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Final Report

MOSS LANDING POWER PLANT OFFSITE MITIGATION IMPLEMENTATION AT DOLAN RANCH, MOSS LANDING, CA

May 15, 2016

Prepared for Dynegy Moss Landing LLC

in cooperation with

Monterey County Agricultural & Historical Land Conservancy

The Dolan Family

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Dolan Ranch South Finger Mitigation Site, May 2015

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EXECUTIVE SUMMARY

This report describes the planning, implementation and successful completion of wetland mitigation required of the Moss Landing Power Plant after disturbances to wetlands during tank removal operations at the plant. The Coastal Development Permit was issued in 2002, and the mitigation and restoration has been ongoing since 2006. The restoration and monitoring has entailed a very significant amount of effort over 10 years. All Permit Conditions and Success Criteria required under the Coastal Development Permit have been met, and the restoration has been an unqualified success.

After an extensive site selection process, Dolan Ranch, next to the Moro Cojo Slough, was chosen for the off-site mitigation. The mitigation site is on a conservation easement purchased by Monterey County Agricultural & Historical Land Conservancy from the landowner. MLPP funded a portion of this easement purchase. Disturbance to small, isolated wetlands at the power plant was mitigated by creating and enhancing larger wetlands, which are also contiguous with the wetlands of the main slough.

Mitigation was focused in two swales or small valleys cutting into the Dolan Ranch: South and North Fingers. South Finger was used as a parking and staging area for the farm, and had only a few patches of Arroyo willows, isolated native plants, and no riparian corridor. A natural riparian corridor was restored here. The North Finger was an established, albeit degraded corridor of Arroyo willows, which was significantly enhanced.

The power plant drains into the mouth of the Moro Cojo. The Ranch is located further up the slough in critically important wetland habitat as indicated by three endangered species of amphibians: the Santa Cruz Long Toed Salamander, California Tiger Salamander and Red Legged Frog. The mitigation improved habitat for all three species, and the larvae of one (Red Legged Frog) was found in the newly created pond in the South Finger, where surrounding wetland and upland habitats were established.

The new riparian corridor is used extensively by a large number of bird species that were monitored throughout the project (113 species in both Fingers). Tracks and scat of deer, raccoon, coyotes and bobcats were observed and indicate a well-developed food web. In the North Finger, additional species were planted to increase habitat complexity and diversity- mostly cottonwood trees and native sedges improving habitat value for many animals, including the endangered amphibians. Soil erosion and transport to the conservation easement and mitigation site was reduced with the cooperation of the farmer, who encouraged the spread of willows further into the swale. This upper section captures farm soil much like a sediment retention basin, and the willows rapidly spread into erosion scars and especially layers of eroded soil deposited in the willow thickets. Also, a concentrated effort was made to work with the farmer to prevent or reduce gully erosion along the sides of the riparian corridor, and to improve the habitat/farm borders throughout the ranch to reduce soil erosion.

In 2014, the tide gates at the mouth of the slough broke and seawater filled the extremely dry Moro Cojo Slough from the mouth to the head beyond the Dolan Ranch. Within weeks, the slough water adjacent to the ranch was 40 ppt, higher than ocean salinity. This had a devastating and largely undocumented impact on these critical freshwater ecosystems and the endangered amphibians. Salt water did not reach either finger (riparian corridor), which provided a refuge from the high salinity stress. In South Finger, the new road and culvert system prevented salt water intrusion to the new wetland, which would have been filled with salt water at least in the large pond where the amphibians breed.

Therefore, the Dolan riparian corridors (mitigation sites) provide critical refuge from saltwater stress to the main slough; they have considerably greater habitat value than the isolated, small wetlands disturbed at the power plant; they are protected in a conservation easement; and they are more protected from farm erosion than they were previously. This is a highly successful wetland mitigation and restoration.

I. INTRODUCTION

In 2000, Moss Landing Power Plant (MLPP) received a permit for the demolition of 19 fuel oil tanks at the Power Plant. Condition 12 of the Combined Coastal Development and Use Permit (PLN990233) required MLPP to perform environmental mitigation for the significantly degraded and small isolated wetlands that were disturbed during the removal of the fuel oil tanks and a wetland mitigation and enhancement plan to improve the biological and ecological values of nearby offsite wetlands and migratory corridors. A Duke Energy Mitigation and Enhancement Plan dated May 2002 (Melanie Mayer Consulting [MMC] 2002) was submitted and approved by the Monterey County Planning Department and the California Department of Fish and Wildlife (CDFW); the 2002 plan describes MLPP's strategy to meet the requirements of Condition 12 of the Combined Coastal Development and Use Permit.

