the closest recorded populations at 3.5 miles and 4.5 miles (respectively) on Olivenhain Cobbly Loam with similar hydrologic and ecological conditions.
Orcuttia californica Orcutt's grass (Federal Endangered; California Endangered)	Absent	Unknown, Reported near Proctor Valley[14]	Sweetwater Reservoir	SR is the closest recorded populations at 3.5 miles on Olivenhain Cobbly Loam with similar hydrologic and ecological conditions.

12. Beauchamp and Cass (1979); Bauder (1986)
13. Calflora
14. Calflora

3.3.2.1 San Diego Fairy Shrimp Supplementation

One concern for Proctor Valley vernal pool restoration is the unintended mixing, competition and/or hybridization of San Diego fairy shrimp with the "weedy" versatile fairy shrimp and the spread of versatile fairy shrimp into unoccupied pools. Measures will be taken to attempt to prevent the spread of versatile fairy shrimp to unoccupied pools during any restoration work. To avoid hybridization, documented San Diego fairy shrimp soil inoculum will only be introduced to Existing Pools or Newly Constructed Pools where monitoring shows no versatile fairy shrimp.

It is unknown whether versatile fairy shrimp are native to cismontane southern California and the species hybridizes with the endangered San Diego fairy shrimp. Versatile fairy shrimp are commonly found in original natural and Artificial Pools most disturbed by anthropogenic activities so this species is a concern in Proctor Valley given the extent of past disturbance. At other local vernal pool restoration sites, versatile fairy shrimp have colonized Newly Constructed Pools without direct inoculation, possibly from cysts in soils on the restoration site that were either always present or that had been introduced from ORV use or other activities. Based on recent surveys in 2010/2011 and 2011/2012, versatile fairy shrimp occupied relatively few Proctor Valley Existing Pools and it may be possible to eradicate the species from occupied pools using solarization as described in section 3.3.5.

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The endangered San Diego fairy shrimp would benefit from expanded populations in Proctor Valley so a goal and challenge for restoration of Proctor Valley vernal pools is to document existing pure San Diego fairy shrimp populations and to inoculate and establish the species in additional, unoccupied pools without creating new San Diego/versatile fairy shrimp hybrid populations. Another closely related goal is to expand the diversity of other vernal pool flora and fauna through use of soil inoculum. However, to avoid mixing San Diego fairy shrimp populations and or San Diego fairy shrimp and versatile fairy shrimp populations, San Diego fairy shrimp will only be introduced into Existing or Newly Constructed Pools that show no evidence of being occupied by either species after one post-construction wet season of monitoring.

Particular measures to benefit San Diego fairy shrimp and exclude versatile fairy shrimp do not appear to have been advanced in past restoration projects and vernal pool restoration in Proctor Valley provides an opportunity to conduct an experiment to inform this issue.[15] Subsequent Proctor Valley vernal pool restoration could then incorporate the results of the experiment deemed most likely to benefit San Diego fairy shrimp.

15. The first vernal pool restoration project at the ORV Site A will not incorporate this experiment.

There are many opinions on how to address the issue of management of San Diego fairy shrimp vs. versatile fairy shrimp. Some suggest a fatalistic course of maintaining the status quo or not interfering with fairy shrimp colonization by not introducing any San Diego fairy shrimp inoculum whatsoever to restored pools. Others suggest the other extreme of immediately inoculating all Newly Constructed Pools with San Diego fairy shrimp prior to determining which shrimp are present (and even prior to documenting functioning hydrology in Newly Constructed Pools) based on the premise that this would tip the advantage to San Diego fairy shrimp to genetically swamp and/or outcompete any accidental colonization by versatile fairy shrimp. The Conservancy proposes a moderate course and quantitative experiment as part of future Proctor Valley vernal pool restoration to adaptively manage fairy shrimp populations for the benefit of San Diego fairy shrimp and other vernal pool fauna.

Under the possible experiment, Newly Constructed Pools at a particular intensive vernal pool restoration site would be used to test the best method for establishing San Diego fairy shrimp and excluding versatile fairy shrimp. Following construction, fifty percent of Newly Constructed Pools would be inoculated with San Diego fairy shrimp (and any other fauna in soil inoculum) from occupied pools onsite and/or offsite Proctor Valley Existing Pools documented to support only San Diego fairy shrimp immediately following grading and immediately prior to the restoration Season 2. Both inoculated and non-inoculated pools would then be surveyed for fairy shrimp in Season 2. Assuming adequate rainfall in Season 2, surveys would show whether versatile fairy shrimp colonize non-inoculated, Newly Constructed Pools and whether San Diego fairy shrimp outcompete any versatile fairy shrimp in inoculated Newly Constructed Pools. Any Existing Pools or Newly Constructed Pools shown to contain versatile fairy shrimp and/or hybrids following fairy shrimp surveys in seasons 1 or 2 would be solarized where practical, inoculated with San Diego fairy shrimp, and seeded and planted with vernal pool plant species. Aside from the fifty percent of inoculated Newly Constructed Pools, San Diego fairy shrimp inoculum would not be introduced to pools where surveys show presence of versatile fairy shrimp, where solarization to control versatile fairy shrimp is not practical, and/or where pools do not retain water for the appropriate amount of time to support San Diego fairy shrimp (i.e., at least 30 days [Hathaway and Simovich 1996, Ripley et. al. 2004]). Vernal pool restoration experts would be convened to refine a fairy shrimp experiment protocol and the protocol would be approved by the property owner and regulatory agencies as part of the detailed work plan for any given intensive vernal pool restoration site.

Prior to collection of inoculum for introduction to unoccupied Restoration Site Pools, surveys would be conducted for donor pools to confirm the presence of San Diego fairy shrimp and the absence of versatile fairy shrimp and hybrids. In accordance with existing standards, no more than 10 percent of the basin area of any donor pool will be used for collection of inoculum. Measures will be taken to prevent accidental introduction of versatile fairy shrimp to unoccupied

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pools during restoration activities. Grading equipment would be used to expand Existing Pools only following construction of new pools to avoid movement of fairy shrimp cysts from Existing pools to Newly Constructed Pools; and construction equipment and workers would not move through Existing Pools to reach Newly Constructed Pools.

Authorization from property owners and the wildlife agencies will be obtained prior to any off-site seed collection, plant species propagation, and San Diego fairy shrimp soil inoculum collection or introduction.

3.3.3 Project Preparation and General Conditions

The following sections describe general project conditions and activities that will take place to prepare recommended restoration sites prior to grading or other active restoration.

