San Diego Association of Governments

OTAY MESA RARE PLANTS

Final Report

SANDAG EMP Grant Agreement No. 5004954

The Chaparral Lands Conservancy (TCLC) submits the final report for the Otay Mesa Rare Plants Project EMP grant. Project activities included work under EMP grant Task 1a seed bulking for MSP plant species, Task 1b restoration of vernal pools & maritime succulent scrub & establishment of MSP plant occurrences, Task 1c project monitoring and reporting, Task 1d project management, Task 1e project management travel, and Task 2 grant reporting and project administration.

I. Project Background

The purpose of the Otay Mesa Rare Plants EMP grant is to improve the conservation status of several of San Diego County's rarest plants as part of TCLC's larger Otay Mesa Vernal Pool Habitat Restoration Project (Project) to reduce weed cover and enhance and restore vernal pools and maritime succulent scrub on conserved land in Otay Mesa. This EMP grant includes tasks to conduct seed bulking for two MSP plants, Orcutt's brodiaea and Otay Mesa mint, to establish new occurrences for these two plants along with three others, Orcutt's grass, Orcutt's birds beak, San Diego thornmint using bulked seed provided by the San Diego Zoo Institute for Conservation Research, and to reduce weed thatch and cover by 75% on approximately eight acres.

Seed for several of the plants is difficult to obtain from existing limited populations and seed bulking is needed to provide sufficient seed for conservation of the species as part the Project. The Project supports the goals of the TransNet EMP and Management Strategic Plan (MSP) by increasing the viability of five high-priority MSP SL and SO species. Specifically, the EMP grant and Project will directly restore populations of five high-priority MSP SL and SO species through seed collection, seed bulking, propagation, seeding, and maintenance.

II. Project Goals

The goals of the EMP grant are to significantly increase available seed and to restore populations of five high- priority MSP SL and SO plant species from Otay Mesa as an integral part of TCLC's Otay Mesa

director@chaparralconservancy.org
chaparralconservancy.org
p.o. box 9311, san diego ca 92169
760 809 9244

Vernal Pool Habitat Restoration Project and to document Project results. Objectives to achieve these goals include seed bulking, restoration of vernal pools and maritime succulent scrub, establishment of MSP plant populations, and Project monitoring and reporting. Criteria to measure successful implementation of objectives include the amount of bulked seeds for each MSP plant, the number of new populations of each MSP plant, the acreage of reduced weed thatch and percentage of reduced weed cover on the Project site, and the results of quantitative monitoring and annual reports.

III. Work Performed by Task

Habitat & Species Restoration (Tasks 1a, 1b, 1d, & 1e)

Budget: $128,946
Spent: $128,990
Match: $152,704

Work under EMP grant Habitat & Species Restoration Tasks 1a, 1b, 1d, and 1e was conducted by several entities including TCLC staff, engineering and habitat restoration and graphic artist contractors retained by TCLC, City of San Diego Parks and Recreation Department staff, habitat restoration contractors retained by the City, and San Diego Zoo Global.

Engineering contractors retained by TCLC surveyed and marked the southern property line of the Project site bordering private property and prepared documents for a City of San Diego grading permit application including a grading plan, drainage plan, erosion control plan, drainage study, and water pollution control plan.

Habitat restoration contractors retained by TCLC collected seed, propagated and bulked seed for several common and sensitive plants including Orcutt's brodiaea and Otay mesa mint, secured bonds required under City of San Diego entry and grading permits, cleaned up and disposed of refuse, dethatched years of accumulated weed cover for offsite disposal, installed fiber roles for erosion control, conducted restoration grading, constructed and installed Burrowing owl artificial burrows, relocated and repaired Burrowing owl artificial burrows, installed vernal pool soil inoculum, propagated container plants, installed container plants, seeded sensitive vernal pool and upland plants including Orcutt's grass, Orcutt's birds beak, and Otay Mesa mint, watered installed container plants and seeded areas, and controlled weeds.

A graphic artist contractor retained by TCLC designed a poster for display in an educational kiosk.

