



Lake Elsinore & San Jacinto Watersheds Authority



City of Lake Elsinore • City of Canyon Lake • County of Riverside
Elsinore Valley Municipal Water District • Santa Ana Watershed Project Authority

FINAL PROJECT REPORT (December 2012) Proposition - 40 San Jacinto River Watershed Nutrient TMLD BMP Implementation - Wetlands Enhancement Project -



2005-2006 CONSOLIDATED GRANTS – PROPOSITION 40
INTEGRATED WATERSHED MANAGEMENT PROGRAM
(AGREEMENT NO. 06-179-558-04)



FINAL PROJECT REPORT

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State Disclosure Requirements – Include the following disclosure statement in any document, written report, or brochure prepared in whole or in part pursuant to this Agreement:

“Funding for this project has been provided in full or in part through an agreement with the State Water Resources Control Board. The contents of this document do not necessarily reflect the views and policies of the State Water Resources Control Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.” (Gov. Code 7550, 40 CFR 31.20)

Signage shall be posted in a prominent location at Project Site (if applicable) and shall include the State Water Board Logo (available from the Program Analyst) and the following disclosure statement:

“Funding for this project has been provided in full or in part through an agreement with the State Water Resources Control Board.”



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1.0 SUMMARY OF PROJECT

The Lake Elsinore/San Jacinto Watersheds Authority (LESJWA) received a Proposition-40 Grant, in the amount of \$600,000, for a Wetlands Enhancement Project to promote an ecological approach to restoring the beneficial uses of Lake Elsinore. The City of Lake Elsinore, as the lead agency, desired to enhance a portion of the existing 356 acre Back-basin mitigation wetlands area, with the potential for expanding improvements in the future. The California Department of Fish & Game holds a conservation easement over the 356 acre mitigation wetlands area. A substantial portion of the Back-basin mitigation wetlands area does not function or serve the purpose of providing “high quality wetlands habitat”, as intended under the Conservation Easement Grant Deed. The Wetlands Enhancement Project was found consistent with preserving and improving the conservation values of the mitigation area.

Lake Elsinore is the largest natural freshwater lake in southern California and is listed as impaired under the Federal Clean Water Act’s 303d listing. Lake Elsinore has a long and sad history of water quantity and quality problems, caused in part from water diversions upstream and cultural eutrophication. Natural conditions and manmade factors have resulted in severe algae blooms, low dissolved oxygen levels; massive fish kills, sewer type odors (hydrogen sulfide & methane) and die offs of waterfowl due to botulism poisoning. The Santa Ana Regional Water Quality Control Board promulgated a Total Maximum Daily Load (TMDL) program for Lake Elsinore in 2005 to limit nutrient input and correct the impairment.

The cost of nutrient control required to reduce phosphorus throughout the entire Lake Elsinore/San Jacinto River Watershed to the degree required to meet federal/state water quality targets for Lake Elsinore may be unachievable and cost prohibitive. Alternatively, a combination of limiting nutrients in the watershed to the maximum extent practicable, lake aeration, lake-level stabilization and biomanipulation of the food web and vegetative community may be the most rapid and low cost approach to achieve the water quality targets.

Traditionally, excess nutrients have been determined to be the sole causal variable(s) that result in a biostimulatory response to produce nuisance algae blooms. This simplistic view that nutrients alone solely determine the biological response overlooks the complex interaction of the aquatic food web in regulating algae biomass through predator-prey interactions. Limnologist recognize there are two types of stable states for nutrient enriched shallow lakes, like Lake Elsinore, that result in very different environmental outcomes. One stable state is like the current condition of Lake Elsinore,



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in which the vegetative community is dominated by single-celled planktonic algae (like blue-green algae) and the fishery is dominated by planktivores (bait fish like, Threadfin Shad minnows and rough fish, like Carp). This stable state is characterized by turbid water, low dissolved oxygen, fish kills (especially sport fish) and swamp type odors.

In contrast, the more desirable second type of stable state for the same nutrient enriched lake is one dominated by true aquatic plants and piscivores (sport fish). This stable state is characterized by clear water, abundant zooplankton and a high number of sport fish. The key to this stable state's desirable outcome is the high density of large bodied zooplankton that filter feed on algae, as well as the beneficial shelter and sequestering of nutrients provided by aquatic plants.

According to the Conservation Easement Deed for the Lake Elsinore Back-basin Wetlands the "Property is intended to provide high quality wetlands habitat in accordance with the Plan". The fundamental features of "wetlands habitat" are hydric soils and wetlands type vegetation. According to the Biological Reconnaissance Survey Report performed for the Back-basin Prop-40 Grant Project, the only areas containing good growth of riparian and/or wetlands type vegetation occurs along the margins of the islands and some of the channels. Only in these limited areas of the conservation area do the soils either remain hydrated and/or the sunlight can penetrate the turbid waters in the shallow photic zone, where emergent plants can root.

Much of the conservation area consists of large, flat bottomed, open ponds that are not capable of supporting emergent, immersed or floating aquatic plants. These large ponds are too deep and the water too turbid to support emergent and immersed plants that require sunlight nears the sediment. Floating aquatic plants cannot become established, because the large wind fetch results in excessive wind and wave action.

The original Mitigation Plan for the Lake Elsinore Management Project included the condition for 75 acres of willow woodland planted on the dry islands at elevations 1,242 – 1,245' 'MSL. According to the recent Biological Survey, only 9.5 acres of southern willow scrub exists at the site. The water source for this riparian vegetation was intended to be a high groundwater table, with the stipulation that the water level in the wetlands be maintained at 1,240' MLS. Subsequent revisions to Permit No. 88-00215-RRS allowed the lowering of the water level in the wetlands to 1,238'MSL. The lowering of the wetlands water level may have dropped the groundwater table, which in turn reduced the suitable area for riparian vegetation.

The proposed Prop-40 Wetlands Enhancement Project is intended to improve the wetlands habitat and serve as a prototype to evaluate the role of wetlands in supporting



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rehabilitation of Lake Elsinore. The overall goal is to promote hydrated soils and shallow water areas to foster establishment of riparian and aquatic vegetation. Maintaining the land to water ratio for the purpose of conserving water is another important goal of the project, so as not to substantially increase net evaporative loss. The proposed improvements in wetlands habitat, with a diverse aquatic plant community, should promote a more biodiverse wildlife assemblage.

Table 1. Items for Review

Work Item	Items for Review #	% of Work Completed	Date Submitted
EXHIBIT A- SCOPE OF WORK A. PLANS AND COMPLIANCE REQUIREMENTS	A1. GPS information for Project site and monitoring locations	100%	03/30/07
	A2. Project Assessment Evaluation Plan (PAEP)	100%	01/31/07
	Non-Point Source Pollution Reduction Project Follow-up Survey Form		
	A3. Monitoring Plan (MP)	100%	03/30/07
	Monitoring Reports		
	A4. Quality Assurance Project Plan (QAPP)	100%	03/30/07
	A5. Copy of final CEQA/NEPA Documentation	100%	04/20/07
	A6. Land Owner Agreement(s)	100%	04/20/07
	A7. Applicable Permits	100%	10/20/11
EXHIBIT A- SCOPE OF WORK B. WORK TO BE PERFORMED BY GRANTEE	B1.0 Characterize Existing Wetlands Habitat at Proposed Project Sites	100%	04/2010
	B2.0 Construct improvements to expand and enhance wetlands	100%	12/2012
	B2.1 Draft Project Design	100%	10/20/11
	B2.2 Final Project Design	100%	1/20/12
	B2.3 Reconfigure a Portion of the Wetlands	100%	4/20/12
	B3.0 Establish a Diverse Community of Aquatic Vegetation	100%	12/19/12
	B3.1 Plant Aquatic Vegetation	100%	12/19/12
	B3.2 Summary of Identification and Enumeration Aquatic Vegetation	100%	12/19/12



