

**San Diego Association of Governments**  
**Vernal Pool Habitat Restoration at Otay Mesa Open Space**  
**Final Report**  
**Project Period: November 2018 to November 2020**  
**SANDAG Contract Number: 5005504**

## **Executive Summary**

The Spring Canyon/Goat Mesa vernal pools complex (J16-18) were identified by the adopted *Recovery Plan for Vernal Pools of Southern California* (USFWS 1998) as necessary to stabilize populations of the following endangered and threatened species: *E. aristulatum*, *P. nudiusscula*, *N. fossalis*, *O. californica*, *B. sandiegonensis*, and *S. woottoni*. The Management Strategic Plan for Conserved Lands in Western San Diego County (SDMMP) also lists other MSP species historically found onsite at Spring Canyon/Goat Mesa including *D. variagata*, *M. minimus*, *S. hammondii*, and *A. cunicularia*. Otay Mesa/Goat Mesa Open Space has also had recent recorded occurrences of Western Burrowing Owl, including a pair of owls observed using artificial burrows as recently as December 29, 2017 before the grant project started.

The vernal pools at the Spring Canyon/Goat Mesa complex (J16-18) and surrounding open space have suffered considerable off-road vehicle damage over the years and this damage has resulted in changes in hydrologic, flow patterns, and inundation characteristics that are threatening current populations of endangered and threatened species. Off-road vehicle activity in the Spring Canyon/Goat Mesa area has also contributed to the spread of invasive plants and degraded existing burrowing habitat adjacent to the vernal pools. While off-road activity has been significantly reduced in recent years through frequent ranger patrols and installation of fencing, the off-road scars have been slow to recover and invasive annual plants continue to spread and threaten these sensitive habitats.

The proposed project will enhance and expand existing vernal pool and Western Burrowing Owl habitat and reduce the threat of wildfire and invasive plant conversion by replacing areas of invasive flashy fuels with native Coastal Sage Scrub (CSS)/Maritime Succulent Scrub (MSS) species in City of San Diego owned and dedicated/designated Spring Canyon/Goat Mesa Open Space. Contracted crews will be hired to perform brush and invasive weed clearing to remove the dead thatch so that City staff can perform multiple as needed herbicide applications to control the weeds in existing and newly planted cactus patches. Contracted crews will also install CSS container plants in areas that have been slow to recover from off-road damage. This project will build on past projects performed by City of San Diego, Parks and Recreation Park Rangers that worked install over 6,000 feet of fencing to protect sensitive vernal pool habitat and restore some of the impacts from the illegal off-road vehicle use.

The project was implemented with intensive dethatching and then follow up spraying was conducted that reduced thatch cover by 95% and annual weed cover was reduced by at least 75% if not more in some locations. A total of 500 plants were proposed to be installed, but in the end a total of 2,433 planted at the vernal pool restoration site and over 100+ cactus cuttings were harvested and planted and 100 pounds of seed were spread to block off and restore some old off-road trails. Large multi-branched cactus cuttings up to one meter in height were harvested either from onsite in the same canyon location or a nearby city managed location. To give the appearance of a more established habitat and so that the restoration sites would fill in sooner large cactus cuttings were used. A total of

1.19 acre of coastal sage scrub (CSS)/maritime succulent scrub (MSS) restoration occurred during this project.

For future management the restoration sites should be continued to be monitored for new and reoccurring threats. Follow up maintenance and weed control will need to be done a few times per year until the container plants are established enough. The installed container plants will need to be maintained through the Spring and Summer of 2021 to fill in the slope area and around the vernal pool. Habitat restoration should continue to be done to further expand these restoration sites and protect them from invasion of adjacent invasive species.

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## Project Background

The Spring Canyon/Goat Mesa vernal pools complex (J16-18) were identified by the adopted *Recovery Plan for Vernal Pools of Southern California* (USFWS 1998) as necessary to stabilize populations of the following endangered and threatened species: *E. aristulatum*, *P. nudiusscula*, *N. fossalis*, *O. californica*, *B. sandiegonensis*, and *S. woottoni*. The Management Strategic Plan for Conserved Lands in Western San Diego County (SDMMP) also lists other MSP species historically found onsite at Spring Canyon/Goat Mesa including *D. variagata*, *M. minimus*, *S. hammondii*, and *A. cunicularia*. Otay Mesa/Goat Mesa Open Space has also had recent recorded occurrences of Western Burrowing Owl, including a pair of owls observed using artificial burrows as recently as December 29, 2017 before the grant project started.