The Moss Landing Power Plant has had several ownership changes during this mitigation project. MLPP was owned by Duke Energy Moss Landing, LLC when the Coastal Development permit was approved. On May 4, 2006, MLPP was purchased by LS Power and the Power Plant's name was changed from Duke Energy Moss Landing, LLC to LSP Moss Landing, LLC. On April 7, 2007, Dynegy Moss Landing, LLC subsequently purchased MLPP. Through the purchase and sale agreement, Dynegy, Inc. has assumed the tank farm demolition Combined Coastal Development and Use Permit as well as the requirement to complete the required environmental mitigations.

CDFW set a minimum of ratio for replacement of lost wetlands in this project at two mitigation acres for each acre lost (Anderson, pers.com.); thus a site had to be selected to support 12.78 acres of wetland enhancement. The 2002 Duke Energy Mitigation and Enhancement Plan (MMC 2002) established specific criteria for prioritizing mitigation sites within the Moro Cojo Slough watershed that were most consistent with both the type of habitat impacted by the fuel tank removal project and the 1996 Moro Cojo Slough Management and Enhancement Plan (MCSME, Habitat Restoration Group 1996). The 12 criteria in the MMC 2002 plan established that the selected site needed to be both ecologically valuable and that landowners demonstrated some interest in working with MLPP to develop a management agreement (Table 1).

Before the final site, Dolan Farm, was selected for mitigation, approximately 6 sites near the power plant in the Moro Cojo Slough watershed were targeted for investigation. Each of these failed because landowners decided they did not want to mitigate on their land. Negotiations continued for almost a year on a site managed by a local land trust. A neighbor to MLML (Moon Glow Dairy) offered his land as last resort, if a better property was not located. The dairy site and the others presented in the 2002 Duke Energy Mitigation and Enhancement Plan did not have as much habitat restoration and enhancement opportunities as the final site, so the delay of about a year (2006-2007) led not only to an exceptional local site as well as good partnerships that will enable management of the site into the future.

TABLE 1. SITE SELECTION CRITERIA FOR THE DOLAN PROPERTY.

Criteria	Description	Analysis of Dolan Property
Cooperative Ownership	Willingness of landowners to participate	Excellent- Dolan has signed a commitment to place the parcel under a conservation easement.
Sustainability	Stable and enduring land use and tenure	Excellent- Conservation easement will be overseen by Monterey Agricultural and Historical Trust in perpetuity.
Hydrology/ Wetness	Hydrologic patterns suitable for wetland persistence	Very Good- There is greater drainage area into the Dolan site than into all sites previously considered, i.e., it will be the wettest for the longest period of time.
Wildlife Habitat	Potential to support a diversity and quantity of wildlife species	Excellent- The large size of the Dolan parcel and the adjacent wetlands of the Moro Cojo Slough insure a higher diversity of species (habitat area is the most significant landscape factor determining species diversity).
Wetland Flora	Potential to support a diversity and quantity of wetland plant species	Excellent-The large size of the Dolan parcel and the adjacent wetlands of the Moro Cojo Slough insure a higher diversity of species (habitat area is the most significant landscape factor determining species diversity).
Threatened and Endangered Species	Contains elements needed to support listed species and is nearby sites known to have listed species	Excellent-Santa Cruz long-toed salamanders, red legged frogs, and tiger salamanders occur nearby the Dolan easement.
Wildlife Corridor/ Contiguousness	Potential to improve habitat between intact habitats to create a larger one	Excellent-The Dolan conservation easement is contiguous with several hundred acres of degraded wetlands in the slough which also can be enhanced
Number of Acres for Mitigation	Size of parcel	Excellent-MLPP's mitigation site (12.78 acres) is a key piece of a larger protected area. Entire Dolan conservation easement is 122 acres.
Groundwater Recharge	Potential to contribute to groundwater recharge	Very Good-Sandy soils on the upper portion of the site are ideal for groundwater recharge
Soils	To what extent will soils at the site support creation of a wetland	Very Good-The lower portions of the site are historic wetland soils.
Consistent with Area Planning	Is mitigation of the site in line with existing plans?	Site is consistent with both the 1996 Moro Cojo Slough Restoration and Enhancement Plan and the approved 2002 Duke Energy Wetland Mitigation and Enhancement Plan.
Proximity to MLPP Wetlands	Distance to MLPP's on-site wetlands	Good-The Dolan site is 2.3 miles from the on-site wetlands at the Moss Landing Power Plant.
Regional Need	How important is the restoration of the mitigation site relevant to regional needs.	High-The site is part of a significant arm of the Moro Cojo Slough, the largest restorable freshwater wetland on the central coast.