TCLC staff Project management and travel was conducted to orchestrate and obtain a grading permit for the Project. Project management and travel was conducted to assist with collection of information and preparation of materials for the grading permit application including maps illustrating grading and

stormwater pollution control measures and a stormwater pollution control plan, to refine measurements of existing micro-topography at each existing vernal pool, to refine measurements for grading enhancement of extant pools and construction of new vernal pools, to refine measurements for grading enhancement of existing Mima mounds and construction of new Mima mounds, to identify locations for erosion control BMPs, and to otherwise assist with preparation of the grading permit application. Project management and travel was also conducted to communicate and meet with City of San Diego Development Services staff to identify necessary elements of a complete grading permit application for this atypical project and to submit and revise the grading permit application.

TCLC staff Project management and travel was also conducted to assist with implementation of the Project including preparation of contractor requests for proposals, collection and removal of refuse, measurement and preparation of fence and gate design, identification of sign locations and design, marking the Project perimeter, identifying and marking Burrowing owl artificial burrow locations, dethatching weed cover, supervising grading, supervising planting of container plants, supervising seeding of sensitive plants controlling weeds, assisting with monitoring, and overseeing contractor activities.

TCLC staff Project management and travel was also conducted to coordinate Project vernal pool restoration activities with others' planning for the location of vernal pool restoration and commercial development on the private property bordering the Project site to support a functional contiguous vernal pool restoration project and preserve. Work was also conducted with the private property owner to install barriers to limit off-road vehicle trespass.

City of San Diego Parks and Recreation Department staff and habitat restoration contractors retained by the City dethatched weed cover, controlled weeds, collected Orcutt's brodiaea seed, installed a perimeter fence and vehicle gate on the south and east edges of the Project site property, and installed an educational Project kiosk purchased by TCLC with an educational poster designed by a TCLC graphic artist contractor.

Project Monitoring & Reporting (Task 1c)

Budget: $39,108
Spent: $39,105
Match: $10,607

Work completed under the EMP grant Project Monitoring & Reporting Task 1c was conducted by a biological monitoring contractor and included baseline and post-construction monitoring of vernal pool hydrology, flora, and fauna, upland flora, photograph monitoring, and reporting.

Grant Reporting & Administration (Task 2)

Budget: $2,905
Spent: $2,905
Match: $2,333

Work completed under the EMP grant Grant Reporting & Administration Task 2 was conducted by TCLC staff and included Project accounting, oversight of contractor activities and expenditures, maintenance of insurance policies, updates to the property owner, and preparation of the EMP grant reports and invoices.

IV. Challenges

A number of challenges were encountered over the course of the Project including the following:

- The Project grading permit was delayed as a result of complicated application materials and lengthy review by the City of San Diego for this atypical grading project and poor performance and termination of the first engineering contractor.

- Other Project funding was lost upon expiration of the performance period for another grant due to the delayed grading permit.

- Drought conditions during the 2020/2021 wet season necessitated supplemental watering of installed container plants when seasonal rainfall would typically reduce or eliminate the need for watering. Drought conditions delayed seeding of Orcutt's grass and may have contributed to a lack of germination of seeded Orcutt's birds beak. Drought conditions also delayed seeding of vernal pools and uplands with other common and sensitive plant species.

- Grading was further delayed for one month by a subcontractor.

- High water tables and flooding necessitated relocation of artificial Burrowing owl burrows to a greater distance and higher elevation from vernal pools. Original wood burrow boxes did not withstand extended periods of soil moisture and relocated burrows were constructed with plastic irrigation boxes.

- Undesirable Versatile fairy shrimp were documented in several Project vernal pools during post-construction monitoring. Versatile shrimp were previously documented in five of the same pools during pre-construction baseline surveys. The remaining two pools where Versatile fairy shrimp were detected post-construction supported immature shrimp that couldn't be identified to species during pre-construction baseline surveys and that were likely Versatile fairy shrimp. Project

measures to remove Versatile shrimp with disposal of topsoil from vernal pools occupied by the species during grading do not appear to have been effective in removing the species.

V. Conclusions

The Otay Mesa Rare Plants Project EMP grant and Otay Mesa Vernal Pool Habitat Restoration Project have been largely successful in accomplishing EMP grant and Project goals.