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Work Item	Items for Review #	% of Work Completed	Date Submitted
	B4.0 Increase Public Awareness	100%	12/19/12
	B4.1 Public Awareness Plan	100%	12/19/12
	B4.2 Agenda and Meeting Notes for 6 Meetings	100%	12/19/12
	B4.3 Copy of Website Postings	100%	04/20/12
	B4.4 Photo of Signage	100%	04/20/12
	B4.5 Copy of Presentation Materials	100%	12/19/12
Exhibit B – Invoicing, Budget Detail and Reporting Provisions F. REPORTS	F1 Grant Summary Form	100%	03/30/07
	F2 Progress Reports	100%	01/20/13
	F3 Natural Resource Project Inventory (NRPI) Project Survey Form	100%	1/22/2013
	F4 Draft Project Report	100%	October 2012
	F5 Final Project Report	100%	December 2012

1.1 PROJECT SITE CONDITIONS

Soils on the site consist of Psammaquent, sandy alluvium Dello Series: Dello loamy sand (0 to 5 percent slopes) and Dello loamy fine sand, gravelly substratum (0 to 2 percent slopes). These soils are composed of granitic alluvial material and are somewhat poorly drained. During the 2010 field surveys, conducted by Tom Dodson & Associates (TDA) biologists, sand, gravel, and cobble substrates were noted. The Back-Basin Area (Project Site) was constructed in the mid-1990's by removing soils to build the levee that borders Lake Elsinore and it is visually apparent that the substrates on site consist of a mixture of native soil and excavated fill material from the levee project used to construct the Back-Basin Area of the Lake. Historically, flows from the San Jacinto River once passed through the project area. However, the integrity of the San Jacinto River in the project vicinity has been disrupted by redirection of the river and the construction of levees.

The proposed location for the wetland ponds is sited in an area that consists primarily of disturbed/ruderal habitat dominated by non-native grasses and weedy species. Open water channels, with intermediate wet conditions, border the west-northwest and east-northeast margins of the proposed wetland ponds.



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The habitat type on site is considered non-native grassland that also has scattered botanical elements generally associated with wetter habitats, such as tamarisk (*Tamarix ramosissima*), mule fat (*Baccharis salicifolia*), and saltgrass (*Distichylis spicata*). These species are classified as facultative and/or facultative wetland species, which means that they usually occur in wetlands but are also found in non-wetland habitats. Being classified in the facultative or facultative wetland indicator category does not be equated to degree of wetness on site. For example, saltgrass commonly occurs in southern California with tamarisk and brome (*Bromus* spp.) in pinyon-juniper woodland, deciduous and mixed-forest, desert shrub, lakeshore, salt marsh, and grassland communities. Tamarisk is an introduced, aggressive colonizer that is a facultative species that is equally likely to occur in wetlands or non-wetlands. A few willows are also found growing outside of and peripheral to the project site. These willows are not flourishing and appear to be stressed from lack of water and/or are in the process of senescence.

Although there are a few individuals of species associated with wetter habitats sparsely distributed in the project area, the site conditions and soil characteristics present no indication that riparian, wetland, vernal pool, or alkali meadow habitat exist on site where the new channels are proposed. The project site has a high percent cover of weedy species, such as *Salsola tragus*, *Hirschfeldia incana*, *Bromus madritensis* ssp.*rubens*, black mustard (*Brassica nigra*), redstem filaree (*Erodium cicutarium*), and wild peppergrass (*Lepidium virginicum*), all of which are indicative of disturbance. The ground cover in the project area primarily consists of a mosaic of exposed soils, disturbed/ruderal and non-native annual grasses and forbes, with a few native plant species scattered about.

1.2 LOCATION OF PROJECT SITE

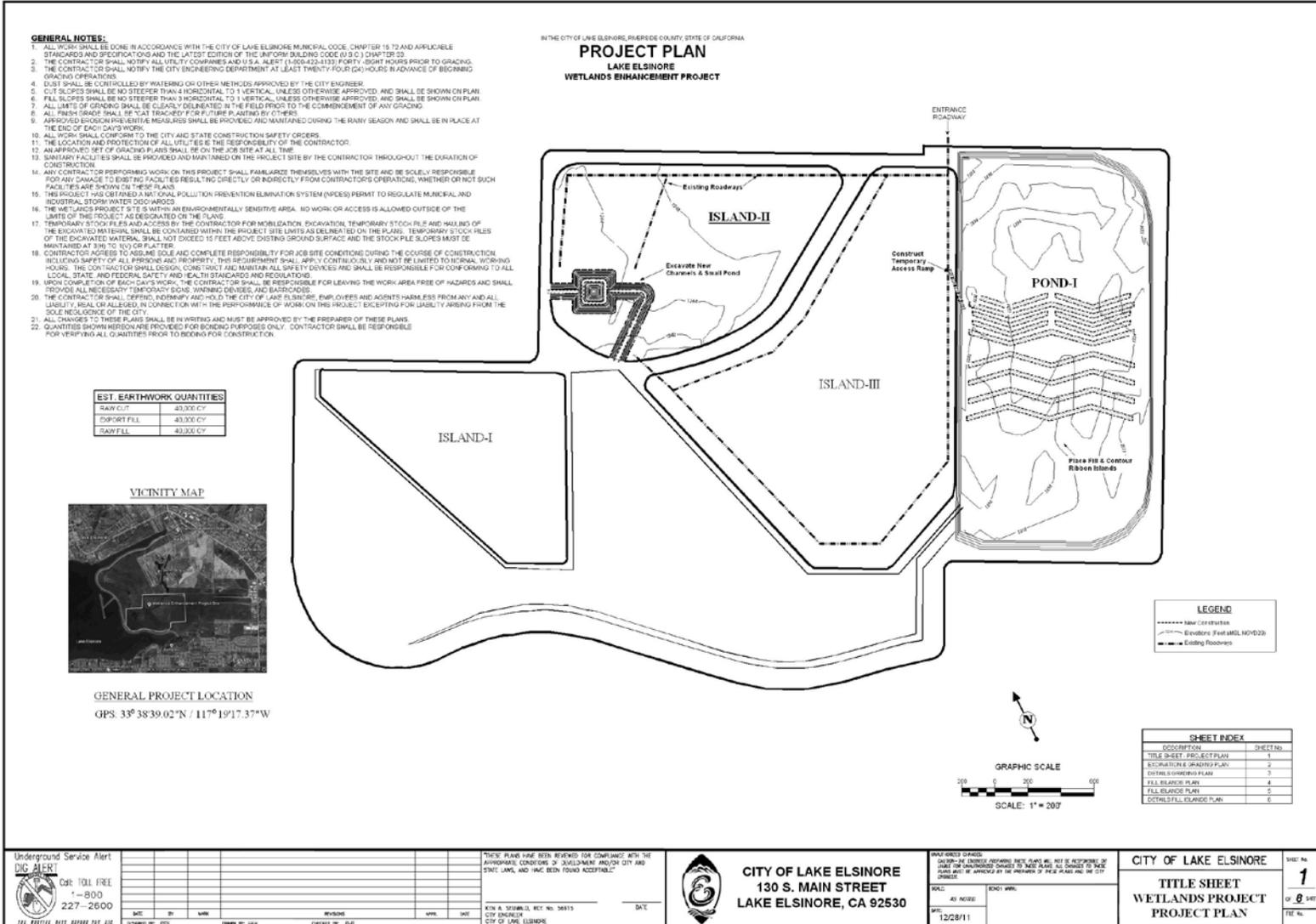
The Wetlands Enhancement Project site is located along the southeastern shore of Lake Elsinore (APNs 371-060-006, 371-050-002 & 371-050-006) within the City of Lake Elsinore, Riverside County, California (see Figure 1). The site can be found within Sections 17 & 20 of Township 6 South, Range 4 West, of the U.S. Geological Survey Lake Elsinore, California, 7.5 minute topographic quadrangle map.

