

Summaries of Four Successful Grant Funded Projects

1. Upper Sulphur Creek Restoration, City of Laguna Niguel

Problem Statement: The City of Laguna Niguel participated between 1997-2003 in the Aliso Creek Watershed Management Planning Study, which was conducted by the U.S. Army Corps of Engineers and County of Orange in conjunction with all the Cities and Water Districts located in the Aliso Creek watershed as co-sponsors. The general purpose of the study was to recommend specific projects to improve the quality of the water the watershed is delivers to the ocean, to address infrastructure damage from flooding and erosion; and to enhance habitat and recreational values. Aliso Creek, which is located in the San Juan Hydrologic Unit, is 303(d) listed by the State Water Resources Control Board as impaired for bacteria, biostimulatory nutrients, and toxic pollutants.

The final Watershed Plan specifically identified Sulphur Creek, as Aliso's largest single tributary, as a contributor to poor water quality in Aliso Creek. The designated beneficial uses for Sulphur Creek in the Water Quality Control Plan for the San Diego Basin include REC-2 (existing non-contact recreational use); REC-1 (potential body-contact recreational use); AGR (agricultural supply); WARM (warm freshwater habitat); and WILD (wildlife habitat). Water quality data subsequently collected by the City and County confirm that bacteria and total phosphorus concentrations routinely exceed water quality objectives along most of Sulphur Creek's length. Source identification efforts in one of Sulphur Creek's tributary subwatersheds concluded that pollutant concentrations in the observed ranges are most likely derived from such non-point sources as wildlife and pet waste, organic soil amendments, turfgrass, organic debris, irrigation runoff, and seasonal bacterial propagation in the gutters and storm drain system.

The Aliso Creek Watershed Management Plan recommended riparian and wetland revegetation for habitat restoration and biofiltration along Sulphur Creek to the extent feasible. The Upper Sulphur Creek Restoration Project was proposed in 2003 as a grant project to replace creek segments consisting of concrete low-flow v-ditch with soft-bottom vegetated channel, replace invasive weedy plants with native species, and substitute native plant species to the extent feasible in place of ornamental landscaping along the stream length. The completed project was expected to help reduce fecal bacteria and reduce biostimulatory nutrients loads; increase the area and quality of warm water aquatic and buffer zone habitat; and attenuate flow rates to the downstream creek system.

Specific goals of the Upper Sulphur Creek Restoration Project were:

- To lengthen the creek segments and seasonal timeframes in which dry-weather flow in Upper Sulphur Creek is compliant with the REC-2 fecal coliform objective, and to increase the percentage of receiving-water samples that are compliant with the REC-1 fecal coliform concentration objective.
- To reduce the relative increase in phosphorus and nitrogen loads that appears to typically occur along the project length during dry-weather flow.
- To provide measurable attenuation of low-flow rates along creek segments currently flowing through v-ditches.
- To reduce exotic invasive vegetation and provide increased warm water (WARM) wetland acreage and wildlife (WILD) habitat.
- To reduce the acreage of water-thirsty ornamental vegetation.

Outcome: The Upper Sulphur Creek Restoration Project was undertaken to restore a more natural configuration and improve multipurpose functionality for a 1.5-mile long flood control channel in suburban Laguna Niguel, California.

Design of the project began in Spring 2004 and construction was completed in March 2006. Pre-construction monitoring of vegetative areas, flow rates, bacteria concentrations, and phosphorus/nitrogen concentrations began in February 2005, with post-construction monitoring extending through December 2006.