Habitat & Species Restoration Seed Bulking for MSP Plant Species Task 1a

Efforts were successful to implement EMP grant Task 1a. Seed was collected for Orcutt's brodiaea and Otay Mesa mint, bulbs propagated for Orcutt's brodiaea, and seed bulked for Otay Mesa mint. Several thousand individual bulbs were produced for Orcutt's brodiaea and over a pound of seed was produced for Otay Mesa mint.

The term "seed bulking" was mistakenly applied to Orcutt's brodiaea for this EMP grant. In the future, this term may be best applied to annuals as it is less appropriate for perennial plants like Orcutt's brodiaea that take years to reach maturity and for which seed bulking is not practical during the shorter term of EMP grants. In the general case of Orcutt's brodiaea, seed collection and propagation of corms for direct use at habitat restoration sites or suitable for storage or even long-term seed production would be helpful and appropriate. And for this EMP grant, the fundamental goal to increase Orcutt's brodiaea numbers was still achieved.

Habitat & Species Restoration of Vernal Pools & Maritime Succulent Scrub & Establishment of MSP Plant Occurrences Task 1b

Five acres of vernal pools and maritime succulent scrub have been successfully restored on the Project site including 33 vernal pools with post-grading functioning vernal pool hydrology. In addition to the specific EMP grant MSP species addressed below, the Project now supports several other MSP species including Burrowing owl, Riverside fairy shrimp, San Diego fairy shrimp, Otay tarplant, and San Diego button-celery. Project measures to prevent spread of undesirable Versatile fairy shrimp to unoccupied pools during habitat restoration activities also appear to have been successful.

EMP grant and Project results have contributed to the conservation of MSP plant species including enhancing recovery and preventing further decline. The conservation status of two of the five target MSP species has been significantly improved by establishing new occurrences on the Project site. And the conservation status of the remaining three species has been improved by significantly increasing seed and propagated plants available for use in establishing expected new occurrences on the Project site by the end of the Project.

The conservation status of each of the five MSP plant species has been improved as follows:

- Otay Mesa mint has been successfully seeded and established in several Project restored vernal pools.
- Orcutt's brodiaea was successfully propagated and will be planted on the Project site this winter.
- San Diego thornmint seed is expected soon from the San Diego Zoo Institute for Conservation Research and will be seeded on the Project site this winter depending on rainfall.
- Orcutt's grass was documented for the first time ever on the site in one vernal pool after restoration grading improved conditions necessary to germinate an existing remnant natural seed bank. Orcutt's grass seed is expected soon from the San Diego Zoo Institute for Conservation Research and will be seeded on the Project this winter depending on rainfall and vernal pool hydrology conditions.
- Orcutt's birds beak seed was received from the San Diego Zoo Institute for Conservation Research and seeded on the Project site. Drought conditions appear to have precluded seed germination but seed is still expected to germinate under future suitable conditions. Additional Orcutt's birds beak seed is expected soon from the San Diego Zoo Institute for Conservation Research and will be seeded on the Project site this winter depending on rainfall.

The EMP grant and Project have also contributed to the conservation of MSP species by reducing weed thatch and cover by at least 75% on approximately twelve acres. Dethatching and weed control was conducted on the five-acre Project site by the habitat restoration contractor retained by TCLC as well as several contiguous acres on the remainder of the same preserve property by a habitat restoration contractor retained by the City of San Diego Parks and Recreation Department.

Some Project EMP grant and Project modifications could have improved results. Some of the greatest challenges for the Project were related to obtaining a grading permit required by the City of San Diego. But the City has since eliminated requirements to obtain a grading permit for habitat restoration projects. Another modification could have been anticipation of a longer EMP grant performance period to accommodate drought conditions that limited both seed collection for seed bulking and other propagation as well as seeding the Project site during suitable conditions. Future project budgets should anticipate increased supplemental watering to establish installed container plants. Artificial Burrowing owl burrows should be installed at a greater distance and elevation from vernal pools. Experiments and special agency permissions may be necessary to identify alternative methods of elimination of Versatile fairy shrimp from occupied vernal pools. And SANDAG may consider grants to the San Diego Zoo Institute for Conservation Research or others to propagate perennial high priority MSP plant species



from occurrences across the County and representing recommended genetic diversity for use by them or others at particular habitat restoration projects.