The proposed habitat enhancement areas are located on City of San Diego Open Space land in the Spring Canyon/Goat Mesa areas of Otay Mesa. They are within the City of San Diego's Multi-Habitat Planning Area of the City's MSCP or within dedicated or designated Parks and Recreation Department Open Space land and will not be developed. The enhancement areas are within the MSP Management Unit 3.

The proposed project will enhance and expand existing vernal pool and Western Burrowing Owl habitat and reduce the threat of wildfire and invasive plant conversion by replacing areas of invasive flashy fuels with native CSS species in City of San Diego owned and dedicated/designated Spring Canyon/Goat Mesa Open Space. Contracted crews will be hired to perform brush and invasive weed clearing to remove the dead thatch so that City staff can perform multiple as needed herbicide applications to control the weeds in existing and newly planted cactus patches. Contracted crews will also install CSS container plants in areas that have been slow to recover from off-road damage. This project will build on past projects performed by City of San Diego, Parks and Recreation Park Rangers that worked install over 6,000 feet of fencing to protect sensitive vernal pool habitat and restore some of the impacts from the illegal off-road vehicle use.

The vernal pools at the Spring Canyon/Goat Mesa complex (J16-18) and surrounding open space have suffered considerable off-road vehicle damage over the years and this damage has resulted in changes in hydrologic, flow patterns, and inundation characteristics that are threatening current populations of endangered and threatened species. Off-road vehicle activity in the Spring Canyon/Goat Mesa area has also contributed to the spread of invasive plants and degraded existing burrowing habitat adjacent to the vernal pools. While off-road activity has been significantly reduced in recent years through frequent ranger patrols and installation of fencing, the off-road scars have been slow to recover and invasive annual plants continue to spread and threaten these sensitive habitats.

## Project Goals

The primary goal is to create, enhance and expand existing Coastal Sage scrub (CSS)/Maritime Succulent Scrub (MSS) habitat surrounding the vernal pools complex and western burrowing owl dens to act as a buffer from invasive plant species and to reduce sediment erosion into the vernal pools. The main objectives to reach these goals are 1) to perform brush removal and invasive weed control within the identified sites, and 2) plant CSS/MSS habitat appropriate plants in the upland areas around the vernal pools and within abandoned off-road scars; thereby enhancing existing Western Burrowing Owl foraging habitat. Contracted crews will be hired to perform initial and ongoing brush and weed clearing so that City staff can perform herbicide applications to control the weeds. Contracted labor will also be used to install CSS/MSS container plants and native cactus cuttings in the habitat enhancement sites. Contracted crews will also be used to install erosion control materials. Container plants, plant protectors and erosion control materials will be purchased from local or online vendors. City staff will oversee and manage the project.

The expected results are as follows:

- Coastal Sage Scrub/Maritime Succulent Scrub habitat will be enhanced and expanded around the vernal pool/western burrowing owl habitat to allow for further foraging areas for the Western Burrowing Owls and act as an invasive weed and sediment buffer for the vernal pools.
- Degraded habitat that is currently dominated by nonnative forbs and grasses will be converted to high quality Coastal Sage Scrub.
- Wildfire impacts will be reduced by replacing flashy annual fuels with over 100 perennial cactus propagules and 500 CSS/MSS container plants.
- Intensive dethatching treatments will reduce thatch and thick nonnative brush cover by 95%.
- As needed herbicide treatments will reduce annual weed cover by 75%.

## Work Performed by Task

### Task 1- Implementation

*Budget: \$65,000 (from grant agreement)*

*Spent: \$64,985.96*

The detailed work completed for Task 1 is listed below by date with corresponding pictures displayed above the date and details for some of the dates worked. Yes, there were some issues encountered during Task 1 Implementation. Project Task 1 Implementation was delayed by internal City purchasing and contracting issues that delayed getting contractors setup to do the work, contracted crew delays because of availability and wildfires, significant precipitation causing access issues, plant herbivory and Covid-19 delays.