With two exceptions, evaluation of the monitoring data confirmed that the project overall was very successful in meeting its goals. The project's effectiveness in reducing nitrogen discharge loads appeared to be mixed, and its effectiveness in attenuating the flow rate was not verifiable. The more positive achievements included the following:

- 2,738 linear feet of concrete-lined channel were removed and replaced with widened and vegetated soft-bottom channel.
- Over the 35-acre site, the area of water-thirsty ornamental vegetation was decreased by 5.28 acres and the area of disturbed ruderal vegetation was decreased by 4.19 acres.
- The area of freshwater wetland and riparian habitat was increased by 3.23 acres.
- The site's Hydrogeomorphic Functional Capacity score more than doubled, increasing from 9.43 to 22.60. This scoring system describes improvements in a wide range of hydrologic, biogeochemical and habitat characteristics.
- Summertime fecal indicator bacteria concentrations (for both the fecal coliform group and *Enterococcus*) at the lower end of the project were reduced by 70%+ compared to pre-project conditions.

- Orthophosphate P removal along the length of the restored stream was improved by up to 32% on a concentration basis and by up to 55% on a load basis compared to pre-project conditions.

2. Restoration and Recharge Projects, Lakeside River Park Conservancy

Problem Statement: The Upper San Diego River watershed has historically been impacted by urbanization and increasing impervious surface area, upstream hydro-modification (San Vicente and El Capitan dams), loss of habitat, occasional severe flooding, contaminated runoff from storm water, and at this site, major industrial mining for sand and gravel in the river bed. The land is part of a redevelopment area, located in the unincorporated community of Lakeside in the County of San Diego, detailed in the Upper San Diego River Improvement Plan. The property was acquired by the Lakeside River Park Conservancy using California Coastal Conservancy, Wildlife Conservation Board, Proposition 40 and Flood Protection Corridor funding to restore and reclaim river functions and further the Watershed Management Plan objectives. The focus of this project was the restoration of river channel and natural function along the San Diego River corridor across 100 acres on property that was formerly a sand and gravel mine.

Prior to this project, additional funds had been awarded to the Lakeside Conservancy (FHR Contract sap #4600003315 with Department of Water Resources, cw 03-113-559 with Regional Board) to work in concert on compatible project goals. Since efficiencies of scale were achieved by design and entitlement of one project, the three grants act in synergy to accomplish the River Restoration project described herein. Through efforts to discover a partner to remove dirt fills, Caltrans entered an agreement to utilize this land as a borrow site for the Highway 52 extension slated to begin in 2008. This multi-grant approach both extended the overall project schedule into two phases and expanded the scope of work that could be accomplished.

Grant Objectives included addressing needs identified in the San Diego River Watershed Management Plan. The project goal was to reduce the loss of natural channels and impacts from hydromodification, expand the floodway, and increase wetland acreage and riparian habitat. The project proposed to remove *Arundo donax* and tamarisk, replacing them with natives.

Outcome: Phase I, undertaken by Lakeside's River Park Conservancy, completed five major project elements and addressed vegetation throughout the project area. The project, conducted across 93 acres of the Lakeside River Park Conservancy site and 10 acres of neighboring Hanson Aggregate property in the river channel made significant progress on all three goals of the project.

Water quality has been improved as a result of the projects. Although the new filtration systems are comprised of immature vegetation, they already have demonstrated pollutant reductions in the urban stream course before it enters the river. Habitat acreage has grown. Acres of invasive *Arundo donax* and Tamarisk, along with other non-natives have been eradicated, while thousands of native plants have been installed, and disturbed areas stabilized with native hydroseed. Flood control has increased. With removal of the 90,000 cubic yard river constriction at Channel Road, 100 year flood levels drop four feet. Sediment transport has been advanced with the creation of additional wetlands at the East Pond and West River Channel.

The unique installation approach taken by the Conservancy separated the work of Phase I into one-time work requiring special expertise (general engineering) and ongoing work (water quality monitoring, re-vegetation tasks) that could be performed by trained volunteers and work crews. Working experts handled the technical requirements and trained others to work alongside, advancing the long term capabilities of the Conservancy and producing tremendous results for a truly efficient cost. Over 700 volunteer man hours are a testament to the community investment made here at the River Park.