In 2006, the Monterey County Agricultural & Historical Land Conservancy (Ag Trust) negotiated with the Dolan family to place habitat (122 acres) and agriculture (281 acres) conservation easements on adjacent parcels in the upper Moro Cojo watershed (Figure 1). The purpose of the habitat conservation easement is to "enhance and protect the natural

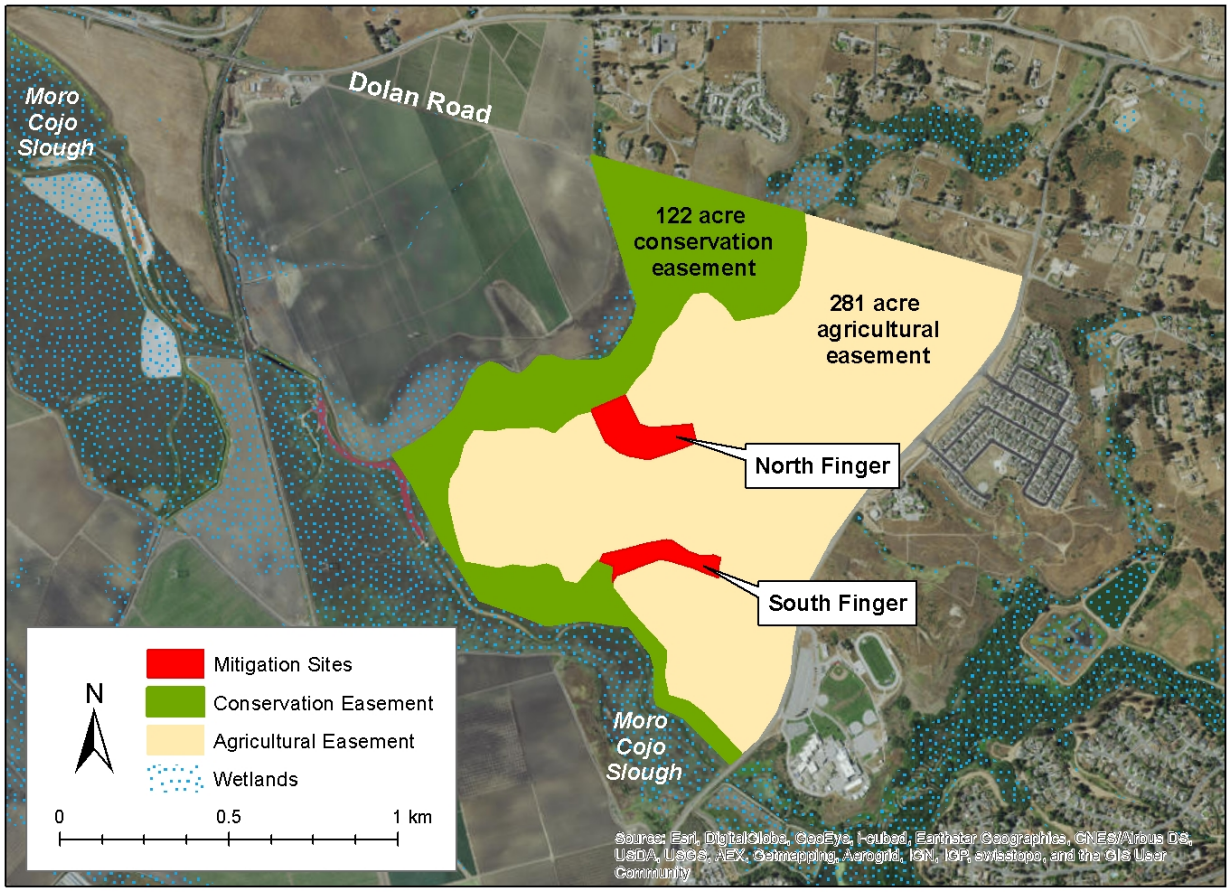


FIGURE 1. LOCAL AREA MAP SHOWING RELATIONSHIP OF MITIGATION SITES TO OTHER PROTECTED LANDS AND MORO COJO SLOUGH.

