

Eelgrass Restoration Synthesis on the U.S. West Coast

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Eelgrass is an important foundation species along the U.S. West Coast, supporting a suite of ecosystem services and functions while providing food and shelter for many fishes and invertebrates. In 2018, the Pacific Marine and Estuarine Fish Habitat Partnership (PMEP) published “*Eelgrass Habitats on The U.S. West Coast: State of the Knowledge of Eelgrass Ecosystem Services and Eelgrass Extent*” which and compiled a geodatabase of eelgrass presence/absence and current and historic extent of eelgrass in 444 estuaries along the U.S. West Coast. In 2020, PMEP commissioned a report to

synthesize eelgrass restoration project successes along the U.S. West Coast to identify best practices for eelgrass restoration and mitigation. The authors of the report reviewed and synthesized data from 51 eelgrass restoration (non-mitigation and mitigation) projects from California, Oregon, and Washington. They identified those methods and approaches that resulted in successful restoration.

The Restoration method, while important, is not typically the primary driver of restoration success or failure. Instead, environmental conditions have a substantial impact on whether or not a project will meet desired outcomes. The authors recommend

that eelgrass restoration follow a five-step process: assessing site suitability, selecting methods, conducting a pilot restoration, conducting a full-scale restoration, and evaluating restoration success using a reference meadow. The report provided the details and motivations for these best practices, while demonstrating their importance in improving knowledge and success of eelgrass restoration across the U.S. West Coast.

The findings of this synthesis can be found [here](#).

A data search tool can be found [here](#) to look at specific restoration projects within the database. ●

Prado Basin Sediment Management and Habitat Restoration

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Orange County Water District (OCWD) owns 2,150 acres behind the Prado Dam within unincorporated Riverside County and referred to as the Prado Basin. The agency operates and manages the 465-acre Prado Wetlands within the basin. OCWD and the US Army Corps of Engineers (LA District) collaborated to temporarily retain water behind Prado Dam. The Prado Basin Sediment Management Demonstration Project (SMDP) was created to deal with the sediment that was continuously building up behind Prado Dam that was decreasing water storage capacity.

In compliance with the Streambed Alteration Agreement with the California Department of Fish and Wildlife (CDFW), OCWD implemented a Sediment Demonstration Project on a 14-acre site on the Santa Ana River, located approximately 1.3 miles upstream of the Prado Dam. Part of the project is a 20-acre dewatering and storage site with four acres of planted in native riparian habitat for the potential impacts associated with annual operations of the Prado

Wetlands. The restoration project serves as partial mitigation for the SMDP.

The project consists of two separate parcels, Site 1 and Site 2. Site 1 is a four-acre plot located in the northeastern corner of the Pheasant Field. Site 2 is a 4-acre plot located east of Site 1 and just outside the Pheasant Field boundary. Site 1 was cleared of vegetation prior to planting with container plants and an irrigation system installed. Site 2 contained existing habitat patches and is currently being weeded by OCWD.

Solutions

Endemic Environmental Services Inc. (Endemic) implemented a native plant restoration project for the Prado Basin.