The Project will temporarily flag the limits of project impacts (including staging areas and access routes) to prevent additional impacts to listed vernal pool species. The Conservancy will submit to the Service for approval, at least 2 weeks prior to initiating project impacts, the final restoration plans for the Project. In a pre-grading site visit with the Service, the Conservancy will show the flagged limits of impact and all areas of San Diego fairy shrimp habitat (vernal pools) to be impacted or avoided. If work occurs beyond the demarcated limits of impact, all work will cease until the problem has been remedied to the satisfaction of the Service. Temporary flagging will be removed upon project completion.

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A project biologist approved by the USFWS will be onsite during restoration to ensure compliance with all conservation measures. The biologist must be knowledgeable of vernal pool ecology and species biology. The Conservancy will submit the biologist's name, address, telephone number, and work schedule on the project to the USFWS at least two weeks prior to initiating active restoration. The biologist will perform or otherwise ensure that the following conditions are implemented during project implementation:

- Oversee installation of and inspect the flagging and erosion control measures within or up-slope of San Diego fairy shrimp restoration and/or preservation areas a minimum of once per week and daily during all rain events to ensure that any breaks in the erosion control measures are repaired immediately;
- Periodically monitor the work area to ensure that work activities do not generate excessive amounts of dust;
- Train all contractors and restoration personnel on the biological resources associated with this project and ensure that training is implemented by construction and restoration

personnel. At a minimum, training will include: The purpose for resource protection; A description of listed vernal pool species and habitat; The conservation measures that should be implemented during project implementation to conserve the San Diego fairy shrimp, including strictly limiting activities, vehicles, equipment, and restoration materials to the flagged project footprint to avoid sensitive resource areas in the field (e.g., avoided areas delineated on maps or on the project site by flagging); Environmentally responsible construction practices; The protocol to resolve conflicts that may arise at any time during the restoration process; and The general provisions of the Act, the need to adhere to the provisions of the Act, the penalties associated with violating the Act.

- Halt work, if necessary, and confer with the Service to ensure the proper implementation of species and habitat protection measures. The biologist will report any violation to the Service within 24 hours of its occurrence;
- Submit weekly letter reports (including photographs of restoration areas) to the Service during active grading within and adjacent to vernal pools. The weekly reports will document that authorized impacts were not exceeded, work did not occur outside the areas approved by the Service, and general compliance with all conditions; and
- Submit a final report to the Service within 60 days of project completion that includes: as-built restoration map with an overlay of habitat that was restored and also areas not restored, photographs of habitat areas before, during, and after implementation, and other relevant summary information documenting that authorized impacts were not exceeded and that general compliance with all conservation measures were achieved.

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The applicant will ensure that the following conditions are implemented during project implementation:

- Employees will strictly limit their activities, vehicles, equipment, and restoration materials to the flagged project footprint;
- The project site will be kept as clean of debris as possible. All food related trash items will be enclosed in sealed containers and regularly removed from the site;
- Pets of project personnel will not be allowed on the project site;
- Disposal or temporary placement of excess fill, brush or other debris will not be allowed in waters of the United States or their banks or upslope of vernal pools in the vernal pool watersheds.

3.3.3.1 Seed Collection

To facilitate greenhouse propagation, seeds from vernal pool plants will be collected from donor sites during the appropriate season prior to and concurrent with restoration work. Target plants include all native vernal pool indicator species, including listed and sensitive species. Collection will be performed by seed collectors with documented collection experience and agency authorization when seeds are ripe and prior to seed shedding. No more than 5% of an annual seed crop would be collected. Seed will be collected manually or by using hand-vacuums. All collected seed will be transported to a native plant nursery or seed bulking facility for seed bulking and plant propagation for use on recommended restoration sites. Table 4 lists the vernal pool planting and seeding pallet.

Native vernal pool plant seed will also be salvaged from vernal pools that will be recontoured or enlarged either by hand or with mechanized equipment. In pools to be avoided during grading or excavation, seed will be left in place unless collection is necessary for propagation purposes.

Only above ground seed will be collected from donor vernal pools. Seed will not be collected out of soil at any location in order to limit possible spread of versatile fairy shrimp with the exception of collection of soil inoculum containing plant seed from documented San Diego fairy shrimp pools for introduction into Restoration Site pools that are unoccupied by fairy shrimp.

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3.3.3.2 Soil Collection

Two types of vernal pool soil inoculum salvage and collection activities would take place as part of proposed vernal pool restoration. First, for Existing Pools to be recontoured and/or expanded at any particular restoration site, soil will be collected from just those portions of the pool to be graded prior to the start of grading to salvage crustacean fauna and embedded vernal pool plant seeds. Second, to inoculate unoccupied Restoration Site Pools with Riverside fairy shrimp or San Diego fairy shrimp, other crustaceans, and vernal pool plants, soil inoculum will be collected offsite from donor vernal pools that have been documented to support only Riverside or San Diego fairy shrimp.

Salvaged soil or donor pool soil inoculum will be collected when dry to avoid damaging or destroying fairy shrimp cysts. Hand tools (i.e., shovels and trowels) will be used to remove the first two inches of soil from the pools. Whenever possible, the trowel will be used to pry up intact chunks of soil, rather than loosening the soil by raking and shoveling which can damage the cysts. Salvaged soil from Existing Pools to be returned to the same pools following recontouring will be placed on a tarp near the vernal pool during recontouring and then immediately replaced into the pool after recontouring is complete. Each pile of soil will be

clearly labeled with the number of the vernal pool from which it was removed. If a rain event is expected during grading, the piled top soil layer will be covered with a tarp. For donor pool soil inoculum, no more than 5 percent or 10 square feet (whichever is smaller) of the basin area of any donor pool will be used for collection of inoculum. The collection of inoculum should be done in a manner that does not alter the appearance or functionality of the donor pool. Donor pool soil inoculum will be stored individually in labeled boxes that are adequately ventilated and kept out of direct sunlight in order to prevent the occurrence of fungus or excessive heating of the soil, and stored off-site at an appropriate facility. Off-site donor pool soil inoculum will not be mixed with soil salvaged from onsite Existing Pools. Offsite soil inoculum will not be collected without specific approval by the USFWS.

3.3.3.3 Fencing and Closure Signs

The Conservancy would install supplemental permanent protective wire fencing approved by the resource property owners to deter human, pet, and vehicle entrance into any restoration areas.