resources on the property, to preserve and protect the sloughs, wetlands, natural resources, and habitat on the property, and to preserve the open space characteristics of the property" (Easement Deed 2007). The Conservation Easement pursuant to Civil Code section 815.1 will run with the land in perpetuity. (see Easement Description, Appendix B). MLPP committed $50,000 to assist with the purchase of the habitat conservation easement to secure a location for the off-site mitigation requirement. The conservation easements were signed in January 2007 (Appendix B).

The Dolan site ranks highest by most of the selection criteria used in the 2002 general mitigation plan (MMC 2002). Many of these high ranks stem from the very large area of the habitat conservation easement on the Dolan parcel, and its contiguousness with an even larger area of wetlands in the upper Moro Cojo Slough (Figure 1). The easement protects the site from future development and also greatly improves the ecological value of MLPP's investment in off-site mitigation, since the company will be contributing to a larger wetland restoration and conservation effort in the Moro Cojo Slough watershed. The mitigation site thus had the potential to greatly exceed in size and quality of habitat the ponded areas that were lost as a result of the MLPP tank removal project. Larger habitat areas also permit

greater heterogeneity of ecological conditions and thus more complex mosaics of native habitats and communities.

Once the mitigation site was selected, an updated implementation plan consistent with the prior 2002 Wetland Mitigation and Enhancement Plan was created. The 2006 Implementation Plan for the Dolan Property Offsite Mitigation (MMC 2006, Appendix A) includes a brief history of the project, a description of the site to be enhanced, and a detailed plan for implementing restoration on the site owned by the Dolan family. The 2006 Implementation Plan for the Dolan Property Offsite Mitigation (MMC 2006) was submitted and approved by the Monterey County Planning Department and CDFW.

A. Consistency with Monterey County's Moro Cojo Slough Management and Enhancement Plan (1996)

The MCSME Plan is a conceptual planning document to provide guidance for projects in the Moro Cojo Slough watershed. It was adopted by Monterey County Planning and Building Department in 1996. The MCSME Plan prioritizes enhancement of existing freshwater habitats and restoration of historical freshwater habitats to increase habitat productivity and diversity, erosion control, and water quality in the Moro Cojo Slough. As such, any wetland mitigation or restoration projects completed within the Moro Cojo Slough watershed are strongly encouraged to follow the guidelines and meet the appropriate objectives established in the MCSME Plan.

The preferred alternative in the MCSME Plan, Winter/Spring Freshwater Conditions, aims to create areas for freshwater impoundments within the lower slough watershed between Moss Landing Road and Castroville Boulevard. Suggested in the plan are actions to protect significant biotic resources, increase overall habitat values within the slough environs, resolve existing resource problems and provide passive recreational/educational uses. The plan also includes the creation of buffers between wetlands and agricultural land uses, specifically in areas upstream of the Southern Pacific railroad tracks.

MLPP's off-site mitigation is composed of two significant fingers, labeled the North Finger and the South Finger, of the Moro Cojo Slough (Figure 1). The habitat conservation easement on the Dolan Property makes up part of a historical freshwater arm of the Moro Cojo Slough, thus it was a logical location to mitigate for the man-made freshwater ponds which were lost in the MLPP tank removal project. Additionally, the Dolan site location between agricultural land and the slough makes it an ideal location to construct a buffer for filtering runoff before it enters the Moro Cojo. Nestled within the larger conservation easement (Figure 1), the MLPP mitigation site allows greater connectivity within the restored wetlands, which enhances the habitat value of both the mitigation site and the surrounding conservation easement. As spelled out in the 2002 Wetland Mitigation and Enhancement Plan (MMC 2002), the plan for the Dolan site met many of the biological, water quality and agricultural objectives in the MCSME Plan, including:

- Eradication of invasive non-native plant species
- Management of habitat in and around wetlands in a manner conducive to enhancing wildlife habitat values
- Revegetation of barren and degraded areas with native plant species
- Minimization of sedimentation and soil erosion through the use of vegetation cover and other surface erosion control measures
- Improvement of stormwater detention facilities to protect/enhance water quality of the slough from agricultural and urban runoff
- Management of water and drainage to accommodate agricultural uses on adjacent lands
- Identification of practices to minimize erosion, control irrigation drainage, and minimize pesticide and fertilizer runoff into wetlands.