Public outreach to the community was also extremely popular, with 300 people attending River Day in May 2006 for our general engineering groundbreaking. The River Ranger program in the local high school engaged scientific inquiry here at the park among youth. Following an article in the San Diego Union-Tribune, more than 800 people attended our Phase I Open House Tours in January 2007 to learn of the new systems.

While additional funding is needed to continue scientific discovery as these wetlands systems mature, the early results of the project meet and exceed the assessment criteria. Water quality, habitat and flood control have been increased by Phase I work, while building a strong base of community support and knowledge to carry the River Park forward.

3. Restoration of Riparian / Wetlands Habitat in the Carlsbad Hydrologic Unit, San Elijo Lagoon Conservancy

Problem Statement: All seven main stem streams of the Carlsbad Hydrologic Unit (CHU) have degraded beneficial uses, and all drain to the Pacific Ocean; two have chronic bacteria beach closure problems; and four drains into ecologically significant coastal lagoons (Buena Vista, Agua Hedionda, BatiQUITOS, and San Elijo). This project is a major effort to remove the predominant species of invasive plants and to restore native vegetation in these watersheds as an essential step in reestablishing the hydrologic and ecological functions of these riparian and coastal wetland habitats. The project consisted of a major riparian/wetland habitat restoration, involving removal of invasive exotic plant

species, testing the efficacy of re-vegetation, monitoring the treatment effectiveness, changes in water quality, ecosystem responses and advancing the experience and capacity of nine (9) nongovernmental organizations to plan at the watershed level, as well as the sub-watershed scale.

Short-term goals included mapping non-native invasive plants and native riparian and wetland vegetation; to establishing a baseline for measuring project effectiveness and tracking future conditions of the habitats; effectively removing exotic invasives, using methods that will reduce the likelihood of re-infestation; comparing the efficacy of active and passive re-vegetation approaches; and determining ecosystem improvements after removal of exotic invasive plants

Long-term goals are to restore the ecological function of riparian and wetland habitat within the CHU; educate the public on the connection between individual behaviors and watershed health, engaging them in reducing factors that contribute to the sustaining of exotic invasive species; and advancing the capacity of nine NGO's to plan and implement projects at the watershed and sub-watershed levels.

Outcome: This project treated all of the initial acreage mapped within the CHU: 280 acres. During the project, invasives data were continuously updated in the field, and an additional 280 acres of invasive species were mapped; bringing the total are of invasive species mapped in the CHU to 560 acres. Of the species treated under Proposition 13 funding, 225 acres were Tier 1 species and 55 acres were Tier 2. The project resulted in the treatment of over 60% of the Arundo within the CHU and almost half of the pampas grass mapped in the CHU. By overlapping landowner data with the invasive species data, the project team determined that approximately 444 acres of the 560 total acres of invasive species mapped were on private property. This project has treated almost half of those private properties. This kind of stakeholder involvement is a huge accomplishment and so far the project team has continued this momentum in obtaining more permission for removal under other funding. Based on field observations and the amount of herbicide used, the estimated die-back of Arundo on the first and subsequent treatments was 90% with an average resprout rate of 10%. Die-back was less, and resprout rates greater, in areas of shade and available water (surface water and/or high groundwater). It would likely take four to five years of retreatment to eradicate Arundo stands. The estimated die-back of pampas grass was 95% on the first treatment and 4% on the second treatment. Eradication of pampas grass stands was achieved over the course of the project. For both Arundo and pampas grass stands, the third and fourth retreatments were primarily treating secondary nuisance weeds (e.g., hemlock, mustard, etc.).

Overall, this project was highly effective in treating the invasive plant infestations in the CHU. Given the tenacity of invasive plant species, the effectiveness and

benefits of such treatments may not be seen for many years. The project team has, however, made significant progress through this project in the initial control of the target invasive species and the restoration of the riparian areas within the CHU. By continuing to address new infestations, monitor regrowth, and secure additional funding, this program can continue toward the goal of having seven functional watersheds within the CHU. It is also expected that the strides made in educating the 42 public and community leaders will lead to fewer intentional plantings of invasive species and greater community involvement and support for invasive species control projects.