Purchasing and contracting issues were resolved by using multiple contractors and having patience navigating through the City of San Diego contracting process. Contracted crew availability was limited at times because of other obligations that included CCC crews being needed to fight wildfires during Summer and Fall of 2020. This was resolved by using other crews or waiting for the crews to be available. Significant precipitation caused exhausting amounts of non-native weeds and safety access issues to some sloped areas not allowing implementation or maintenance to be done that had to wait to

be completed later when safe to do so. Wet and muddy conditions made the site difficult to access for a few months during Winter/Spring of 2019 and 2020. All we could do was wait for the area to dry out. Herbivory from animals was an issue and was slowed by using plant protector cones and also using a non-toxic organic animal deterrent spray. At the beginning of the Covid-19 pandemic in Spring 2020 City staff and contractors were limited in working and performing site maintenance, but health and safety protocols were put into place and allowed work to continue. Overall timelines of the whole project were thrown off because of the delays and a 6-month extension was needed to be able to complete the scope of work.

Once the issues were resolved the tasks and scope of work were completed under budget and funding remained to purchase and install container plants, perform more weed control and also perform some trail trimming and maintenance for the trail that allows access to and between the project sites.

Intensive dethatching and then follow up spraying reduced thatch by 95% and annual weed cover was reduced by at least 75% if not more in some locations. A total of 500 plants were proposed to be installed, but in the end a total of 2,433 planted at the vernal pool restoration site, 100 pounds of native plant seed and over 100+ cactus cuttings were harvested and planted to block off and restore some old off-road trails. Large multi-branched cactus cuttings up to one meter in height were harvested either from onsite in the same canyon location or a nearby city managed location. To give the appearance of a more established habitat and so that the restoration sites would fill in sooner large cactus cuttings were used. A total of 1.19 acre of Coastal Sage Scrub (CSS)/Maritime Succulent Scrub (MSS) restoration occurred during this project.

Follow up maintenance and weed control will need to be done annually for the installed container plants will need to be maintained through the Spring and Summer of 2021 to fill in the slope area and around the vernal pool.

On 1/3/19 City staff performed thatch/brush removal for planting site. Weed control treatments were performed at and around planting site.



On 3/11/19 City of San Diego contributed 425 CSS/MSS plants to this project site and used City staff and a non-grant funded contracted crew provided by the City to install them. Above picture.

On 5/24/19 City of San Diego staff weed whacked invasive plants around restoration site.

On 6/27/19 City of San Diego staff sprayed invasive plants around restoration site and along road that leads to restoration site.

On 8/29/19 City of San Diego staff hand pulled invasive plants around restoration site and planned tasks for contractor to implement in the future.



On 9/5/19 City of San Diego staff hand pulled invasive plants around restoration site and installed a few test plant protectors to protect installed plants from herbivory and planned tasks for contractor to implement in the future. Above picture.





On 10/22/19 City of San Diego staff watered grasses, fixed plant basins, spread native plant seed in habitat restoration site and on trails to be closed. Used drag to remove dead biomass thatch. Above picture.



On 11/8/19 City of San Diego staff sprayed animal herbivory deterrent on native grasses, removed blue plant protectors, used drag to remove additional dead biomass and harvested cactus cuttings for future installation. Above picture.







On 1/2/20, 1/3/20 and 1/6/20 City of San Diego staff and Habitat West crew transported through a very muddy/mucky access road to the grant restoration site and installed 708 native plants. Habitat West also installed 100+ multi branch coast cholla cactus cuttings. City staff applied herbicide to invasive weeds within restoration site. Above pictures.

On 1/30/20 City of San Diego staff applied herbicide to invasive plants in restoration site.



On 2/3/20 City of San Diego staff watered installed native plants. Above picture.

On 2/6/20 City of San Diego staff applied herbicide to invasive plants in restoration site.



On 2/20/20 City of San Diego staff watered installed native plants and installed straw wattles along toe of slope. Above picture.