B. Additional Agreements with Landowner

B.1 Fence

Fencing surrounding the South Finger was necessary to ensure the farm workers, who tend to experience a lot of turnover, did not accidentally negatively impact the mitigation sites by driving through or spraying herbicide on newly planted native vegetation. The fencing was installed by the landowner to mark the mitigation site boundaries in 2011 (Figure 2). For ease of access, the sites are not entirely enclosed, but the long axes of each parcel are continuous. Minor problems with fencing have been fixed by farm workers to this point.

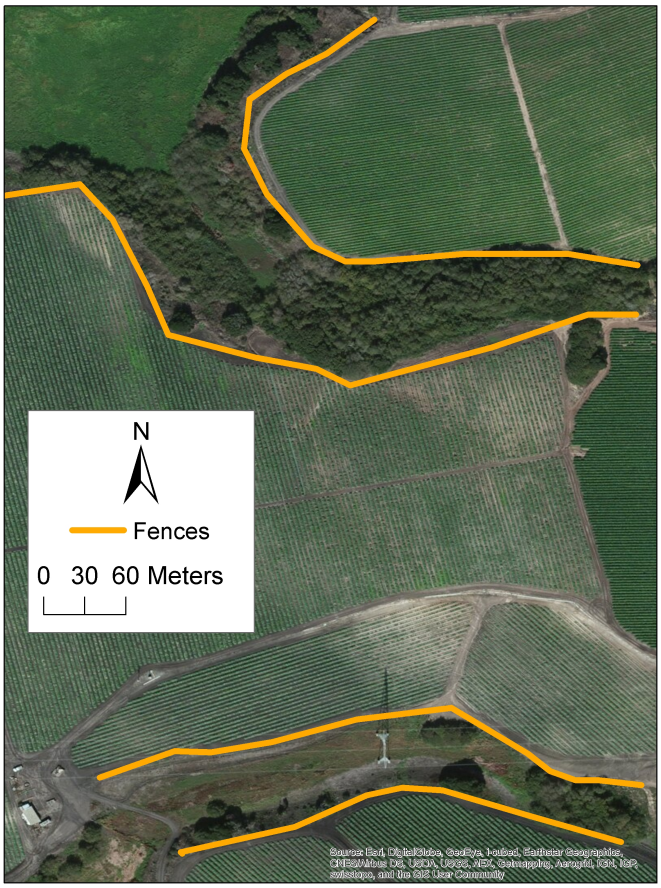


Figure 2. Location of Fences on Mitigation Site.

B.2 Sediment Basin

The landowner was concerned about the topsoil that could erode from the fields and then be deposited in the South Finger mitigation site. Although not required as part of the wetlands mitigation (Condition #12 of the CDP) or by the Land Trust, an agreement was made between Moss Landing Power Plant and the landowner to put in a sediment basin at the east end of the South Finger mitigation site. MLPP paid for the design and construction of that sediment basin and the landowner

agreed to have the farmers maintain it. Constructed in 2011, the sediment basin acts as a receptacle for eroded topsoil, preventing it from entering the wetland. The farmer is able to collect the topsoil and redistribute it on the farmlands. Although there is not a formally constructed sediment basin in the North Finger, sediment tends to collect at the southeastern edge of the mitigation site and farm workers have been observed to use it for filling gullies that have formed as a result of irrigation practices.

C. Dolan Property Habitat Conservation easement

C.1 Regional and site description

Prior to the 1750s, indigenous people known as the Ohlone inhabited the Moro Cojo Region. The earliest known accounts of the region were from the Spanish explorers during the late 1500s (Gordon 1996). Their journals described the greater Monterey Bay region as an environment much wetter than today with large wetlands over lowland areas and native grasses and oak woodland covering much of the uplands. The area has rainfall patterns characteristic of other central California coast areas without high mountains immediately inland. The average yearly rainfall is 17 inches. The Ohlone likely practiced land management within the Moro Cojo Watershed as they did in other areas, periodically burning grass and woodland and cutting shrubs. By the mid-1700s Spanish missionaries and large ranching families began to graze herds of cattle and sheep in the area converting many of the upland native grasslands to non-native species.