The Project included the following major accomplishments:

- Mapped and ground-truthed invasive vegetation in the Carlsbad Hydrologic Unit (560 acres).
- Created a GIS database of invasives distribution (available at www.carlsbadwatershednetwork.org and www.sanelijo.org)
- Removed 280 acres of invasive vegetation from public and private land.
- Treated invasive species along 38,235 linear feet of creek.
- Installed 55,624 native plants within selected treated areas (approximately 200 acres)
- Monitored Water Quality at 6 sites (2 stations per site) on 8 occasions between December 2004 and September 2006 for a total of 96 samples (13 constituents).
- Conducted Bioassessment at 6 sites (2 stations per site) in Spring and Fall of 2005 and 2006 for a total of 48 samples.
- Installed six stream and rain gauges on five creeks in the Carlsbad Hydrologic Unit and one water quality station at San Elijo Lagoon.
- Monitored hydrology at six stream gauges on five creeks in the Carlsbad Hydrologic Unit.
- Prepared an Invasive Species Management and Habitat Restoration Plan to guide future efforts in the Carlsbad Hydrologic Unit.
- Raised awareness by making 22 presentations to the general public, sending 3 direct mailings to residents, and making 27 presentations to local and state officials.
- Created Project NIIMBY (No Invasives In My Back Yard) – a program developed to educate landowners on invasives in their landscape.
- Recognized public officials, residents, and community groups who were champions of invasive species removal with annual Weed Warrior Award events.
- Helped develop and distribute the Southern California version of the Don't Plant a Pest brochure.
- Worked with state officials and the legislature in Sacramento to fund additional invasive species programs and to further recognize the importance of invasive species removal projects.
- Developed an interactive mapping tool to allow the public to report areas of invasive infestations via the CWN website.

4. Famosa Slough Wetland Restoration/Fill Removal, Friends of Famosa Slough

Problem Statement: Famosa Slough is a tidal wetland in the Point Loma area of San Diego. It was previously a tidal backwater of the estuary of the San Diego River. It was partially fragmented from the San Diego River by the channelization of the River and construction of Interstate 8. The Slough has been further reduced in size during the last 100 years by incremental fill and development. The site of this project was a three acre weedy field that contained fill dirt, asphalt, and concrete rubble. The primary purpose of the project was to restore prior tidal wetland through the removal of fill material that had been dumped in Famosa Slough.

The short term goal was to remove fill material, return much of the area to wetland, to allow wetland vegetation to colonize over the restored inter-tidal area, and to provide a natural transition to the upland area around the restored habitat. This will improve tidal flushing, expand coastal wetland habitat, restore natural upland habitat, and make the Slough more attractive as a natural park.

The long term goal is to implement the hydrology and biology objectives of the Famosa Slough Enhancement Plan and thereby to improve the Slough as a wetland habitat and a natural park.

Outcome: This project restored 2.2 acres of former wetland to a combination of intertidal area, shallow subtidal area, and tidal channels that provide additional habitat for fish and marine invertebrates. It also converted 1.1 acres of weedy upland to a contoured area with about 1300 wetland, wetland/upland transition, coastal upland plants that are native to the area that will eventually support native birds, insects, and reptiles. The finished project provides 21000 additional linear feet of gently sloping vegetated shoreline for the benefit of salt marsh vegetation, intertidal invertebrates, and foraging fish and shorebirds. Odor issues, floodwater capacity and erosion are also addressed by this project. Finally, the project has improved habitat value for fish and marine invertebrates on the east side of the Slough by improving tidal flushing, which also improves water quality by moderating algae buildups, oxygen levels, temperature conditions, and nutrient levels in the Slough's waters.