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Figure 1. Project Location Map



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Underground Service Alert
DIG ALERT
Call: 1-800-422-4133
227-2600

DATE	BY	WORK	REVISIONS	APPROVED	DATE

THESE PLANS HAVE BEEN REVIEWED FOR COMPLIANCE WITH THE APPLICABLE ORDINANCES OF JUALUQUENT AND/OR CITY AND STATE LAWS, AND HAVE BEEN FOUND ACCEPTABLE.

FOR A STANDARD REC. NO. 56815
CITY ENGINEER
CITY OF LAKE ELSINORE

CITY OF LAKE ELSINORE
130 S. MAIN STREET
LAKE ELSINORE, CA 92530

APPROVED CONTRACTOR:
CITY OF LAKE ELSINORE
DATE: 12/28/11

CITY OF LAKE ELSINORE
TITLE SHEET
WETLANDS PROJECT
PROJECT PLAN

SHEET No. **1**
OF **6** SHEETS
FILE No. _____



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2.0 PROJECT GOALS

The Lake Elsinore & San Jacinto Watershed Authority (LESJWA) and TMDL Watershed Task Force were formed to unite efforts and ensure that TMDL implementation is organized and systematic. To compliment all projects implemented in the watershed, LESJWA is implementing this Prop-40 Wetlands Enhancement Project to assist in rehabilitation of Lake Elsinore by encouraging a natural ecological balance. Promoting a more natural balance between organisms is an ecological approach to lake rehabilitation. The goal is to balance the high nutrient pollution, sediment re-suspension and algae blooms, by increasing the natural competition for nutrients, trapping of sediment and increasing the predation on algae. Establishment of aquatic plants can help achieve these broad goals.

Aquatic plants provide important habitat for zooplankton, fish and fowl. A plethora of scientific studies have documented the ability of zooplankton, especially large bodied cladocerans, to control phytoplankton blooms. These beneficial zooplankton that graze on algae are easy prey in open waters to the schools of Threadfin Shad minnows found in Lake Elsinore. Zooplankton can find shelter from predators in the mesh of aquatic vegetation. These protected areas usually have high densities of zooplankton, such as copepods, daphnia, ciliates and rotifers whose offspring disperse and continually replenish the open-water areas of a lake. Wetlands act as a nursery for newly hatched fry & fingerlings. These small fish also take shelter from predators among the aquatic vegetation, as they feed on the wealth of zooplankton and insects. Successful breeding sites for many warmwater sportfish are often found near the edge of a marsh or wetland. Birds can also find food and shelter in the small open ponds associated with many wetlands.

The goal of the project is to configure the Back-basin wetlands habitat to promote establishment of riparian and aquatic vegetation, thereby improving the aquatic ecosystem and reducing nutrient re-suspension and algae blooms, while still providing important wildlife habitat. Specific goals and objectives include:

1. Characterize existing habitat at proposed project site.
2. Increase the area for establishment of riparian and aquatic vegetation by 20,000 linear feet.
3. Establish a diverse community of aquatic vegetation that conforms to regulatory norms for the geographic location.



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4. Enhance shallow water habitat to promote sportfish production.
5. Enhance propagation of beneficial filter-feeding zooplankton (especially cladocerans) to support control of phytoplankton.

2.1 TYPE OF HABITAT TO BE CREATED/ENHANCED

This Project proposes to enhance Southwestern scrub (SWS) and wetlands habitat by improving the hydrology of the existing wetlands and revegetating the project site with a hydroseed mix of native alkali grasses, planting of SWS vegetation and planting of wetlands vegetative plants, bulbs, plugs or cuttings.

2.2 FUNCTIONS AND VALUES OF HABITAT TO BE CREATED/ENHANCED

The habitat functions and values to be created will be of a greater value existing at the project site. Currently, the project site provides minimal biological functions and values due to the disturbed nature of the site and hydrology. Habitat functions and values at the project site will be enhanced through creation of SWS and wetlands habitat that will provide improved native vegetative habitat and foraging habitat for bird species at Lake Elsinore. Additionally, the expansion of wetlands vegetation will improve water quality.

3.0 MANAGEMENT MEASURES IMPLEMENTED

The project consists of excavating two new channels and one open water small pond on the existing large Island-II, then utilizing the excavated material to form shallow water islands in the existing large southeast pond. In addition, two existing channels surrounding Island-II are periodically dry, especially during the summer months. This is due to the poor design of the water infrastructure that connects the channels to the wetlands. The dry channels do not support riparian/wetlands habitat. The existing water infrastructure shall be improved in three separate locations to permit water to properly circulate around Island-II. Below are descriptions of key components of the project.

New Channels & Small Pond – Create approximately 2,800 linear feet of riparian shoreline by excavating approximately 850 linear-feet of new channels and 264 square-feet of a small pond on Islands-II. Given the surface water elevation in the Back-basin wetlands area is designated at 1,238' AMSL (above Mean Sea Level), the bottom of the new channels will be excavated to an elevation of 1,234' AMSL to provide a maximum of 4-feet of water depth. The location of the new channels is based on placement at the



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lowest elevations to reduce excavation and to avoid impacts to high value habitat along the existing channel to the southeast of Island-II.

The bottom of the small pond will be excavated to an elevation of 1,230'MSL to provide a maximum water depth of 8-feet. The banks of the channels and pond will be graded to a slope ratio of 4 to 1. The bank of the small pond will be contoured to provide 4-foot wide horizontal reliefs at a 4' water depth to provide additional shallow water areas. A small island will be shaped in the center of the small pond to reduce wind fetch and provide an additional vegetative area.

Excavation, Grading & Hauling – The volume of excavated material from the new channels and pond is estimated at 40,000 cubic yards (CY). The excavated material will be stock piled immediately adjacent (within 100-feet) to the excavation site prior to loading onto dump trucks. The specific stock pile area(s) will be determined in the field by a qualified biologist to reduce impacts to surrounding habitat.

Haul routes from the original construction of the Back-basin wetlands have been maintained and will now be utilized to provide access for heavy equipment to the Back-basin wetlands, the excavation site and placement of material in the large pond to the southeast.

Coffer Dam & Drawdown of Southeast Pond – A coffer dam, with the dimensions of 125' x 16', will be constructed across a channel to isolate the large southeast pond. Drawdown of the southeast pond will begin utilizing portable pumps. Access to the dry bed of the southeast pond will require the construction of temporary earthen ramps into the bank of the shoreline that are 20' wide, with a 12% grade. The City shall temporarily maintain the existing cattail and bulrush vegetation that is located around the margin of the pond by utilizing a water truck, as necessary, until the pond is refilled.