In the 1930s and 40s agricultural activities began to claim land within the Moro Cojo Watershed. Many of the wet areas were ditched, and levees and berms were constructed to drain the land and facilitate farming adjacent to the slough. The property now owned by the Dolan Family likely changed from ranch land to farmland within this time frame. The upper portion of this property (the parcel now under agricultural easement) has been intensively farmed, producing various crops, most recently artichokes and Brussels sprouts. The lower portion of the site, historically too wet to farm, retains some characteristics of freshwater coastal wetland and riparian forest but has been significantly disturbed by land use activities on adjacent properties.

C.2 Morphology and Soils

The morphology of the two fingers that make up the mitigation site has changed significantly as a result of sediment inputs from neighboring fields. The soils in the area reflect the topography on the site as the coastal wetland transitions into the adjacent foothills. According to the Monterey County NRCS soil map, the soils on the site are largely comprised of Diablo clay, Alviso silty clay loam, Santa Ynez fine sandy loam, and Rindge muck. The soils range from well-drained to poorly drained with a range of erosion hazard levels.

The sandier soil from the fields is carried downhill towards the fingers by overland flows during precipitation and extreme run-off events. The heavier sand is deposited at the top of

the fingers while the lighter silt is carried along and deposited near the base of the fingers. Discussions with the Land Trust and the landowner determined that sediment basins would be beneficial to the farmer as well as the wetland so MLPP committed to funding design and construction of a sediment basin east of the South Finger mitigation site. In addition to reducing sedimentation into the mitigation site, the basin reduces stress on the wetland vegetation by providing a water source during a portion of the dry season.

C.3 Hydrology

Hydrology on the Dolan Property is typical of agricultural cultivation on the hills surrounding Moro Cojo Slough. The North Finger drains approximately 100 acres of agricultural land while the South Finger drains approximately 60 acres of agricultural land. Both Fingers drain into a prominent arm of Moro Cojo Slough, an impaired water body listed on the California 303d list. Primary threats to the resources of the slough are nutrient inputs, inadvertent release of hazardous materials, persistent pesticide residue, and salt water from defective tide gates. In addition to creating additional habitat, wetland construction like that proposed for the mitigation site can help to improve water quality in the Slough.

The slopes of the hills on the Dolan Property vary from 10% to 30%. Runoff can be high velocity when strawberry fields are covered with plastic and can carry large pulses of fine grain sediment. Surface water flow is dependent on both precipitation and irrigation patterns. Sedimentation is an issue on both of the Fingers and this has been addressed to some extent by recent improvements in furrow alignment and the construction of the South Finger sediment basin.

Elevation of existing agricultural roads was also proposed for the South Finger to improve them and to control water levels. On the eastern end of the South Finger, the road which crosses the mouth of the finger as it enters Moro Cojo Slough was elevated. This improvement also placed culverts beneath the roads of sufficient elevation to allow retention of water in the wetland area. On the western end of the South Finger, a new road was added to allow farm truck and equipment access across the sediment basin/wetland area. Culverts were installed under this new road to allow sediment to settle before water entered into the wetlands (Figure 3).

C.4 Pre-Mitigation Vegetation

Prior to mitigation the upper portion of the North Finger (8.18 acres) was dominated by arroyo willow with a number of mature coast live oaks interspersed. There was a wide range of native and non-native plant species on the lateral edges of the Finger where there was less sediment deposition. The freshwater marsh area was dominated by natives. Because non-native plants were largely found on the edges of the Finger, and because the understory of the willow and oak habitat contained extensive poison oak, efforts were concentrated on the weedy margins of the site.

The South Finger (4.6 acres) was mostly unvegetated with the exception of a few live oaks and marginal plant communities. The establishment of vegetation on this site was hindered both by consistent sediment inputs and the intermittent movement and storage of agricultural equipment. The removal of the equipment and the construction of a sediment basin provided the opportunity for a more robust plant community to develop. The lower portion of the site is populated with freshwater marsh plants typical of Moro Cojo Slough. Table 2 lists all of the plant species found on the sites in an October 2005 survey prior to mitigation.