Please direct any questions to David Hogan at 760 809-9244 or director@chaparralconservancy.org. Thank you for your consideration and SANDAG support to conduct the Otay Mesa Rare Plants Project.

The Chaparral Lands Conservancy

Preserving California's Shrubland Ecosystems



Removal of accumulated weed thatch cover by the habitat restoration contractor.



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Preserving California's Shrubland Ecosystems



Installtion of water pollution control BMPs by the habitat restoration contractor.





Weed control herbicide spraying by the habitat restoration contractor.



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Careful weed control arround sensitive ashy spikemoss (above) and San Diego button-celery (below).



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Initial grading to construct new vernal pools in October 2019.



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Initial grading to repair existing vernal pools in October 2019.



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Restoration finish grading of vernal pools in November 2019.



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First filling of vernal pools in November 2019.



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First filling of restored vernal pools in November 2019.



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Continuous ponding of restored vernal pools into December 2019.



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Container plants prior to planting (above).
Orcutt's brodiaea container plants (below).

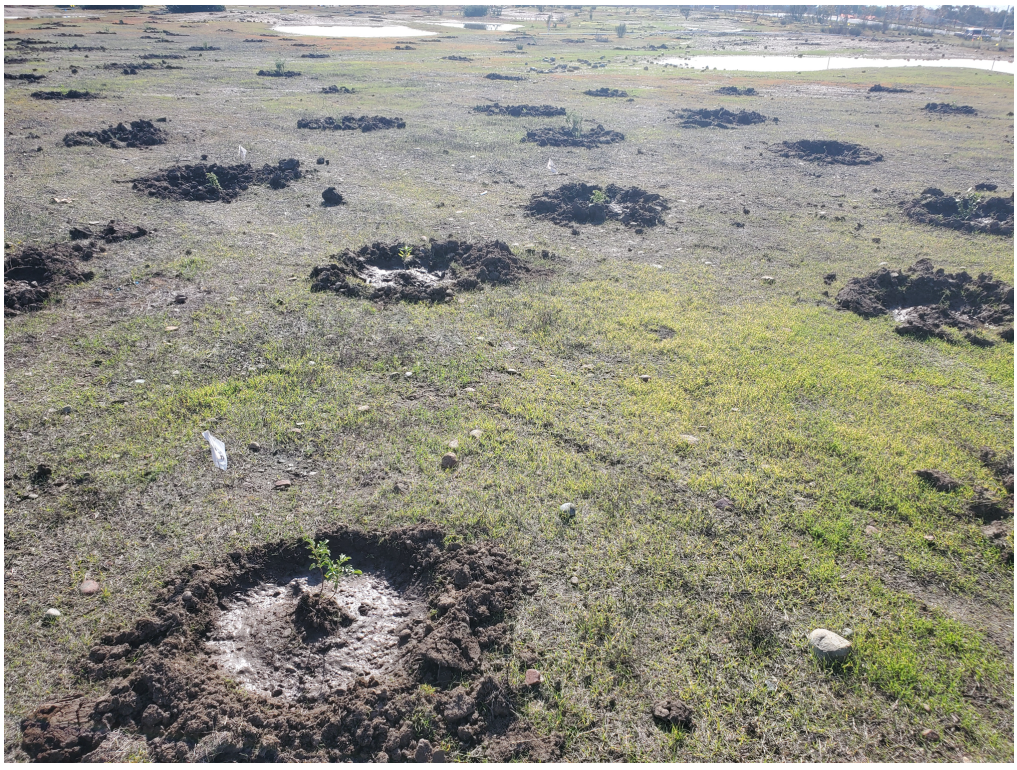


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Container plantings.



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Continuous ponding of restored vernal pools into December 2019.



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Weed control.



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Supplemental watering of installed container plants.



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Installed upland container plants.



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Boy Scout weeding volunteer event.



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Ponded restored vernal pools in February 2020.



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Orcutt's grass and ring of Otay Mesa mint in dry vernal pools in June 2021.



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New fence (above).
Educational kiosk installation (below).



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Relocation of Burrowing owl artificial burrows.



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New Project resident (above).
Container plants delivered to site (below).



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Seeded Otay tarplant in bloom (above).
Seeded Otay Mesa mint in bloom (below).