On 4/1/20 – 6/30/20 No Implementation was completed this quarter because of the Covid-19 pandemic constraints and the site being inaccessible during March, April and early May.



On 7/27/20 – 7/30/20 California Conservation Corps crew performed thatch/brush removal at habitat restoration sites. Above picture.







On 8/11/20 – 8/13/20 California Conservation Corps crew performed thatch/brush removal, trash pickup and installed erosion control wattles at habitat restoration sites. Above pictures.





On 10/5/20 – 10/8/20 California Conservation Corps crew performed weed removal, thatch/brush removal, trail trimming/maintenance and trash pickup at habitat restoration sites. Above pictures.

On 10/8/20 – 10/9/20 Alpha Project crew performed trail trimming for access to the habitat restoration sites.

On 10/12/20 Alpha Project crew performed trail trimming for access to the habitat restoration sites.



On 10/19/20 – 10/22/20 California Conservation Corps crew performed native plant watering, weed removal, thatch/brush removal, trail trimming/maintenance and trash pickup at habitat restoration sites. Above picture.



On 10/27/20 – 10/28/20 Habitat West crew performed digging of holes for upcoming native plant installation. Above picture.

On 10/27/20 Alpha Project crew performed trail trimming for access to the habitat restoration sites.









On 11/2/20 – 11/5/20 Habitat West crew and City staff performed pre watering of holes for plant installation, transportation of plants and water from road to habitat restoration site, installation of 1,300 native plants and watered them all in. Above pictures.

## **Task 2- Monitoring**

*Budget: \$0 (from grant agreement)*

*Spent: \$0*

### **Photo Point 1**

Three photo points were setup at Otay Mesa to track the change and progress of the project over time. Significant positive change occurred over the 24 months for all photo point locations. Monitoring visits occurred on 12/21/18, 12/27/18, 1/3/19, 2/7/19, 2/27/19, 3/11/19, 4/2/19, 5/8/19, 5/24/19, 6/27/19, 8/5/19, 8/29/19, 9/5/19, 10/22/19, 11/8/19, 12/16/19, 1/2/20, 1/30/20, 2/6/20, 2/20/20, 5/27/20, 6/30/20, 7/8/20, 8/4/20, 9/24/20, 10/5/20, 10/27/20 and 11/5/20 to photo document progress of the habitat restoration site. Photo labels under each photo. March and April of 2020 were too wet to access the site.



Photo Point 1: 12/21/18 – Slope facing North towards vernal pool. Before any work had begun.



Photo Point 1: 1/3/19 – Slope facing North towards vernal pool. Site just mowed to remove thatch.



Photo Point 1: 2/7/19 – Slope facing North towards vernal pool.





Photo Point 1: 2/27/19 – Slope facing North towards vernal pool.



Photo Point 1: 3/11/19 – Slope facing North towards vernal pool.



Photo Point 1: 4/2/19 – Slope facing North towards vernal pool. Installed native plants not very visible.





Photo Point 1: 5/8/19 – Slope facing North towards vernal pool. Installed native plants not very visible.



Photo Point 1: 5/24/19 – Slope facing North towards vernal pool.



Photo Point 1: 6/27/19 – Slope facing North towards vernal pool.



Photo Point 1: 8/5/19 – Slope facing North towards vernal pool. Installed plants are increasing in size.





Photo Point 1: 8/29/19 – Slope facing North towards vernal pool. Installed plants are increasing in size.



Photo Point 1: 10/22/19 – Slope facing North towards vernal pool. Installed plants are increasing in size.



Photo Point 1: 12/16/19 – Slope facing North towards vernal pool. Installed plants are increasing in size and some native plant seed and weeds are germinating.



Photo Point 1: 1/31/20 – Slope facing N toward vernal pool. New installed plants lower right.





Photo Point 1: 2/20/20 – Slope facing North towards vernal pool. New plants just watered.



Photo Point 1: 5/27/20 – Slope facing North towards vernal pool. Installed native plants getting bigger.



Photo Point 1: 6/30/20 – Slope facing North towards vernal pool. Weeds growing.





Photo Point 1: 8/4/20 – Slope facing North towards vernal pool.