C.5 Species of Concern

In October 2005, prior to the start of mitigation, the Fish and Wildlife Natural Diversity Database had no reported occurrences of rare or endangered plants or animals on the mitigation site. There was at one time a population of burrowing owls within the greater vicinity but local sources stated that they are no longer present. Areas of the Moro Cojo Slough adjacent to the mitigation sites supported Santa Cruz Long Toed Salamanders, California Tiger Salamanders and Red Legged Frogs.

Both the Santa Cruz Long Toed Salamander and the California Tiger Salamander breed primarily in pools and swales that fill with winter rains and dry completely by summer. Both of these salamanders occur directly north of the mitigation site in an arm of Moro Cojo Slough. They spend much of their lifecycles estivating underground in adjacent oak woodland or grassland habitat. Red-legged frogs require aquatic habitat for breeding but also use a variety of other habitat types including riparian and upland areas. Red-legged frogs occur at North County High School just east of the mitigation site. Adult frogs often utilize dense, shrubby or emergent vegetation closely associated with deep-water pools with fringes of cattails and dense stands of overhanging vegetation such as willows. With the wetlands restored through implementation of the mitigation plan, the range of vegetation classes (marsh, riparian forest and oak buffer) in close association to each other on the mitigation site has created valuable habitat for these species of concern.

D. Mitigation Goals and Success Criteria

In the Implementation Plan for the Dolan Property Offsite Mitigation (MMC 2006), the goal of restoration on the Dolan site was “to re-establish wetland hydrology and diverse, native plant communities in areas currently dominated by monocultural willow stands, weeds and large unvegetated areas. The site was highly disturbed by human activity and both landform changes and vegetation management were necessary steps in restoration. The construction of low berms and minor landform changes to slow water flow, reduce excessive erosion and create a range of microhabitats for flora and fauna. Native plant communities were established either by collecting local propagules and direct seeding them or cultivating propagules in a greenhouse and replanting them on the site.”

Mitigation and enhancement involved four primary tasks: 1) creation of changes in landform and hydrology, 2) control of weeds, 3) establishment of native plants, and 4)

monitoring of progress toward goals. Methods utilized to accomplish the mitigation and enhancement tasks are discussed in the Methods section below. Success criteria are the guideposts by which to measure the extent to which a project has achieved its restoration goals. The success criteria established for this mitigation are listed here as taken from the 2006 Implementation Plan (MMC 2006).

TABLE 2. MITIGATION SITE PRE-RESTORATION PLANT LIST BY LOCATION.

Location: North Finger		
Species	**Common Name**	**Non/Native**
Anthemis cotula	Mayweed	Non native
Artemesia biennis	Biennial Sagewort	Non native
Baccharis douglasii	Coyote Bush	Native
Baccharis pilularis	Coyote Bush	Native
Berula erecta	Cut-leaved Water Parsnip	Non-native
Brassica nigra	Mustard	Non-native
Carex barbarae	Santa Barbara Sedge	Native
Chenopoduim sp.	Coast Goosefoot	Non-native
Circium vulgare	Bull Thistle	Non native
Conium maculatum	Poison Hemlock	Non-native
Conyza canadensis	Horseweed	Non-native
Cyperus eragrostis	Nutsedge	Native
Eleocharis sp	Spike Rush	Native
Epilobium ciliatium	Willow Herb	Native
Frankenia salina	Alkalai Heath	Native
Gnaphalium straminium	Cotton-Batting Plant	Native
Juncus sp	Rush	Native
Plantago coronopus	Cut leaf Plantain	Non Native
Polypogon monspeliensis	Rabbit's Foot Grass	Non-native
Potentilla anserina	Silvertip	Native
Rubis ursinus	California Blackberry	Native
Rumex crispus	Curly Dock	Non-native
Salicornia virginica	Pickleweed	Native
Salix lasiolepis	Arroyo Willow	Native
Sambucus mexicanus	Elderberry	Native
Scirpus californicus	Bulrush	Native
Scirpus pungens	Three Square Bulrush	Native
Solanum nigrum	Black Nightshade	Non-native
Solidago spp.	Goldenrod	Native
Sonchus asper	Sow Thistle	Non-native
Spergularia sp.		Non-native
Toxicodenderon diversilobum	Poison Oak	Native
Typha latifolia	Cattail	Native
Urtica dioica	Stinging Nettle	Non-native
Xanthium spinosum	Spiny Clotbur	Native

TABLE 2, CONTINUED.