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Installation of container plants (above).
Educational kiosk with poster (below).

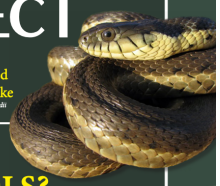


OTAY MESA HABITAT RESTORATION PROJECT

Saving Sensitive Vernal Pool Wetlands



Quino Checkerspot Butterfly
Euphydryas editha quino

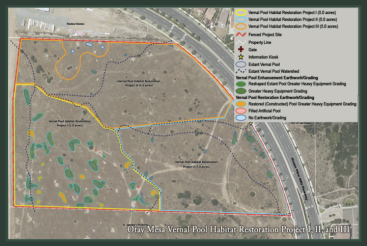


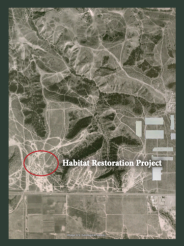
Two Striped Garter Snake
Thamnophis hammondii



WHAT'S GOING ON BEHIND THE FENCE?

The fence around this site protects sensitive vernal pool wetlands and several special and delicate endangered species. This property was purchased as a nature preserve by the City of San Diego in 2011 with grant funds from the California Wildlife Conservation Board. Now a project is being conducted by The Chaparral Lands Conservancy to repair past damage from off-road vehicles.









WHY DOES THE SITE NEED TO BE RESTORED?

Over 95% of all vernal pools in California have been lost to development and agriculture. In the 1990s, hundreds of off-road vehicle riders would gather at this site to ride out on nearby trails. ORV use caused enormous damage to these delicate wetlands and upland vegetation. Since then, ORV use has been effectively controlled with improved law enforcement and stewardship by the City of San Diego and this project will repair past damage from off-road vehicles to these delicate wetland wonders.

THIS PROJECT WAS MADE POSSIBLE BY PARTNERSHIPS WITH:

The Chaparral Lands Conservancy

California Natural Resources Agency

OHV Funds at Work

Center for Biological Diversity

The City of San Diego Parks and Recreation Department

SANDAG

WCB State of California Wildlife Conservation Board



Blainville's Horned Lizard
Phrynosoma blainvillii

WHAT ARE VERNAL POOLS?

Vernal pools are a special and fascinating type of temporary wetland found in different regions of California on flat coastal mesas and inland valleys. Vernal pools can be as large as a lake or as small as a dining table.



Western Spadefoot Toad
Spea hammondii



San Diego Fairy Shrimp
Brachinecta sandiegonensis



Baja California Treefrog
Pseudacris hypochondriaca

Vernal pools support many unique plants and animals that have evolved to thrive in extreme conditions ranging over the course of a year from a fully submerged aquatic environment during the rainy winter and spring to a totally dry and sun baked environment in the summer and fall.

Just a few days after pools fill, fairy shrimp and a soup of other tiny crustaceans hatch from eggs that have lain dormant in the soil and swim in search of microscopic food and mates. Toads and frogs emerge from nearby summer hiding places to begin their wet season mating chorus, and tiny plants germinate from floating seeds. Toad and frog eggs hatch into tadpoles which in turn eat the crustaceans and insect larvae, garter snakes swim seeking snack-size tadpoles, and migrating ducks rest and dabble for food. Pools recede over several weeks as tadpoles metamorphose into frogs and toadlets, and plants that once grew entirely underwater transform to thrive, bloom, and set seed in a totally dry environment. Fairy shrimp eggs settle to the bottom of pools, bake in the blazing summer sun, and await hatching in next year's winter rains.



Otay Mesa Mint
Pogogyne nudiuscula



San Diego Button-Celery
Eryngium aristulatum var. parishii



Vernal Pool Pincushion Plant
Navarretia fossalis

In southern California, seven animals and plants that live only in vernal pools have been formally recognized as endangered by state and federal agencies: Riverside fairy shrimp, San Diego fairy shrimp, California Orcutt's grass, Otay Mesa mint, San Diego button-celery, San Diego mesa mint, and vernal pool pincushion plant. Several other vernal pool species are also rare but have no formal government protection: Two-striped garter snake, Western spadefoot toad, little mousetail plant, and toothed calico flower.



Western Burrowing Owl
Athene cunicularia hypugaea