The primary purposes of fencing and closure signs are to protect delicate restoration work areas. The location and extent of fencing reflects the minimum fencing necessary to protect recommended restoration sites, vernal pools and other resources, and to assist with implementation of area specific management directives under the MSCP (figures 6a - 6j). In some areas, existing wire fencing near Proctor Valley Road will be relocated closer to existing vehicle barriers to provide larger restoration sites and improved interior access for restoration activities (e.g. Corral Site, ORV Site A, and ORV Site B). New fencing will also be installed in limited strategic areas to block old ORV tracks (e.g. Figure 6f). It does not appear necessary to fence the entire perimeter of most Proctor Valley restoration sites. Fencing will have gates only as needed to allow access for project implementation and maintenance and monitoring of the project areas. Closure signs approved by the resource agency property owners would be posted in appropriate locations. A separate, complimentary project is being pursued to complete gaps in vehicle barriers along Proctor Valley Road to protect natural resources from unauthorized ORV activity.

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3.3.3.4 Mowing and Dethatching

Many Proctor Valley vernal pool areas are heavily invested with exotic invasive weeds so preparation of restoration sites would include selective mowing and/or dethatching to remove weed material (thatch and seeds). Mowing and dethatching will occur prior to seed shedding, before seeds are ripe, to limit existing exotic seed banks. Seed heads and plant debris will be removed from the restoration site immediately and will be legally disposed of off-site.

Nonnative plants will be mowed with a line trimmer to a height of no more than 3 to 4 inches. Dethatching involves raking up dead thatch that has built up in areas dominated by weeds, as well as in and around areas that still support viable habitat. Dethatching not only removes nonnative organics from the site, but also much of the seed (especially if dethatching takes places before seeds are set). Particular care will be taken to protect microbiotic soil crusts that may be present.

3.3.4 Topographic Reconstruction

3.3.4.1 Grading Activities

Topographic restoration grading activities at recommended Proctor Valley vernal pool restoration sites would include some or all of the following methods, as directed by the project biologist:

- Excavation and creation of Newly Constructed Pools using a small bulldozer and/or hand tools
- Expansion of degraded Existing Pools using a small bulldozer and/or hand tools
- Minor localized smoothing of degraded Existing Pools to remove tire trenching and to provide improved shoreline micro-topography using a small bulldozer and/or hand tools.
- Construction or repair of Mima mounds using excavated material with a small bulldozer and/or hand tools.

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Grading will be carried out with a bulldozer small enough to access and maneuver within the site and hand tools. Grading will only occur in the delineated and marked restoration work area. Most grading will take place to expand some Existing Pools and to create Newly Constructed Pools, but some excavated material will be placed as mima mounds or to fill tire trenching followed by seeding and planting in nearby highly disturbed upland areas such as ORV tracks. Constructed Mima mounds will be similar in size to any existing natural Mima mounds. Graded material will not be placed in areas of original topography with native vegetation. Final grading details will be carried out according to a detailed work map and direction from the project biologist. Staging areas will be located outside of the MHPA.

With few exceptions, the bottoms of Existing Pools would not be disturbed during restoration activities so as to protect existing pool hydrology, fairy shrimp eggs, and other values. Examples of possible exceptions to this approach include hand tool work to smooth tire trenching, the introduction of small amounts of soil to provide a suitable substrate for plants where hardpan

substrate is exposed in pool bottoms, and the removal of erosion fill. Grading work at Existing Pools would use a small bulldozer and/or hand tools to smooth areas around the perimeter of disturbed basins to provide improved micro-topography conducive to colonization by vernal pool plant species and/or to enlarge degraded Existing Pools to provide expanded vernal pool species habitat.

Seed and soil would be salvaged from areas that are to be graded as described in sections 3.3.3.1 and 3.3.3.2 above. These will be temporarily stored until topographic reconstruction is completed, at which point seeds and soil will be placed back in the basin from which they were salvaged.

Newly Constructed Pools and Expanded Pools will be slightly over-graded (2.5 to 5 centimeters [1 to 2 inches]) and excavated areas will be backfilled with a thin layer of topsoil to promote plant propagation. Earthwork in some Existing Pools would be conducted with hand tools, particularly around areas with existing vernal pool plant cover.

Grading earthmoving will be balanced so that export of soil from any restoration site is not required, except for unsuitable waste materials such as asphalt, concrete, and other debris unearthed during grading. Cobblestones that are excavated during topographic reconstruction will be reapplied to graded vernal pool basins as directed by the project biologist. To minimize impacts to vernal pool soil surfaces during monitoring, any cobbles will be oriented within the restored vernal pools to serve as stepping stones.

Finish grading will be measured at the top surface of surface materials and will be at the final water-compacted and settled surface grades (within plus/minus 2.5 centimeters [1 inch] at spot elevations). Established site drainage will be maintained during all phases of topographic reconstruction. Final grades will be approved by the project biologist prior to any seeding and planting of container plants.

The project biologist will be on-site to direct grading and contouring activities. The project biologist will inspect the creation/restoration areas following initial grading and verify that basin depths and mound heights are acceptable. The project biologist, GPS specialist, or surveyor will check the pool depths, saddle heights, mound heights, and flow patterns using survey equipment (laser level or laser transit). Minor modifications to the final grading plan may be required in the field to properly prepare the site for planting, as determined by the project biologist. Vernal pool site grading is a delicate operation that attempts to manipulate topography at a microtopographic scale; therefore, establishment of the final grade may require hand tools only.

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A final pregrading field visit will be conducted by the project biologist to delineate areas of cut and fill using pin flagging. No spray paint will be used. A complete set of preconstruction photographs will also be taken at this time. The grading operator will be familiarized with the site and issues involved during a preconstruction site visit with the project biologist. Areas to be manipulated with grading equipment or hand tools will be graded before the saturation of soils.

3.3.4.2 Grading Conditions

Grading activities will be timed to avoid wet weather to minimize potential impacts siltation and other impacts to the vernal pools. To achieve this goal, grading adjacent to avoided pools will comply with the following:

- Grading will occur only when the soil is dry to the touch both at the surface and one inch below. A visual check for color differences (i.e., darker soil indicating moisture) in the soil between the surface and one inch below indicates the soil is dry.
- After a rain of greater than 0.2 inch, grading will occur only after the soil surface has dried sufficiently as described above, and no sooner than two days (48 hours) after the rain event ends.
- To prevent erosion and siltation from storm water runoff due to unexpected rains, Best Management Practices (e.g. silt fences) will be implemented as needed during grading.
- If rain occurs during grading, work will stop and resume only after soils are dry, as described above.
- Grading will be done in a manner to prevent run-off from entering preserved vernal pools.