Vegetation Islands – The excavated material will be placed in the dry bed of the southeast pond to form approximately 18,000 linear feet of island slopes for planting aquatic vegetation islands. Dump trucks will place the material in the approximate location. The material will be contoured, graded, compacted and tracked by a bulldozer.

The ribbon islands have a top width of 8-feet and slopes varying from 2:1 up to 4:1. The lengths of the islands are variable and range from about 450 feet to 1,000 feet. The top of the islands will approximate the water surface elevation of 1,238'MSL or below to ensure the soils remain wet. The ribbon islands are generally spaced 35' apart from top to top and 20' apart from the bottom of the slopes.



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Improvements to Water Circulation – Three access road crossings over the channels that are supposed to feed water around Island-II will be partially excavated or removed. An 18” diameter pvc pipe will be embedded into the road crossing at a bottom elevation of 1,234’MSL. The excavation will then be refilled and compacted.

Site Restoration – All disturbed ground that is not a part of the project shall be tracked by a bulldozer and reseeded with native grasses. The temporary earthen ramps to the southeast pond will be removed and graded to the original specification. All access road crossings and coffer dam will be improved or removed to allow proper water circulation into channels and ponds.

Planting of Riparian & Wetland Vegetation – A Planting Plan for the establishment of riparian and wetland vegetation on the new channels and ribbon islands will be developed and implemented for the revegetation of native plants at the project site.

3.1 PLANTING PLAN

Background

In July 1989 the California Department of Fish & Game approved the “Lake Elsinore Management Project – Final Mitigation Plan”. Bullet point No. 13 below describes the planting scheme for the Lake Management Wetlands Mitigation Plan.

13. *“Vegetation planting scheme (subject to agricultural suitability soils tests) for example: the willow woodland islands shall be black willow plants on 10 ft. centers over 50 acres, the margins of the willow plantings shall be planted in mule fat on 10 ft. centers. The minimum acceptable planting material shall be deep containerized rooted cuttings. Cottonwoods shall be mixed in with the willows, with a minimum of 25 cottonwoods per island. Fifty percent of the mainland shoreline shall be planted 100 ft. swathes in black willow, then 100 ft. of bulrush/cattail root, then 100 ft. open, and repeat this scheme.”*

The current Lake Elsinore Prop-40 Wetlands Enhancement Project will generally follow the original planting scheme to maintain the conservation values of the original Lake Elsinore Management Project’s Final Mitigation Plan. In addition, experimental test plantings of a variety of native or regionally naturalized beneficial plants may be planted, based upon availability and funding.

Transplantation of native vegetation that is locally abundant in the Back-basin wetlands area will be used where appropriate. The slopes of the newly excavated channels and

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pond will provide both riparian and wetland zones for planting. The constructed ribbon islands and the protected open water areas in between, will provide areas for establishing wetlands vegetation for emergent, submerged and floating aquatic vegetation. Below are tables showing the primary plantings for each zone. In addition, attached are cross sectional and plan view graphics showing the proposed plantings.

Table 2. Channels & Small Pond - Riparian & Wetland Zones:

Common Name	Scientific Name (<i>Genus species</i>)	Planting Density/Number of Plants
Gooding Willow	<i>Salix gooddingii</i>	1-gal saplings 10-ft o.c. per 2,500 LF channel slope (Max = 250 plants)
Red Willow	<i>Salix laevigata</i>	1-gal saplings 10-ft o.c. per 2,500 LF channel slope (Max = 250 plants)
Fremont Cottonwood	<i>Populus fremontii</i>	5-gal saplings 50-ft o.c. per 2,500 LF channel slope (Max = 50 plants)
Mulefat	<i>Baccharis salicifolia</i>	1-gal 10-ft o.c. per 2,500 LF channel slope (Max = 250 plants)
Mexican Rush	<i>Juncus mexicanus</i>	1-gal 10-ft o.c. per 2,500 LF of shoreline. (Max = 250 plants)
Southern Cattail	<i>Typha domingensis</i>	Plugs in groups of 5 per 50-LF of shoreline over 2,500 LF (Max = 250 plugs)
Common Spikerush	<i>Eleocharis macrostachya</i>	Plugs in groups of 5 per 50-LF of shoreline over 2,500 LF (Max = 250 plugs)
Wire Rush	<i>Juncus balticus</i>	Plugs in groups of 5 per 50-LF of shoreline over 2,500 LF (Max = 250 plugs)

Table 3. Native Seed Mix – Channel slopes & disturbed areas.

Common Name	Scientific Name (<i>Genus species</i>)	Lbs/acre
Western ragweed	<i>Ambrosia psilostachya</i>	2.0
Mugwort	<i>Artemisia douglasiana</i>	2.0
California goldfields	<i>Lasthenia californica</i>	2.0
Alkali heath	<i>Frankenia salina</i>	2.0
Alkali heliotrope	<i>Heliotropium curassavicum</i>	2.0
Salt marsh fleabane	<i>Pluchea odorata</i>	2.0
Willow dock	<i>Rumex salicifolius</i>	2.0
Saltgrass	<i>Distichlis spicata</i>	8.0
California barley	<i>Hordeum brachyantherum ssp. californicum</i>	6.0
Low barley	<i>Hordeum depressum</i>	6.0
Vernal barley	<i>Hordeum intercedens</i>	6.0
Total =		40



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Table 4. Ribbon Islands Wetlands Zones:

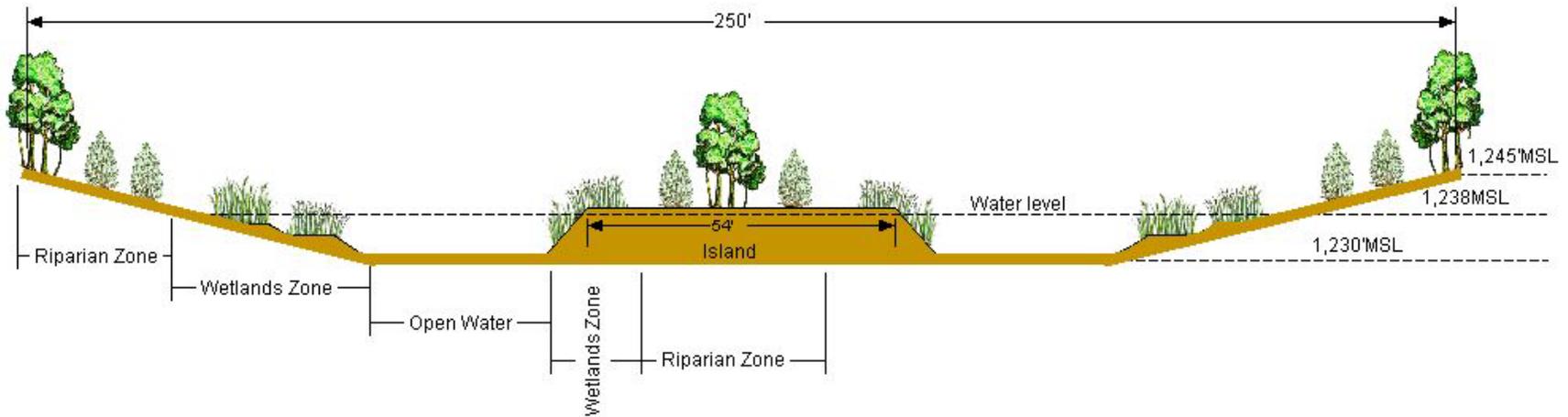
Common Name	Scientific Name (<i>Genus species</i>)	Number of Plants (Plugs)
Wire Rush	<i>Juncus balticus</i>	144,000
Southern Cattail	<i>Typha domingensis</i>	20,735
Brownhead Rush	<i>Juncus phaeocephalus</i>	5,180
Common Spikerush	<i>Eleocharis macrostachya</i>	38,400
Mexican Bulrush	<i>Juncus mexicanus</i>	6,630

3.2 IRRIGATION PLAN

Long-term irrigation is not recommended for this Project. Plants will be kept hydrated by a combination of natural rainfall, as well as re-flooding of newly constructed channels and pond within the greater wetlands area. The proximity of water from the greater wetlands area precludes the need for irrigation system.