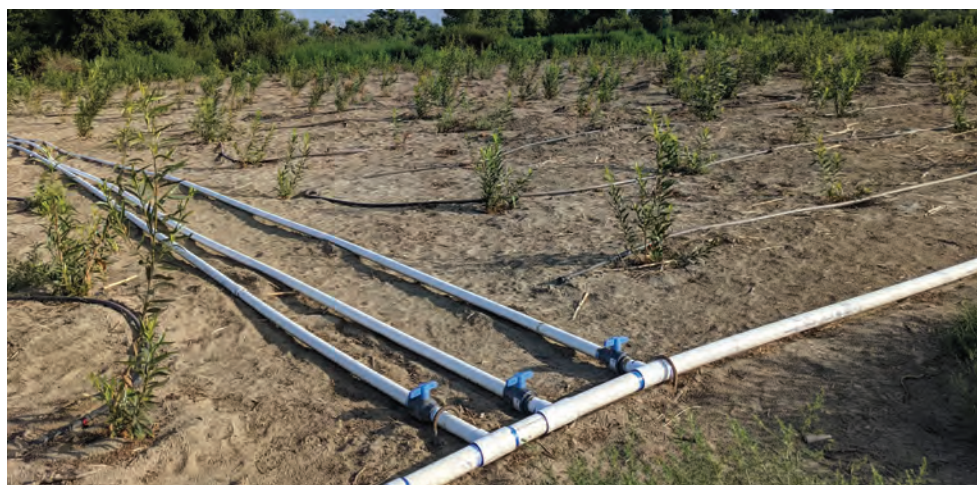
For Site 1, around 4,000 container plants were installed. A drip irrigation system was installed and connected to a large water storage tank provided by OCWD. All plant and irrigation materials were purchased by Endemic for Site 1. We placed deep pole cuttings of Fremont's cottonwood (*Populus fremontii*), black willow (*Salix gooddingii*), and mulefat (*Baccharis salicifolia*) scattered throughout the site. Endemic designed and installed an above ground filtered drip irrigation system at Site 1. The system will supply



each of the 4000 plants with 1-gallon of water within a 2-hour period. The mainline is connected to a 5000-gallon water storage supplied by and placed by OCWD staff along the southern edge of the site prior to planting. The tank is filled with an OCWD water truck. Cam locks are installed at the tank to accommodate a small trash pump which is used to run the system. Brass ball valves are installed and used to control the flow to each station. Two in-line filters (Rainbird) are installed above ground to help reduce clogging of the emitters. Endemic was responsible for purchase of all irrigation system materials.

Endemic will also provide a 90-day Site Maintenance Period for Site 1. This includes keeping the site free of weeds, repairing irrigation, and watering for the first 30 days.

For Site 2, Endemic supervised the planting of 500 8'-10' long pole cuttings consisting of mulefat, willows and cottonwoods. The cuttings were prepared by OCWD prior to project start date. A backhoe or similar piece of equipment with an auger attachment was used to dig holes for the pole cuttings. The cuttings were installed down at groundwater level (~5'-7' deep) and watered in. The cuttings were scattered throughout the site with final placement will be approved by OCWD staff. OCWD provided the pole cuttings for Site 2. ●



Short-Joint Beavertail Cactus Relocation Project

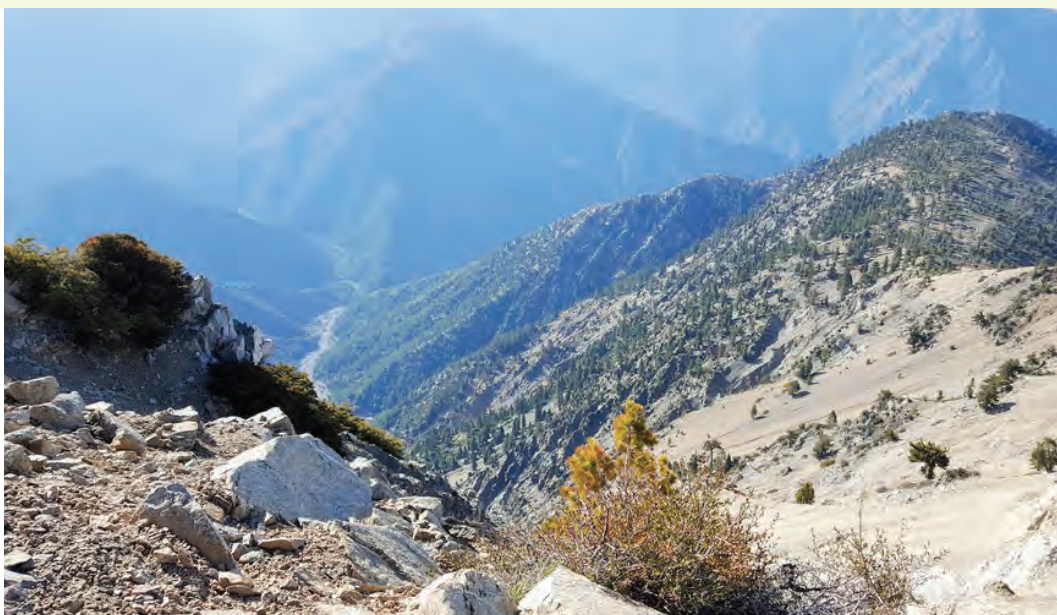
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Endemic Environmental Services (Endemic) supported Huttopia Paradise Springs Properties (Client) in providing preconstruction surveys, rare plant monitoring, oak mapping and monitoring. Included in our efforts was a Short-Joint Beavertail Cactus (SJBT) Relocation Plan for the implementation of the Paradise Springs Campground Improvement Project (Project) located in Valyermo in unincorporated Los Angeles County (County). The Project Site lies at the edge of the Los Angeles National Forest situated in the San Gabriel Mountains. The study area consists primarily of upland vegetation and characteristic chaparral habitat with vegetive associations such as pinyon woodland, riparian area, alluvial creek bed, sagebrush scrub, and scrub oak chaparral. Big Rock Creek lies along the northern boundary of the study area, running from east to west along the site.