All equipment maintenance, staging, and dispensing of fuel, oil, coolant, or any other such activities will occur in designated areas outside of Waters of the United States, vernal pool watersheds, and the MHPA. These designated areas will be located in previously compacted and disturbed areas to the maximum extent practicable in such a manner as to prevent any runoff from entering Waters of the United States, vernal pool watersheds and the MHPA, and will be shown on the restoration plans. Fueling of equipment will take place within existing paved areas greater than 100 feet from Waters of the United States and outside of the MHPA. Contractor equipment will be checked for leaks prior to operation and repaired as necessary. "No-fueling zones" will be designated on the detailed work map.

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3.3.5 Solarization

Solarization will be used in an attempt to eliminate versatile fairy shrimp and hybrids from any occupied pools to provide unoccupied habitat for San Diego fairy shrimp. Solarization will also be used to control limited areas of concentrated exotic plant populations to improve conditions for native plants. Solarization appears unproven as a technique to kill fairy shrimp but has been used with success to control plant weeds.

Solarization involves applying black plastic over pools fixed in place with sandbags following rainfall or artificial watering adequate to thoroughly wet the soil. The hotter the weather, the more effective the solarization, so this may be applied in summer or fall months with an artificial water supply such as a small portable water tank. For weed control, solarization is most effective on seedlings and is best applied when new weed seedlings have sprouted after the first rains of the season and while temperatures are often still warm. For the most effective weed control, several rounds of solarization may be necessary to control as much of the weed seed bank as possible. To apply more than one round of solarization, plastic is removed after the initial application, weeds are again allowed to sprout, and plastic is reapplied when soils are wet.
Solarization will also kill native plants but this is not anticipated to be a concern in most Proctor Valley vernal pools where there are no existing endangered plant populations, where native plant seed will be salvaged, and plants will be replaced with seed, container plants, and soil inoculum. Vernal pools at the Rancho Jamul Ecological Reserve are the only pools with existing populations of endangered plants and do not contain versatile fairy shrimp or hybrids and would not be solarized. Solarization would only be applied in seasons 1 and 2 of active restoration work. Restoration Site Pools would not be seeded or planted with native plants or inoculated with San Diego fairy shrimp soil until solarization is complete (see Appendix A).

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3.3.6 Greenhouse Plant Propagation

Vernal pool plant seed collected from donor sites will be used for greenhouse plant propagation with agency approval. Container plants will be grown in either flats or in 4-inch rose-pot containers depending on the species with the intent that plants be large enough for planting while minimizing the size of the container that will be installed. Minimizing the container size helps to limit the impacts during installation and helps reduce the cost of greenhouse propagation and planting program.

3.3.7 Container Planting and Seeding

Please see Table 4 for a vernal pool planting and seeding palette. Vernal pool plant species will be obtained from donor sites (Table 3) if they cannot be obtained from any particular restoration

Table 4.
Vernal Pool Planting and Seeding Palette

Species List	Container Size/Seed	Plantings Number & Density (Plants/ft²)[16]
Callitriche marginata – water-starwort	Seed	--
Centunculus minimus – chaffweed	Seed	--
Crassula aquatica – stonecrop	Seed	--
Deschampsia danthonioides – annual hairgrass	4 inch	6
Downingia cuspidata – toothed calico-flower	Seed	--
Elatine brachysperma – yerba fango	Seed	--
Eleocharis macrostachya – pale spikerush	4 inch	2
Eryngium aristulatum var. *parishii* – San Diego button-celery	Seed	--
Isoetes howellii – Howell's quillwort	Seed	--
Juncus bufonius – toad rush	Seed	--
Lilaea scilloides – flowering quillwort	Seed	--
Myosurus minimus – little mousetail	Seed	--
Navarretia fossalis – spreading navarretia	Seed	--
Orcuttia californica – Orcutt's grass	Seed	--
Pilularia americana – American pillwort	Seed	--
Plagiobothrys acanthocarpus – adobe allocarya	Seed	--
Plantago elongata – vernal pool plantain	Seed	--
Psilocarphus brevissiumus – woolly marbles	Seed	--

site. The source and proof of local origin of all plant material and seed will be provided by the Conservancy.

Seeds and container plants will be planted in one half of each Restoration Site Pool only to reduce wetting of fairy shrimp cysts in the event emergency watering of plants is necessary to prevent plant loss from unseasonable drying in any growing season.

Seeds from threatened and endangered plants will not be introduced until Expanded Pools or Newly Constructed Pools show one complete, post-construction wet season of functioning pool hydrology. Restoration Site Pools where sensitive and listed species are introduced will be matched with similar pools based on pool depth and ponding duration at the donor site pools to determine the species composition appropriate for any given Restoration Site Pool. The source

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16. Density is for target planting patches and not for the entire site, so planting densities are approximate. Exact planting densities will mirror nearby vegetation and the density of Reference/Control Pools.

and proof of local origin of all plant material and seed will be provided. Container plants will not be installed until the USFWS has approved of grading at any restoration site.

The project biologist will confirm vernal pool plants are delivered to the site in a healthy and vigorous condition before being installed. The project biologist will inspect all container plants and reject plants that are dead, root-bound, stunted, pest-infested, diseased, or unacceptable for other reasons. Container sizes larger than needed are not recommended, as they require much more disturbance of the site when planting and can be more difficult to install. The project biologist will also oversee plant layout before installation. Container plants will be installed in a manner that mimics natural plant distribution (e.g. random and/or aggregate distributions rather than uniform rows). At the first and second anniversary of plant installation, all dead plants will be replaced unless their function has been replaced by natural recruitment.

3.3.8 Soil Inoculation

Immediately following grading, soil salvaged from Existing Pools to be expanded or otherwise recontoured will be placed back in the same pool from which it was salvaged. For either salvaged soil from Existing Pools or offsite donor pool soil inoculum, soil will be spread into the bottoms of Restoration Site Pools as appropriate. Soils will be placed in dry Restoration Site Pools only, preferably before the first rains of the wet season. Soil will not be placed into basins that are already ponding as the shock of instant cyst inundation may reduce the success of the cyst hatch. Inoculum will be placed in a manner that preserves, to the maximum extent possible, the orientation of the fairy shrimp cysts within the surface layer of soil (e.g. collected inoculum will be shallowly distributed within the pond so that cysts have the potential to be brought into solution upon inundation). Please see section 3.3.2.1 for a discussion of specific treatment of San Diego fairy shrimp soil inoculum.