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Lake Elsinore - Prop-40 Grant - Wetlands Enhancement Project

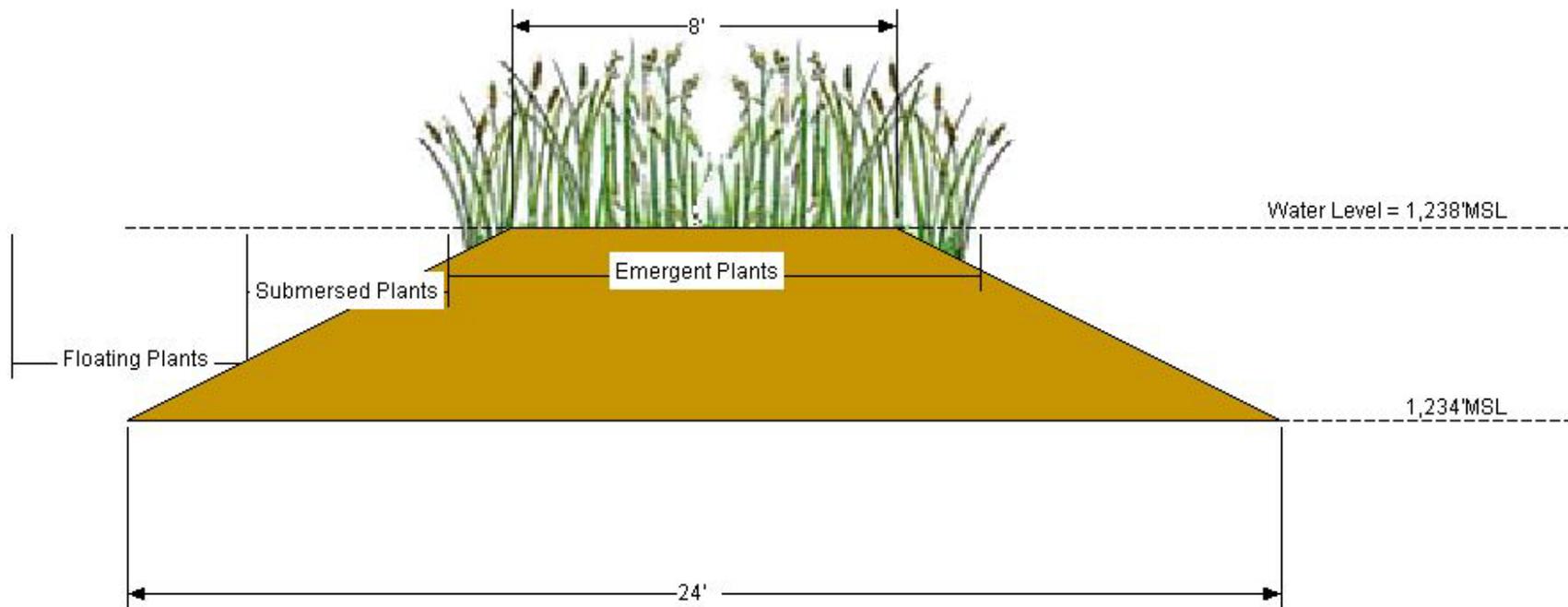


Typical Pond - Cross Section View - Planting Plan

Note: Total Volume per Linear-foot of Pond = 1,733 CuFt = 64.2 CuYd

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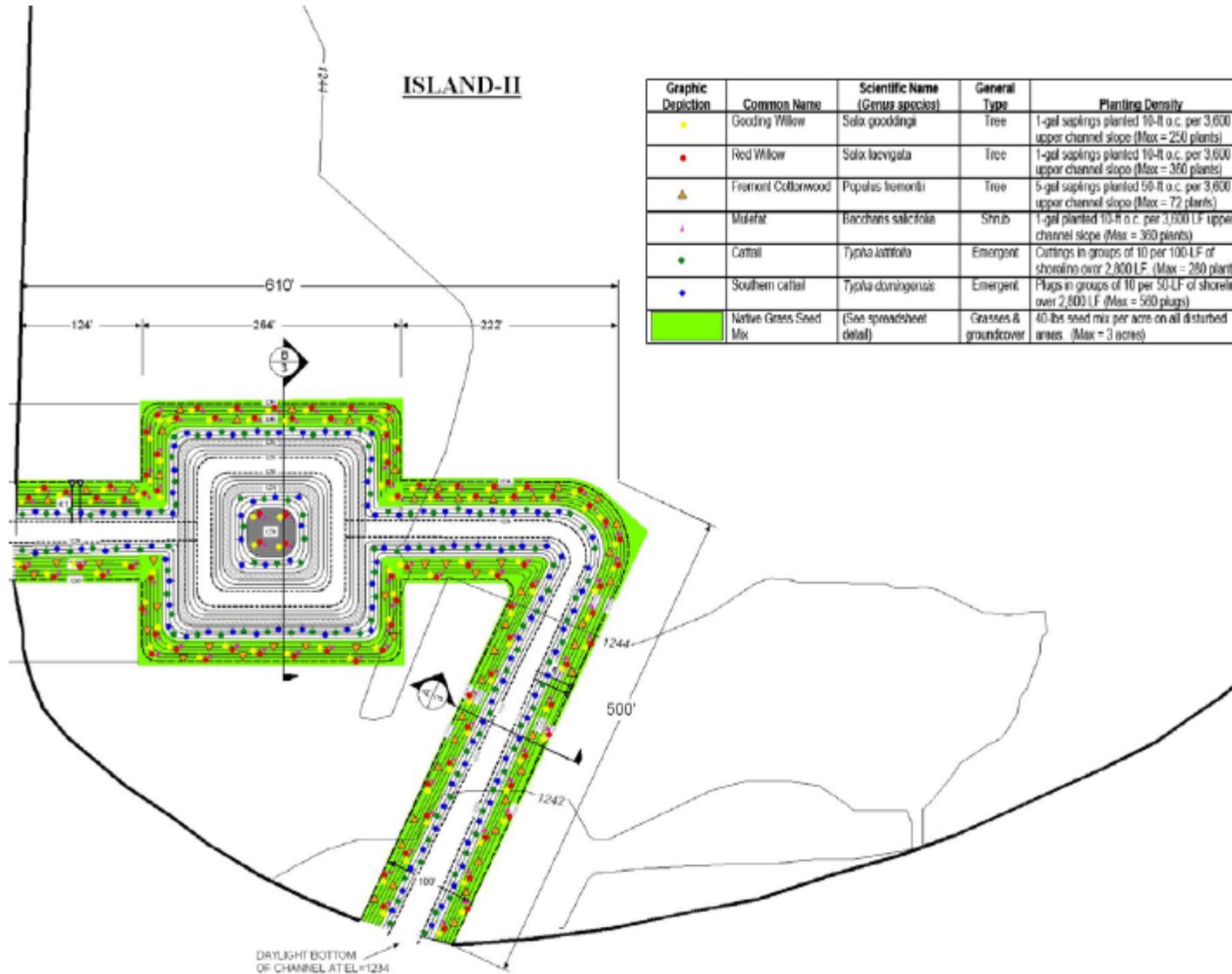
Lake Elsinore - Prop-40 Grant - Wetlands Enhancement Project