Photo Point 1: 8/13/20 – Slope facing North towards vernal pool. Plants watered.



Photo Point 1: 9/24/20 – Slope facing North towards vernal pool.



Photo Point 1: 10/5/20 – Slope facing North towards vernal pool. Plants watered.





Photo Point 1: 10/27/20 – Slope facing North towards vernal pool.



Photo Point 1: 11/2/20 – Slope facing North towards vernal pool.



Photo Point 1: 11/5/20 – Slope facing North towards vernal pool.



Photo Point 1: 1/5/21 – Slope facing North towards vernal pool.

## Photo Point 2





Photo Point 2: 12/21/18 – Slope facing South. Before any work had begun.



Photo Point 2: 1/3/19 – Slope facing South. Site recently mowed to remove thatch.



Photo Point 2: 10/22/19 – Slope facing South. Installed plants are increasing in size.





Photo Point 2: 12/16/19 – Slope facing South. Installed plants are increasing in size.



Photo Point 2: 1/31/20 – Slope facing South. New plants in areas where soil looks disturbed.



Photo Point 2: 2/20/20 – Slope facing South. Newly installed plants can be seen after the watering.





Photo Point 2: 5/27/20 – Slope facing South. Installed native plants getting bigger.



Photo Point 2: 6/30/20 – Slope facing South. Installed native plants getting bigger along with the weeds.



Photo Point 2: 7/8/20 – Slope facing South. After weed whacking.



Photo Point 2: 7/8/20 – Slope facing South. Before weed whacking.



Photo Point 2: 8/4/20 – Slope facing South.



Photo Point 2: 8/13/20 – Slope facing South. Installed native plants getting bigger.





Photo Point 2: 9/24/20 – Slope facing South.



Photo Point 2: 10/9/20 – Slope facing South.



Photo Point 2: 10/23/20 – Slope facing South.



Photo Point 2: 10/27/20 – Slope facing South.

### Photo Point 3



Photo Point 3: 12/27/18 – Middle vernal pools and buffer facing Northwest.





Photo Point 3: 7/30/20 – Middle vernal pools and buffer facing Northwest.



Photo Point 3: 8/11/20 – Middle vernal pools and buffer facing Northwest. Before weed whacking.



Photo Point 3: 8/12/20 – Middle vernal pools and buffer facing Northwest. After weed whacking.



Photo Point 3: 9/24/20 – Middle vernal pools and buffer facing Northwest.

On 8/1/19 the Caliente wildfire burned a portion of the restoration site near the upper vernal pool area. This section of the project only had weed control proposed and no native plants were installed in this area. The fire moved quickly through the area and did not damage the vernal pool vegetation, but some upland shrubs were burnt. The site was monitored during the grant project and appropriate measures were taken to address any erosion or invasive plant issues. See photos below.



8/1/19 Watching fire fighters from a ridge South of the fire.





8/1/19 Watching fire fighters from a ridge South of the fire.



8/1/19 Wildlife camera setup at top Vernal Pool restoration site. During wildfire.



8/1/19 Wildlife camera setup at top Vernal Pool restoration site. Retardant dropped.



8/1/19 Wildlife camera setup at top Vernal Pool restoration site. After fire.





8/5/19 Site visit to assess fire damage. Firefighter cut fire line in middle. Retardant on right.

### **Task 3-Maintenance**

*Budget: \$15,000 (from grant)*

*Spent: \$15,000*

The detailed work completed for Task 3 is listed below by date with corresponding pictures displayed above the date and details for some of the dates worked. Task 3 Maintenance was a smaller portion of the overall project. No issues were encountered, task was completed according to the original scope, task came in at budget and overall weed cover was reduced by at least 75% or greater.

On 7/8/20 City staff weed whacked and performed follow up weed control around native plant restoration site.



On 7/24/20 Alpha Project crew watered native plant restoration site. Above picture.

On 7/27/20 City staff performed follow up weed control and applied herbicide to annual and perennial invasive weeds in habitat restoration site.





On 7/27/20 – 7/30/20 California Conservation Corps crew performed follow up weed control, picked up trash and debris at native plant restoration site. Above pictures.