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Soil inoculum from offsite donor pools will not be introduced to any Restoration Site Pools until the USFWS has approved of habitat restoration site grading and one complete wet season of monitoring has shown functioning pool hydrology and no existing fairy shrimp in each Restoration Site Pool to be inoculated.

3.4 VERNAL POOL RESTORATION MAINTENANCE ACTIVITIES

The following sections describe maintenance activities for the site following initiation of active restoration and during the subsequent three-year project implementation period.

3.4.1 Weed Control

Weed control methods described below would be applied as determined by the project biologist. Within Restoration Site Pools, all weeding would be performed exclusively by hand with no herbicide, mowing, or line trimming. Herbicides may be applied by hand up to the edge of Restoration Site Pools, and with sprayers beyond three feet from the edge of pools. Mowing and line trimming may be used anywhere outside of Restoration Site Pools. And hand weeding may be used anywhere within the vernal pool restoration work area. In general, herbicide application and hand weeding will be used from initial weed germination until weeds are flowering and setting seed. If these methods are effective in removing all of the weeds before flowering and seed set, then weed mowing/trimming techniques will not be necessary. Otherwise, mowing/trimming methods will follow herbicide application and hand weeding. Please see Table 5 for targeted weed species.

It is critical to minimize the level of exotics prior to the emergence of native plant species. Removing plant competitors at this stage allows for the persistence of higher amounts of available soil moisture and nutrients later into the growing season. Reducing the height of invasive plant competitors will increase the quality and quantity of solar radiation and increase visibility for pollinators. Because of this, weed control is most effective in the earlier stages of plant germination and establishment. In addition, it is easier to avoid native species when weeding early in the season, as native and nonnative species have more spatial separation early in the growing season.

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Weed control will typically begin in mid-autumn and will usually continue until late spring, or until weeds have been effectively removed from any restoration site. Depending on the timing of wet season precipitation, weed control could start earlier or extend into summer months.

3.4.1.1 Herbicides

In many cases, herbicide use can be the single most effective method available for weed control in native habitats, even though its cost may be higher than other methods. As required by law, specific herbicides must be recommended by a licensed pest control advisor and applied under the supervision of a licensed pest control applicator. It is important that the herbicide is appropriate for use around aquatic invertebrates as herbicide may reach the water table of ponded vernal pools. Misuse of herbicides can cause substantial damage to native plant species, habitats, and wildlife, especially in aquatic environments. When used properly and under the direction of a qualified project biologist, herbicide use can be the factor that determines success or failure of weed control. When working on very sensitive habitats, there is both an increased benefit in weed control and increased consequences for mistakes.

Table 5.
Targeted Weed Species

Scientific Name	Common Name
GRASSES	
Avena barbata	Slender Wild Oat
Bromus diandrus	Ripgut Brome
Bromus hordeaceus	Soft Chess
Bromus madritensis ssp. rubens	Red brome
Gastridium ventricosum	Nit grass
Poa annua	Annual Blue-Grass
Polypogon monspelensis	Annual Beard-Grass
Schismus barbatus	Mediterranean Schismus
Vulpia bromoides	Six-Weeks Fescue
Vulpia myuros	Rat-tail fescue
FORBS	
Anagallis arvensis	Scarlet Pimpernel
Centauria melitensis	Tocalote
Cotula coronopifolia	African Brass-Buttons
Erodium botrys	Long-Beak Filaree/Storksbill
Erodium brachycarpum	Short-Beak Filaree/Storksbill
Erodium cicutarium	Red-Stem Filaree/Storksbill
Erodium moschatum	White-Stem Filaree/Storksbill
Hirschfeldia incana	Short-Pod Mustard
Hypochaeris glabra	Smooth Cat's Ear
Logfia gallica	Narrow-Leaf Filago
Lytrhrum hyssopifolia	Grass Poly
Medicago polymorpha	California burclover
Sonchus asper	Prickly Sow-Thistle
Spergularia bocconi	Boccone's Sand-Spurry
Spergularia villosa	Villose Sand-Spurry
Silene gallica	Common Catchfly

Upon approval of the resource agency property owner of any given restoration site, recommended restoration projects would use Roundup Pro® herbicide applied through spraying in upland areas greater than three feet from the edge of vernal pools and applied directly by hand

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using hand/glove and direct wand techniques within three feet of pools. When using herbicide, it is always important to stay away from standing water, as the water can transfer herbicide (in a reduced concentration) to collateral species, including both plants and animals. Some aquatic invertebrate species are particularly sensitive to some herbicides. Herbicide will be applied in monthly weeding visits from January - April during the three years of active project implementation. All workers conducting weed removal activities will be educated to distinguish between native and non-native species so that local native plants are not inadvertently killed by weed removal activities. Please see Table 5 for a partial list of targeted weeds.

3.4.1.2 Mowing and Line Trimming

Weed trimming and mowing can be an effective tool to prevent non-native species such as annual grasses from flowering and producing seeds. Weed trimming would be used only outside of Restoration Site Pools. Care will be taken to verify a "high" mow is employed (i.e. no weed trimming or mowing shorter than 6 inches). This is important so that desirable native species, especially sensitive vernal pool plant species, are not accidentally impacted. When coupled with had weeding and solarization, weed trimming and mowing can help to successfully control weeds, allowing native plants to persist or to establish.

From year to year, the appropriate timing for weed trimming and mowing may vary with the timing of rainfall. In general, regular weed trimming or mowing treatments should begin in late winter and early spring, when nonnative species have grown tall enough for these methods to be effective but the majority of individuals have not yet begun to flower. The key is to perform weed trimming and mowing just as individuals begin to flower, but before the seeds begin to form. In a typical year, nonnative grasses will be ready for weed trimming and mowing in January and February. In general, by the end of March or April seeds have developed and weed trimming and mowing are less effective. In years with late rainfall, this timing can be pushed back as much as 2 months if rains arrive in March or April. The timing weed trimming and mowing will be determined by the project biologist and depend on the species being controlled and the rainfall received that year.

In general, weed trimming and mowing are not a significant threat to invertebrate wildlife so long as mowing and trimming does not disturb the soil. Weed trimming and mowing can be a risk to some vertebrate species if those species are foraging in the vegetation to be mowed. To minimize the risk to ground-foraging wildlife, weed trimming will be kept at least 6 inches from the ground and care will be taken to avoid wildlife dens or nests.