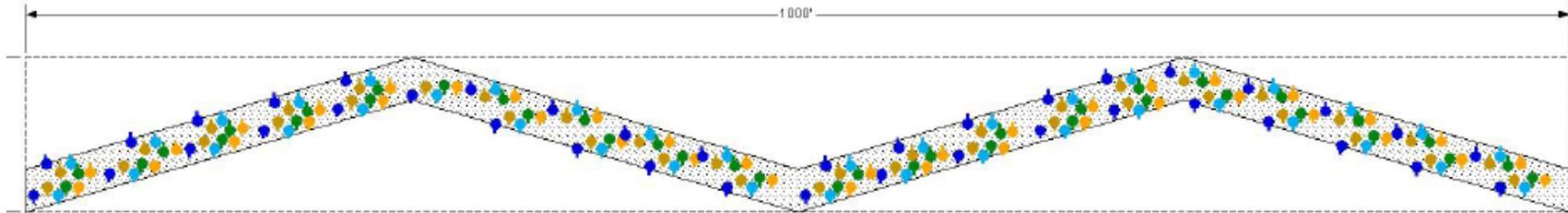
Typical Fill-in Ribbon Island - Section View - Planting Plan

Note: Total Volume per Linear-foot of Fill-in Islands = 2.4 CuYd

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TYPICAL RIBBON ISLAND
PLAN VIEW (Not To Scale)

Graphic Depiction	Common Name	Scientific Name (Genus species)	Number of Plants (Plugs)
	Wire Rush	<i>Juncus balticus</i>	144,000
	Southern Cattail	<i>Typha domingensis</i>	20,735
	Brownhead Rush	<i>Juncus phaeocephalus</i>	5,180
	Common Spikerush	<i>Eleocharis macrostachya</i>	38,400
	Mexican Bulrush	<i>Juncus mexicanus</i>	6,630



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4.0 PROJECT PERFORMANCE

The construction of the new channels and islands in close proximity to water has created the environment for colonization by riparian and aquatic vegetation. Two beneficial uses of Lake Elsinore enhanced by this Project include (WARM) warm freshwater aquatic habitat and (WILD) wildlife habitat.

This Project could restore the degraded habitat back to a native habitat condition and enhance the function of the existing surrounding by converting scattered “pockets” of nonnative vegetation to native vegetation. Restoration and enhancement of this area would increase the habitat continuity and ecological integrity of the area and would provide more functional habitat.

The initial plantings had a low survival rate. The low survival rate of the newly planted aquatic vegetation was caused by submergence in turbid waters shortly after reflooding of the wetlands. The local Water District began reflooding of the wetlands by opening the electronically actuated slide plate valve on the 48” diameter conduit connection to Lake Elsinore. As planned, the Lake-water gravity flowed into the wetlands until filled; however, a mechanic failure occurred when attempting to close this valve. The result of the mechanical failure was the overfilling of the wetlands. At the time, Staff was unsure about the survival of the aquatic plants and had to weigh the high cost of pumping down the excess water against the probability that the aquatic plants would survive the submergence. On the other hand, the low survival rate for the riparian vegetation was caused by poor planting technique and high summer heat. In total, it is estimated that 80% of the plantings did not survive.

Natural recruitment of native plants on the islands was high. During the springtime, the surface waters of the wetlands are covered with floating seeds from the nearby riparian and aquatic plants, including willows, mulefat and cattails.

Similar plantings of riparian vegetation on the new channels shall be made during the fall 2012.



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**TABLE 5: Project Performance Measures for Habitat Restoration Activities
Wetlands Enhancement Project for the Lake Elsinore/San Jacinto River Watershed**

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
<ol style="list-style-type: none"> 1. Increase the area for establishment of riparian and aquatic vegetation. 2. Establish a diverse community of aquatic vegetation. 3. Enhance shallow water habitat to promote sportfish production. 	<ol style="list-style-type: none"> 1. Expand wetlands habitat area for riparian & aquatic vegetation for the benefit of fish and wildlife, as well as the production of beneficial zooplankton as a prototype to support an ecological approach to obtain the water quality targets for Lake Elsinore. 	<ol style="list-style-type: none"> 1. Integrate underutilized terrestrial & large pond areas into wetlands habitat to increase area for establishment of aquatic vegetation to enhance aquatic ecosystem. 	<ol style="list-style-type: none"> 1. Construct riparian & aquatic habitat areas. 2. Promote establishment of riparian & aquatic vegetation by planting native vegetation and promote natural recruitment. 	<ol style="list-style-type: none"> 1. <u>Manual Constructed Wetlands, (Sept 2000),</u> USEPA/625/R/010 	<ol style="list-style-type: none"> 1. Constructed 20,000 linear feet of new riverine habitat for establishment of riparian & aquatic vegetation. 2. Improved infrastructure of existing wetlands to promote hydrated soils. 3. Planted native riparian & aquatic vegetation.



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**TABLE 6. Project Performance Measures for Education, Outreach and Capacity-building Activities
Wetlands Enhancement Project for the Lake Elsinore/San Jacinto River Watershed**

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools & Methods	Targets
1. Provide an understanding of the balance between lake aquatic habitat; nutrient loadings, and water quality concentrations	2. Attendance of multiple stakeholders at LESJWA TMDL Task Force meetings, including representatives of multiple pollutant sources 3. Broad community attendance at meetings of LESJWA 4. Broad press coverage at meetings of LESJWA	1. No. of stakeholders representing a broad spectrum of nutrient sources (e.g., dairies, cropland, urban runoff) 2. No. of residents attending LESJWA meetings 3. No. of newspaper articles and media coverage	1. Increasing knowledge of impacts of nutrient loading to the lake, in terms of aquatic life and habitat. 2. Broad understanding of lake beneficial uses, and holistic plan for overall lake improvement 3. Broad understanding of the purpose and beneficial uses of wetlands.	1. LESJWA & TMDL Task Force Meetings Attendance Sign-in Sheets. 2. LESJWA Board Meeting Presentation. 3. Published News Articles.	1. Multiple staff of municipal agencies and representatives from agriculture/dairies informed the importance of wetlands to water quality. 2. Two local newspaper articles featuring project. 3. Public access and viewpoint of wetland, with useful signs describing wetlands and their beneficial uses
1. Provide public access and education of beneficial uses of wetlands.	1. Public access with signage including information on wetlands for public education & Agency Website.	1. Number of public access points and availability of educational material.	1. Broad understanding of the purpose and beneficial uses of wetlands.	1. Public access and viewpoint of wetland, with useful signs describing wetlands and their beneficial uses.	1. Installed Interpretive Project Sign at wetlands. 2. Project featured on City website.



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5.0 LESSONS LEARNED

Riparian plantings in southern California that are planted in the spring need to be frequently irrigated until the roots are deep enough to reach the water table. Alternatively, riparian plants can be planted during the rainy season.