Challenges

During preconstruction surveys, rare short-joint beavertail cactus plants



(*Opuntia basilaris* var. *brachyclada*) and protected oaks were observed to be present throughout the Project site. Short-joint Beavertail Cactus (SJBT) is listed as rare or endangered by the California Native Plant Society and the Paradise Springs population is protected under the West Mojave Plan. The cactus range and habitat has declined continuously in past decades.

Short-joint beavertail (*Opuntia basilaris* var. *brachyclada*) was observed during the initial biological

survey in the scrub oak chaparral and sagebrush scrub. Scattered communities of SJBT were also found ubiquitously around the pinyon woodland. The West Mojave Plan allocated the Big Rock Creek Conservation Area as a significant conservation area for SJBT since it is one of the last substantial unfragmented populations, and therefore must be protected. The Big Rock Creek population was established as one of the last remaining populations, located on private land at the old Paradise Springs Camp at an elevation of 1,600 meters. EES provided rare plant surveys, monitoring, and a protection plan in order to ensure compliance in accordance with the proposed Conditional Use Permit (CUP) and per conditions of the California Department of Fish and Wildlife (CDFW), Los Angeles County, and the West Mojave Plan.

Solutions

Endemic was tasked by the Client to develop and implement a Relocation Plan and subsequently follow up with
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Short-Joint Beavertail Cactus Relocation Project



the implementation of this Plan with biological monitoring and reporting.

The purposes of this Relocation Plan were to:

- identify and map pre-existing populations of short-joint beavertail throughout the site;
- identify avoidance and minimization areas and establish Relocation Sites that met the proper conditions for SJBT cactus;
- ensure that mitigation measures were implemented for the SJBT relocation to suitable habitat onsite;
- establish standard best management practices and guidelines for relocating this species.

Endemic's Qualified Biologists identified and flagged all SJBT cactus that would be impacted from future project activities. These cacti were relocated to the designated Relocation Areas, which were determined during the site surveys. These Relocation Areas demonstrated the highest potential for well-drained soils that fit the description and match

the density distribution for the local short-joint beavertail population. Endemic provided biological monitoring services throughout the SJBT cactus relocation process, which included follow up monitoring once the cactus had been relocated to establish and measure qualitative and quantitative success criteria. Biological monitoring reports were delivered to the client on a monthly

basis in order to assess the health and condition of SJBT cactus populations after the relocation.

Endemic also supplied oak mapping and monitoring in compliance with the LA County Tree Protection Ordinance for all oak trees with a trunk of at least 8 inches in diameter measured at 4.5 feet above the natural grade. We identified, flagged, and mapped all protected trees and heritage oak trees, buffers in order to prevent these trees from being impacted from future project activities. Biological monitoring was conducted in the Significant Ecological Areas with high densities of protected oak trees and reports were submitted to the client and all respective agencies. These ecological efforts allowed for the smooth completion of the Paradise Springs Campground Improvement Project while maintaining proper protection and compliance for the sensitive biological resources that were pervasive within the Project Boundaries. ●