On 7/31/20 Alpha Project crew watered and repaired native plant basins.

On 8/4/20 City staff watered native plant restoration site.

On 8/7/20 City staff performed follow up weed control and applied herbicide to annual and perennial invasive weeds in restoration site.



On 8/11/20 – 8/13/20 California Conservation Corps crew performed follow up weed control, watered native plants and repaired native plant basins. Above picture.

On 9/24/20 City staff watered native plant restoration sites.

## Conclusions

### Was it successful and did it accomplish the specified goals?

Yes, the project was successful. The primary goal was to create, enhance and expand existing Coastal Sage scrub (CSS)/Maritime Succulent Scrub (MSS) habitat surrounding the vernal pools complex and western burrowing owl dens to act as a buffer from invasive plant species and to reduce sediment erosion into the vernal pools. The main objectives to reach these goals were 1) to perform brush removal and invasive weed control within the identified sites, and 2) plant CSS habitat appropriate plants in the upland areas around the vernal pools and within abandoned off-road scars; thereby enhancing existing Western Burrowing Owl foraging habitat.

City staff and contracted crews were used to perform initial and ongoing brush and weed clearing so that City staff could perform herbicide applications to control the weeds in the created CSS/MSS habitat. Contracted crews were used to install CCS/MSS container plants and native cactus cuttings in the habitat enhancement sites. A total of over 2,433 CSS/MSS container plants and 100 cacti+ cuttings were planted. 100 pounds of native plant seed was also spread. Contracted crews were also used to install erosion control materials.

### What could have been done differently to improve the project outcome?

The project outcome turned out great, but a lot of factors caused delays and were out of our control and these delays threw off the timeline and did not allow as much container plant maintenance and weed control to happen as originally desired. If we had more time to perform maintenance at the restoration sites the project outcome would have been even better.

### How have the results contributed to the conservation of MSP species and has it enhanced recovery/prevented further decline?

The vernal pools at the Spring Canyon/Goat Mesa complex (J16-18) and surrounding open space have suffered considerable off-road vehicle damage over the years and this damage has resulted in changes in hydrologic, flow patterns, and inundation characteristics that are threatening current populations of endangered and threatened species. Off-road vehicle activity in the Spring Canyon/Goat Mesa area has also contributed to the spread of invasive plants and degraded existing burrowing habitat adjacent to the vernal pools.

The results have contributed to the conservation of the following endangered and threatened species: *E. aristulatum*, *P. nudiusscula*, *N. fossalis*, *O. californica*, *B. sandiegonensis*, and *S. woottoni* and other MSP species historically found onsite at Spring Canyon/Goat Mesa including *D. variagata*, *M. minimus*, *S. hammondii*, and *A. cunicularia* and Western Burrowing Owl by enhancing and expanding existing vernal pool and Western Burrowing Owl habitat. Intensive dethatching treatments reduced thatch and thick nonnative brush cover by 95%. As needed herbicide treatments reduced annual weed cover by 75%. Degraded habitat that was once dominated by nonnative forbs and grasses is being converted to high quality CSS/MSS habitat. Wildfire impacts have been reduced by replacing the flashy annual fuels with over 2,433 CSS/MSS plants, 100 pounds of native plant seed and 100+ perennial cactus propagules. In time these expanded CSS/MSS patches will create sustainable habitat and enhance recovery and prevent further decline of the sensitive vernal pool and Western Burrowing Owl habitat. After a few years of being absent Wintering Burrowing Owls were occupying the upper vernal pool restoration site in Winter 2020

and were also observed as recent as January 2021. Vernal pool plant and animal species had two good years of precipitation that enhanced recovery of the species. Birds, reptiles and mammal species are thriving in this area and were regularly spotted in and above the habitat restoration sites.

**What work still needs to be done, what are the future management recommendations?**

For future management the restoration sites should be continued to be monitored for new and reoccurring threats. Follow up maintenance and weed control will need to be done a few times per year until the container plants are established enough. The installed container plants will need to be maintained through the Spring and Summer of 2021 to fill in the slope area and around the vernal pool. Habitat restoration should continue to be done to further expand these restoration sites and protect them from invasion of adjacent invasive species.