6.0 PUBLIC OUTREACH

Progress and benefits of the Project were presented to the TMDL Task Force at six meetings. The TMDL Task Force consists of appointed and elected representatives from the following agencies/parties: US Air Force (March Air Reserve Base), March Joint Powers Authority, California Dept. of Transportation (Caltrans), California Dept. of Fish and Game, the County of Riverside, the Riverside County Flood Control and Water Conservation District, Eastern Municipal Water District, Elsinore Valley Municipal Water District, Western Riverside County Agricultural Coalition, and the cities of Lake Elsinore, Canyon Lake, Hemet, San Jacinto, Perris, Moreno Valley, Murrieta, Riverside and Beaumont. City of Hemet, City of Moreno Valley, City of Canyon Lake, City of Murrieta, and the City of Lake Elsinore.

Local newspapers were notified about the project, which resulted in several articles.

The Project is featured on the City's website at www.lake-elsinore.org.

A PowerPoint Presentation about the Project was provided at a public meeting of the Lake Elsinore/San Jacinto Watersheds Authority (LESJWA) Board.

7.0 SUMMARY PROJECT FUNDING

The total project cost was \$879,775. Funding for the project was provided by the State Water Resources Control Board and came from Proposition 40, the California Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act of 2002.

Matching funds in the amount of \$279,775 were provided in excess of the 25% percent grant requirement by member agencies of the Lake Elsinore/San Jacinto Watersheds Authority (LEJWSA) in the form of complimentary in-lake nutrient TMDL monitoring by Elsinore Valley Municipal Water District (EVMWD). The matching funds also include funding for the Evaluation of In-Lake Projects Nutrient Reduction Potential, which is also performed and funded by EVMWD.



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Table 7. Source of Funding

State Prop-40 Grant Funds	= \$600,000
In-Lake Monitoring 2006/07 (EVMWD)	= \$144,375
In-Lake Monitoring 2007/08 (EVMWD)	= \$115,500
<u>In-Lake Projects Nutrient Reduction Study (EVMWD)</u>	<u>= \$ 19,900</u>
Total Budget (% Funding Match)	= \$879,775 (31.8%)

8.0 FUTURE ACTIVITIES

The establishment of aquatic vegetation around the margins of Lake Elsinore has been identified as part of the restoration measures for Lake Elsinore. LESJWA and the City of Lake Elsinore, in consultation with the California Department of Fish & Game, intend to continue to monitor and augment the vegetative plantings in the wetlands for the next four years, with the expectation of transferring the “lessons learned”, along with the aquatic plants, to the Lake.

The beneficial aspects of this project relative to biological resources include the expansion of the fresh water marsh and riparian habitats, and decreases in the non-native grassland habitat. However, with a larger inundation area, there is some potential for the expansion of water tolerant noxious weeds such as tamarisk and non-native amphibians such as bull frogs. Therefore, the City, in coordination with the resource agencies, will implement a long-term habitat and wildlife monitoring plan that includes an exotic species removal program.

9.0 LIST OF APPENDICES

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Appendix A. Photos of Project Stages

1. Dewatering of Project Site.



2. Excavation & Earthwork.



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Appendix A. Photos of Project Stages

3. Excavation & Earthwork.



4. Hydroseeding with Native Seed Plants.



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Appendix A. Photos of Project Stages

5. Hydroseeding with Native Seed Plants.



6. Planting native vegetation by the volunteers.



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Appendix A. Photos of Project Stages

7. Planting native vegetation by the volunteers.



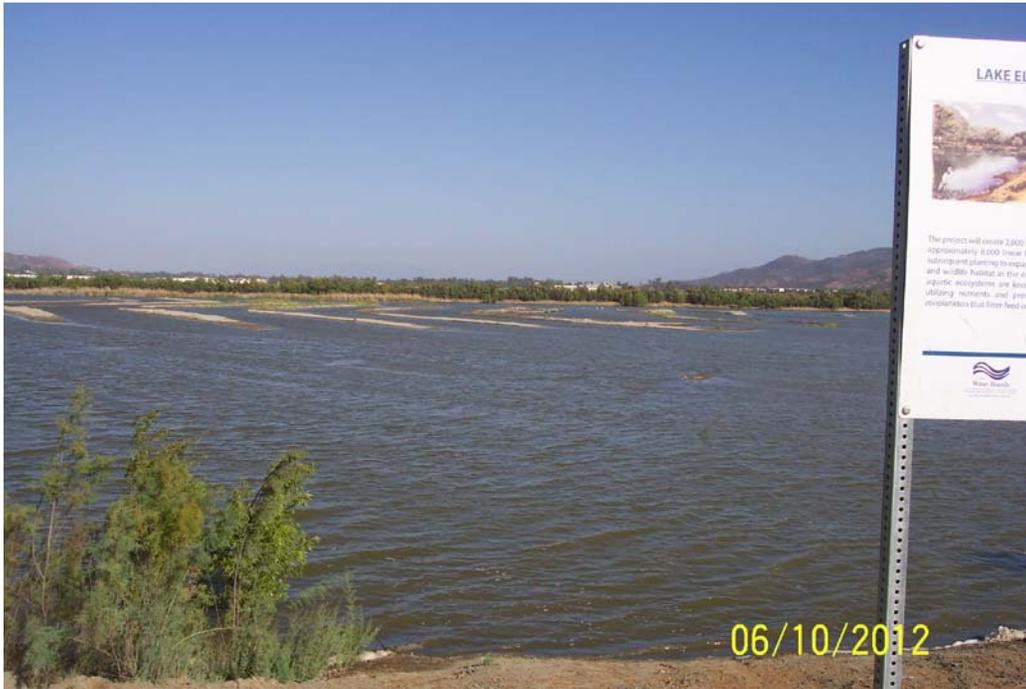
8. Reflooding of Wetlands.



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Appendix A. Photos of Project Stages

9. Re-flooding of Wetland's Ribbon Islands.



10. Improved water infrastructure to increase water to existing channel.



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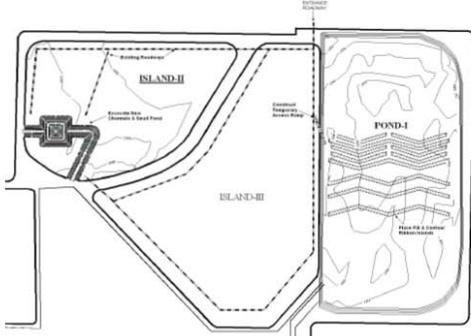
Appendix B. Photos of Interpretive Project Sign

LAKE ELSINORE WETLANDS ENHANCEMENT PROJECT



The **STATE WATER RESOURCES CONTROL BOARD** provided a voter approved Proposition-40 Grant of \$600,000 to the **LAKE ELSINORE/SAN JACINTO WATERSHEDS AUTHORITY (LESJWA)** for the purpose of implementing an efficient and cost effective Best Management Practices (BMP) strategy to help address Lake Elsinore's nutrient Total Maximum Daily Load (TMDL) to improve water quality. The **CITY OF LAKE ELSINORE** is the local lead agency implementing the project.

The project will create 2,800 linear feet of riparian channels and approximately 8,000 linear feet of ribbon shaped islands for subsequent planting to expand riparian and aquatic vegetation and wildlife habitat in the existing wetlands area. Biodiverse aquatic ecosystems are known to improve water quality by utilizing nutrients and providing shelter for large bodied zooplankton that filter-feed on algae.









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Appendix C. News Articles

Lake Elsinore

LAKE ELSINORE

LAKE ELSINORE: Volunteers to replant wetlands



APRIL 26, 2012 6:00 PM • BY MICHAEL J. WILLIAMS
MWILLIAMS@CALIFORNIAN.COM

More than 100 members of area Mormon churches will be trucked out to Lake Elsinore's back basin Saturday morning to replant a section of the area with native vegetation.