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3.4.1.3 Hand Weeding

Hand weeding will only be used in vernal pool basins to avoid herbicide impacts, and outside of pools when and where it is too difficult to use other methods (i.e. sensitive plants could be impacted) or where the area to be managed is relatively small. Weeding by hand is the least efficient method that can be used on vernal pool habitats. Hand weeding is difficult and expensive relative to the area that can be covered. Although hand weeding does not have the same risks of herbicide or weed mowing and trimming, it does still have some risks. Because hand weeding is slow and time consuming, the area being weeded can be disturbed by trampling, which can be very difficult to control. In addition, pulling weeds from the ground can cause a substantial amount of soil disturbance in and around the area of weeding, especially when the soils are moist or saturated following rain. This disturbance can often be substantial enough to counter the effects of the initial weeding and, in some cases, can allow facilitate invasion of nonnative plants into new areas.

3.4.2 Supplemental Watering

In the event that natural rain is inadequate in a particular wet season to support plant establishment, supplemental watering of Restoration Site Pools and their watersheds may be conducted. Supplemental watering will only be conducted with case-by-case approval from USFWS. Watering of Restoration Site Pools will be utilized only as-needed to prevent plant failure in a particular wet season if early rainfall germinates vernal pool plants but subsequent rainfall is inadequate to carry the species through flowering and seed set. Inadequate rainfall following germination of vernal pool plants could result in a substantial or complete loss of established or supplemented vernal pool seed bank and planted containers. Such preventable losses are unacceptable when working with very rare vernal pool species or with a limited restoration project duration and budget.

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Vernal pool plant watering will only be conducted in the one half of each Restoration Site Pool that has been seeded or planted with containers to reduce wetting of fairy shrimp cysts. Watering will only be conducted by hand watering from a portable water tank or from backpack sprayers. Any water to be used will be purified and free of contaminants that could harm vernal pools. Supplemental watering would be applied to keep soils moist enough for plants but without ponding that could trigger hatching of aquatic invertebrates.

Watering of pools may be required multiple times over a particular wet season to ensure plant survivorship. If at any point natural rainfall is sufficient to provide water to the vernal pool plants, then supplemental watering will be suspended. The project biologist will be responsible

for determining when and how much to water the pools with prior, case-by-case authorization from USFWS.

3.4.3 Erosion Control

The project biologist will ensure erosion does not develop as a result of restoration activities. If erosion does develop, the restoration contractor will install erosion control measures such as weed-free straw wattles, silt fencing, or other material to reduce erosion on-site and sediment flow off-site.

3.5 VERNAL POOL RESTORATION SCHEDULE

Please see Table 6 for a list and schedule of vernal pool restoration activities. Please also see Appendix A for a flow chart of monitoring activities in relation to restoration implementation activities.

3.5.1 Site Maintenance Schedule

Site maintenance is a year-round effort and should apply adaptive management as appropriate. The timing and level of the proposed maintenance schedule will be subject to modification and adaptation by the project biologist as necessary to achieve restoration goals.

A general project schedule is shown in Table 6 and includes restoration maintenance activities such as remedial planting and seeding, supplemental watering, weed control, and more. Some of the scheduled activities have a wide range of dates because the actual timing will be based on seasonal rainfall and resulting effects at each restoration site.

In general, remedial planting and seeding will occur in the fall to early winter so that plants and seed may take advantage of the full rainfall season. When possible, remedial seeding will occur prior to a predicted rainfall event to help prevent loss to wildlife and promote better germination and development of seedlings.

Supplemental watering will be conducted as needed with case-by-case approval by USFWS. The schedule for supplemental watering will be determined by the project biologist, but in general is most likely to be needed anytime from early winter (January) through late spring (May).

Weed control will be initiated as soon as early rainfall is adequate to germinate weed species throughout the site. Weed control will begin within two to four weeks after weed species have

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Table 6.
List and Schedule of Vernal Pool Restoration Activities

TASK	START	END
YEAR 1[17]		
Monitoring (vernal pool hydrology, fauna, & fairy shrimp)	November	May
Monitoring (vernal pool & upland plants)	March	May
Seed Collection	May	August
YEAR 2		
Greenhouse Propagation	June	December
Quarterly Report	September	September
Grading	September	September
Fence Construction	September	September
Kiosk Construction	September	September
Volunteer Work Party	October	October
Seeding	November	December
Monitoring (vernal pool hydrology, fauna, & fairy shrimp)	November	May
Quarterly Report	December	December
Greenhouse Propagation	January	December
Container Planting (vernal pools)	January	February
Weed Control, 1st visit	January	January
Weed Control, 2nd visit	February	February
Volunteer Work Party	February	February
Weed Control, 3rd visit	March	March
Volunteer Work Party	March	March
Quarterly Report	March	March
Monitoring (vernal pool & upland plants)	March	May
Seed Collection	May	August
Volunteer Work Party	June	June
Annual Report	June	June
YEAR 3		
Quarterly Report	September	September
Seeding	November	December
Container Planting (uplands)	November	December

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17. Years are July 1 - June 30.

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TASK	START	END
Volunteer Work Party	November	November
Monitoring (vernal pool hydrology, fauna, & fairy shrimp)	November	May
Volunteer Work Party	December	December
Quarterly Report	December	December
Greenhouse Propagation	January	December
Container Planting (vernal pools)	January	February
Weed Control, 1st visit	January	January
Weed Control, 2nd visit	February	February
Volunteer Work Party	February	February
Weed Control, 3rd visit	March	March
Volunteer Work Party	March	March
Quarterly Report	March	March
Monitoring (vernal pool & upland plants)	March	May
Seed Collection	May	August
Volunteer Work Party	June	June
Annual Report	June	June
YEAR 4		
Quarterly Report	September	September
Seeding	November	December
Container Planting (uplands)	November	December
Volunteer Work Party	November	November
Monitoring (vernal pool hydrology, fauna, & fairy shrimp)	November	December
Volunteer Work Party	December	December
Quarterly Report	December	December
Container Planting (vernal pools)	January	February
Weed Control, 1st visit	January	January
Weed Control, 2nd visit	February	February
Weed Control, 3rd visit	March	March
Volunteer Work Party	March	March
Quarterly Report	March	March
Monitoring (vernal pool & upland plants)	March	May
Final Report	June	June

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germinated and can be identified. Weed control will continue until weed populations have been removed.

Other maintenance activities like trash removal and access control will be conducted throughout the year as necessary. The Conservancy and consultants will assume these typical resource agency property owner stewardship responsibilities within the project work area for the duration of the restoration project.