The work on the southeastern side of the lake is part of the city's wetlands enhancement project,

Lake Director Pat Kilroy said.

Environmental officials required the city to rejuvenate about 20 acres of wetlands in the basin to offset potential damages to habitat on the opposite side of the lake resulting from construction of a massive boat launch.

The wetlands enhancement involved resculping the ground so it will regain its character as a marsh habitat. Created with the installation of a flood-protection levee by the [U.S. Army Corps of Engineers](#), the basin has been deteriorating in quality in recent years, Kilroy said.

"It's a huge feat to not only do the earthwork construction, but to be able to plant 7,000 aquatic and riparian vegetation specimens," Kilroy said. "It's wonderful to be a part of improving habitat. I think a lot of the wetlands no longer was functioning as wetlands."

Planting of the bulbs, shrubs, reeds and trees will be done in one fell swoop Saturday with the help of volunteers from [Church of Jesus Christ of Latter-day Saints](#) congregations in [Lake Elsinore](#), [Perris](#) and surrounding communities, said [George Kramer](#) of Lake Elsinore, who is helping to organize the work brigades.

While that work is going on, other volunteers will be staying behind at the staging area, [The Diamond](#) stadium, to help fill bags with rice and beans for distribution by the Lake Elsinore nonprofit HOPE.

Still more volunteers will be cleaning up properties with [Habitat for Humanity](#) in Menifee, among many other projects, Kramer said.

He estimated there could be as many as 150 workers going out to the back basin. Having so many people out there will be a rare sight, because that section along the levee is off-limits to vehicles unless authorized by the city.

"We've asked each person to contribute at least three hours," Kramer said. "If each person can plant about a dozen plants an hour, we'll get done before noon. We'll have some people that will be able to knock out way more than that."



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Kramer said the work take place rain or shine.

"We have a lot of people who are doers," he said. "We'll stay out there till the cows come home."

The hope is that the new vegetation will spread and the area will become a wetlands garden where striplings can be transplanted elsewhere around the lake, Kilroy said.

"This project will help establish native plants in the back basin area," he said. "It's mainly going to be cattails, bullrushes and various species of those, and also willows and cottonwoods.

"I think there's a high likelihood of success. Lake Elsinore was actually a cottonwood and willow woodlands, so this is consistent with that."

The wetlands work is occurring as progress continues on the [boat launch](#). That work started last summer and is expected to wrap up in June.

City officials are looking to hold a celebration June 30 for the opening of the six-lane, 400-foot-long ramp accompanied by two floating docks, a parking lot, restrooms, fish-cleaning station, and picnic and beach area.

"It's moving along pretty good, actually," project manager Peter Ramey said of the \$8.3 million project.

Appendix C. News Articles

LakeElsinore-WildomarPatch 65°

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Q

Breaking: Plane Crash Report In Southwest Riverside County Turns Out To Be "Loud Bang" »

[Local Connections](#), [Awareness](#)

LDS Members To Sow Plants In Lake Elsinore

The Menfee Stake of the Church of Jesus Christ of Latter-Day Saints will send volunteers Saturday to plant water vegetation in a 65-acre wetlands basin at the south end of Lake Elsinore.

By [Mirna Alfonso](#) | [Email the author](#) | April 28, 2012

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Related Topics: [Wetlands](#) and [aquatic plants](#)



A service project in Lake Elsinore today will receive volunteer assistance from members of the Menfee Stake of the Church of Jesus Christ of Latter-day Saints.

The city of Lake Elsinore will enlist five wards (congregations) from the Stake as far away as Perris, to help plant aquatic vegetation in a 65-acre wetlands basin (now de-watered) at the south end of the city, according to George Kramer, with the church's public affairs council.

In conjunction with this activity, the Stake is donating 500 pounds each of rice and beans, so a portion of the expected 200 volunteers will be bagging these goods on behalf of H.O.P.E., a local charity, Kramer said.

April 28 has been designated as the Mormon Helping Hands Day of Service statewide in both California and Hawaii, he said.

The long term lake rehabilitation plan calls for establishing aquatic vegetation around the margins of the Lake. Aquatic vegetation is known to improve both water quality and habitat, according to church officials.

The Wetlands Enhancement Project is an important first step toward achieving this long term goal.

The Wetlands Enhancement Project will serve both as a prototype and as a future seed area for native aquatic vegetation to be transplanted to the margins of the lake, officials said.

City officials expressed gratitude to the church for its contribution.

"The planting of over 5,700 aquatic plants by the volunteers of the Church of Jesus Christ of Latter-day Saints to improve water quality is a huge benefit to the surrounding community of people and wildlife," said Pat Kilroy, director of the Lake, Parks & Recreation Department.

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Appendix D. Webpages by City of Lake Elsinore

Wetlands Enhancement Project

State Proposition 40 - Water Boards Grant

LAKE ELSINORE WETLANDS ENHANCEMENT PROJECT

The State Water Resources Control Board provided a voter approved Proposition-40 Grant of \$600,000 to the Lake Elsinore/San Jacinto Watersheds Authority (LESJWA) for the purpose of implementing an efficient and cost effective Best Management Practices (BMP) strategy to help address Lake Elsinore's nutrient Total Maximum Daily Load (TMDL) to improve water quality. The City of Lake Elsinore is the local lead agency implementing the project.



The project created 2,800 linear feet of riparian shoreline and approximately 18,000 linear feet of new island shoreline for subsequent planting to expand riparian and aquatic vegetation and wildlife habitat in the existing wetlands area. Biodiverse aquatic ecosystems are known to improve water quality by utilizing nutrients and providing shelter for large bodied zooplankton that filter-feed on algae.



The cost of nutrient control, primarily phosphorus, throughout the entire Lake Elsinore/San Jacinto River Watershed to the degree required to meet federal/state water quality targets for Lake Elsinore may be unachievable and cost prohibitive. Alternatively, a combination of limiting nutrients in the watershed to the maximum extent practicable, lake aeration, lake-level stabilization and biomanipulation of the food web and vegetative community may be the most rapid and low cost approach to achieve the water quality targets.

Traditionally, excess nutrients have been determined to be the sole causal variable(s) that result in a biostimulatory response to produce nuisance algae blooms. This simplistic view that chemicals solely determine the biological response overlooks the complex interaction of the aquatic food web in regulating algae biomass through predator-prey interactions. Limnologist recognize there are two types of stable states for nutrient enriched shallow lakes, like Lake Elsinore, that result in very different environmental outcomes. One stable state is like the current condition of Lake Elsinore, in which the vegetative community is dominated by single-celled planktonic algae (like blue-green algae) and the fishery is dominated by planktivores (bait fish like, Threadfin Shad minnows and rough fish, like Carp). This stable state is characterized by turbid water, low dissolved oxygen, fish kills (especially sport fish) and swamp type odors.

In contrast, the more desirable second type of stable state for the same nutrient enriched lake is one dominated by true aquatic plants and piscivores (sport fish). This stable state is characterized by clear

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water, abundant zooplankton and a high number of sport fish. The key to this stable state's desirable outcome is the high density of large bodied zooplankton that filter feed on algae, as well as the beneficial shelter and sequestering of nutrients by aquatic plants.

The project consisted of several phases, as pictured below.

1. Dewatering of Project Site.



2. Excavation & Earthwork.



3. Hydroseeding with Native Seed Plants.



4. Planting Native Plants by the volunteers from the Church of Jesus Christ of Latter Day Saints.





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Appendix E. Plant Identification