3.6 MONITORING OF VERNAL POOL RESTORATION

Monitoring for recommended Proctor Valley vernal pool restoration activities is intended to track implementation of goals for the vernal pool ecosystems both as a whole and for specific elements. Monitoring includes four elements: Fauna surveys; Fairy shrimp surveys; Hydrology surveys, and; Flora surveys:

- Fauna surveys are intended to determine the composition of the full vernal pool invertebrate fauna at any given restoration site (including all crustaceans), to inform invertebrate fauna composition goals for the restoration project, and to track implementation of restoration project goals (Table 10).
- Fairy shrimp surveys would supplement the fauna surveys and are intended to identify the presence or absence of Riverside fairy shrimp and San Diego fairy shrimp (endangered fairy shrimp), versatile fairy shrimp, and/or hybrids. Fairy shrimp surveys would inform restoration project goals for endangered fairy shrimp and inform project implementation decisions on inoculation of endangered fairy shrimp or control of the weedy versatile fairy shrimp.
- Hydrology and flora surveys are intended to identify the possible range of original natural vernal pool conditions at any given restoration site, to inform goals for the restoration project, and to track implementation of restoration project goals.

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Monitoring for each of the four elements will take place in pools at each restoration site plus the Reference/Control Pools. Please see Table 9 below for a summary and schedule of restoration monitoring activities. Please also see Appendix A for a flow chart of monitoring activities in relation to restoration implementation activities.

For each restoration project, monitoring would take place in both Restoration Site Pools and Reference/Control Pools over four wet seasons to first identify baseline conditions and then to inform adaptive management and to track implementation of project goals. Monitoring will start

with collection of baseline data prior to initiation of restoration activities and will be followed by monitoring over three wet seasons concurrent with and following restoration activities. Monitoring activities are an integral part of each recommended restoration project and would be conducted by the Conservancy and consultants. Resource agency property owners would not be responsible for any monitoring beyond ongoing levels of MSCP monitoring.

Proposed monitoring activities use a combination of methods: The Hydrogeomorphic approach to Assessing Wetland Functions of Vernal Pools (HGM method) (Bauder et al. 2009), the Macroinvertebrate Bioassessment Method to Assess California Vernal Pools (macroinvertebrate method) (Rogers, in review), and the Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods (fairy shrimp surveys) (USFWS 1996). The HGM method will be used to collect and analyze data on hydrology, and flora as well as to analyze data on fauna collected using the macroinvertebrate method[18]. The macroinvertebrate method will be used to collect and analyze data on all invertebrate fauna. And fairy shrimp surveys will be used to collect data on the specific presence or absence of endangered fairy shrimp, versatile fairy shrimp, and/or hybrids.

Recommended vernal pool restoration in Proctor Valley is pro-active, for the benefit of vernal pool wetland ecosystems and species, and is not mitigation for harm done elsewhere to vernal pools. As such, monitoring activities for this project are different from those required for a more typical mitigation-related restoration effort. Recommended restoration monitoring is both more and less rigorous than that typically required for mitigation projects. For example, the rigorous macroinvertebrate method proposed in this Restoration Plan to track all vernal pool invertebrate has not been used for mitigation restoration projects that have been traditionally focused on just the San Diego or Riverside fairy shrimp species. The presence, absence, and abundance of these two species upon completion of any given Proctor Valley vernal pool restoration project is considered an important elements of project goals. But unlike typical restoration mitigation projects where protocol fairy shrimp surveys are conducted in every pool in every monitoring year, the status of either of these single species would be determined through a combination of pre- and post-construction use of the macroinvertebrate monitoring method in a subset of restored pools along and supplemental fairy shrimp surveys. In this way, limited funding resources for monitoring will generate results on the status of the entire vernal pool fauna ecosystem rather than single (albeit important) species.

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18. The macroinvertebrate method includes fewer fauna sample collection visits than the HGM Method but results could still be analyzed using HGM formulas.

3.6.1 Fauna Monitoring

Surveys for all vernal pool fauna using the macroinvertebrate method would be conducted prior to construction in Wet Season 1 and in Wet Season 4 to determine the possible composition of original natural vernal pool invertebrate fauna at any given Proctor Valley restoration site based on conditions of similar Reference/Control Pools and to inform and track implementation of restoration goals.

In Wet Season 1 prior to grading, fauna surveys would be conducted in all four Reference/Control Pools and at least four Existing Pools (including some pending Expanded Pools). Pre-grading surveys are intended to identify a baseline of possible vernal pool flora composition on any given restoration site and in similar nearby pools and to inform restoration goals. Additional surveys would be conducted in subsequent wet seasons in any one pool where ponding was inadequate to conduct Wet Season 1 surveys.

In Wet Season 4, surveys would be conducted again in all four Reference/Control Pools plus at least four Newly Constructed Pools and at least the four Expanded Pools that were surveyed in Wet Season 1 to track implementation of restoration project goals. Due to expense, and to allow for stabilization of Newly Constructed Pools and Expanded Pools following construction, vernal pool fauna surveys are not proposed in Wet Seasons 2 and 3 except where ponding was inadequate to conduct Wet Season 1 surveys.

The macroinvertebrate method was developed as a quantitative method for monitoring the health and functionality of vernal pool wetlands and has been used to monitor those wetlands for more than a decade (Rogers, in review). The method is a tool for estimating the quality of existing vernal pool habitat and defining vernal pool habitat restoration goals and standards. The method is quantitative, replicable, and allows for direct comparisons between data sets from different pools, pool complexes, and vernal pool habitat types. This method is a modified form of aquatic bioassessment, which is a primary tool of regulatory agencies in measuring habitat health and water quality.

Under the macroinvertebrate method, the vernal pool macroinvertebrate community composition at a given site is quantitatively compared with local natural reference features with the same phenology and geomorphology. Impacted or impaired habitats tend to become dominated by opportunistic species, which may outcompete vernal pool obligate species if those species are stressed. Through monitoring of the macroinvertebrate community structure, any shifts towards opportunistic species will be evident. If a drop in obligate species numbers and an increase in opportunistic species numbers is observed, then adaptive management activities may be implemented to return the habitats to a normal, functioning vernal pool complex.

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Biological systems are considered better indicators of habitat health and functionality than chemical, hydrological or soils monitoring simply because organisms are a function of the abiotic characters of the system. Different ecological conditions allow for the colonization and establishment of different organisms with different ecological needs. If the requirements for a given species are not present, that species cannot survive at that locality. Invertebrates may have anywhere from one to dozens of generations in a single wet season, and therefore will readily reflect small perturbations in a system. As a result, macroinvertebrates (invertebrates > 0.5 mm) have become the standard biological indicators in quantitative biological monitoring (bioassessment) in aquatic systems. Monitoring for Proctor Valley vernal pool restoration projects would still include hydrology and flora as these elements will provide valuable additional information to track implementation of project goals and does not greatly increase the practical work or cost of collecting monitoring data.

The quantitative, direct measurements that will be made for the macroinvertebrate method are the composition of all invertebrate species in each sampled pool at three times (early, mid, and late season) over the course of each wet season. The timing of each sampling event is determined by the ecological succession stage of the inundated vernal pool (Rogers 1998). Early wet season sampling occurs after the pools had been continuously inundated for approximately two weeks to allow for the hatching or other establishment of early season invertebrates. Mid-wet season sampling occurs when the first floating hydrophytes appear and begin to cover pool margins. Late wet season sampling occurs during the early stages of drying and subsequent collapse of the aquatic component of the vernal pool community. Rogers selects these phonological stages as sampling periods rather than temporal increments due to variability in temperature and rainfall, which prolongs or shortens the different stages of the ponding cycle (Rogers, in review). For Proctor Valley monitoring, the Conservancy intends to time samples using a combination of phonological stages and temporal increments. For example, mid-season sampling would be conducted one month after the early/first sampling if floating hydrophytes are present and have begun to cover pool margins. If hydrophyte conditions are not present then sampling would be delayed in two-week increments until hydrophyte conditions are present. Please see Table 7 for an annual schedule of vernal pool fauna monitoring.

Samples are collected using a fine mesh sweep net with a mesh size between 1 – 2 mm. Mesh larger than 2 mm would allow desired invertebrate specimens to escape. Mesh less than 1mm would catch too much debris and specimens, clogging the net, and pushing the water and specimens ahead of the net, rather than gathering them. The net aperture should be 0.0451m^2. Each sample is collected from the water column by pulling the net through 1.5 horizontal meters of the pool, thereby sampling 0.0677 m^3 of the pool. One sweep is collected for every 200m^2 of

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Table 7.
Seasonal Vernal Pool Fauna Monitoring Schedule

Fauna Sampling Description	Fauna Sampling Schedule
Early Wet Season Sampling	Two weeks following first continuous ponding.
Mid-Wet Season Sampling	One month after first sampling if floating hydrophytes are present and have begun to colonize pool margins. If hydrophyte conditions are not present then delay sampling in two-week increments until such conditions are present. Sampling may be conducted even if pool has dried and re-filled as later season and/or warmer conditions may trigger different species.
Late Wet Season Sampling	One month after second sampling if floating hydrophytes are present, have thoroughly colonized pool margins, and pool is drying. If hydrophyte and drying conditions are not present then delay sampling in two-week increments until such conditions are present. Sampling may be conducted even if pool has dried and re-filled as later season and/or warmer conditions may trigger different species.

vernal pool surface area. If the pool depth at the time of collection is only half the net aperture height, then two 1.5 m sweeps are taken. Each sample is placed in its own unique labeled container and preserved immediately in 90% ethanol. All samples are labeled with location, pool and collection number, date, time, and area sampled. The samples are then transported to a laboratory for processing. After 24 hours, the ethanol in each sample is replaced with fresh 70% ethanol to ensure preservation of all specimens within the sample.

In the laboratory, each sample is emptied into a sorting tray, and the macroinvertebrates (invertebrates > 2 m in size) are removed from the remaining debris into a separate labeled container. After sorting, the specimens were identified and enumerated under a dissection microscope to the lowest practicable level. Taxonomic standards for aquatic macroinvertebrates are set by the Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT) Standard Taxonomic Effort list (Richards & Rogers 2006). All identification and enumeration data is entered into a spreadsheet program.

Invertebrate collection under the macroinvertebrate method will be conducted by biologists holding a valid ESA Section 10(a) permit for fairy shrimp. Sample identifications must be carried out by a trained invertebrate diagnostician or invertebrate taxonomist and utilize the Southwest Association of Freshwater Invertebrate Taxonomist's (SAFIT) most recent version of the Standard Taxonomic Effort List as a taxonomic guide where applicable (see www.safit.org). All organisms must be identified to the lowest practicable level as defined by SAFIT.

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3.6.2 Fairy Shrimp Monitoring

Fairy shrimp surveys would be conducted in wet seasons 1, 2, and 4 to supplement the macroinvertebrate method in an effort to more conclusively determine the presence or absence of Riverside fairy shrimp, San Diego fairy shrimp, versatile fairy shrimp, and hybrids in various pools.

In Wet Season 1 prior to grading, all four Reference/Control Pools and all other Existing Pools would be surveyed. Pre-construction surveys are intended to determine the presence or absence of endangered fairy shrimp, versatile fairy shrimp, and hybrids and identification of potential inoculum donor pools. Surveying Existing Pools is also intended to determine project impacts to endangered fairy shrimp, to determine the presence or absence of endangered fairy shrimp to inform decisions on whether to solarize and/or inoculate Existing Pools, and to track implementation of project goals to establish endangered fairy shrimp in Existing Pools unoccupied by fairy shrimp.

In Wet Season 2 following grading, all Newly Constructed Pools would be surveyed along with any one Existing Pool where ponding was inadequate and/or where fairy shrimp surveys were inconclusive in Wet Season 1. In Wet Season 3, surveys would only be conducted in any Restoration Site Pools where ponding was inadequate and/or where surveys were inconclusive in Wet Seasons 1 and 2. In Wet Season 4, surveys would be conducted in any Existing Pools (including Expanded Pools) inoculated with endangered fairy shrimp but excluding those surveyed for all fauna (section 3.6.1). Post-construction surveys are intended to determine whether accidental or opportunistic colonization by versatile fairy shrimp has occurred and to inform decisions on solarizing and inoculation. In the final Wet Season 4, establishment of Riverside fairy shrimp or San Diego fairy shrimp in Newly Constructed Pools would be determined through macroinvertebrate method surveys for all fauna in four Newly Constructed Pools (section 3.6.1) rather than direct surveys for endangered fairy shrimp in all Newly Constructed pools.

Fairy shrimp surveys will be conducted by a certified biologist holding a valid Section 10(a) permit and use the Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods (USFWS 1996). With authorization from USFWS, fairy shrimp surveys would vary from the protocol and continue even after discovery of either Riverside or San Diego fairy shrimp in an effort to determine the presence or absence of versatile fairy shrimp and/or hybrids.

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