Location: South Finger		
Species	**Common Name**	**Non/Native**
Anagallis arvensis	Scarlet Pimpernel	Non-native
Atriplex triangularis	Spearscale	Native
Brassica nigra	Mustard	Non-native
Chenopodium sp.	Coast Goosefoot	Non-native
Circium vulgare	Bull thistle	Non native
Conium maculatum	Poison Hemlock	Non-native
Cotula coronopifolia	Brass Buttons	Non-native
Cyperus eragrostis	Nutsedge	Native
Distichlis spicata	Salt Grass	Native
Eleocharis macrostachya	Spike Rush	Native
Epilobium ciliatum	Willow Herb	Native
Frankenia salina	Alkali Heath	Native
Gnaphalium stramimeum	Cotton-batting Plant	Native
Hordeum brachyantherum	Meadow Barley	Native
Malva parvilfora	Cheeseweed (Mallow)	Non-native
Picris echioides	Bristly ox tongue	Non-native
Plantago lanceolata	English Plantain	Non-native
Polygonum spp.	Knotweed	Non-native
Polypogon monspeliensis	Rabbit's Foot Grass	Non-native
Potentilla anserina	Silver Tip	Native
Quercus agrifolia	Coast Live Oak	Native
Raphanus sativus	Wild Radish	Non-native
Rubus discolor	Blackberry	Non-native
Rumex conglomeratus	Cluster Dock	Non-native
Rumex crispus	Curly Dock	Non-native
Rumex maritimus	Golden Dock	Native
Salix lasiolepis	Arroyo Willow	Native
Sambucus mexicanus	Elderberry	Native
Scirpus maritimus	Sea Clubrush	Native
Solanum nigrum	Black Nightshade	Non-native
Sonchus asper	Sow Thistle	Non-native
Sparganium eurycarpum	Bur-reed	Non-native
Toxicodendron multiflorum	Poison Oak	Native
Typha latifolia	Cattail	Native
Urtica dioica	Stinging Nettle	Non-native
Vulpia spp.		Non-native
Xanthium sp.	Spiny Clotbur	Non-native

First year criteria

The primary objective of the first year is to make significant progress in removing the most invasive non-native species (e.g. curly dock, pampas grass, bristly ox tongue, bull thistle, hemlock, and fennel). After the first year, coverage of non-natives on the vegetated area of the mitigation site will not exceed 30%. Baseline data on plant coverage for year-end will be mapped using GIS. Any threatened or endangered species present on site will be maintained at minimum and increased if possible.

The goal is to have no failure of roads, sediment basins, engineered berms and erosion control measures. They will all maintain their integrity and function as designed. This will be particularly important to monitor during the first winter storms. Culvert controls under roads will be tested during the first storms to assure that they are functioning properly. Some orientation and size adjustments of the erosion control berms may need to be made to improve their utility.

Second year criteria

After the second year, coverage of non-natives on the vegetated area of the mitigation site will not exceed 20%. Native vegetation will be planted as needed to fill in gaps left by weed removal. Threatened or endangered species present on site will be maintained at minimum and increased if possible.

The goal is to have no failure of roads, engineered berms and erosion control measures. They will all maintain their integrity and function as designed. Culvert controls under roads will be tested during the first storms to assure that they are functioning properly. The erosion control berms orientation and size should not need to be adjusted unless the adjacent agricultural activities change significantly.

Third year criteria

After the third year, coverage of non-natives on the vegetated area of the mitigation site will not exceed 15%. A 40-60% increase in cover of native species from year one will be reached. Native vegetation will be planted in gaps as needed to reach this target for species composition of native plants. A target minimum of 60% survival of planted species from previous years will be met. No new critical erosion points will initiate on site. Culvert controls under roads will be tested during the first storms to assure that they are functioning properly. Threatened or endangered species present on site will be maintained at minimum and increased if possible.

Fourth year criteria

After the fourth year, coverage of non-natives on the vegetated area of the mitigation site will not exceed 10%. A 50-60% increase in cover of native species from year one will be reached. Native vegetation will be planted in gaps as needed to reach the target for species composition of native plants. A target minimum of 60% survival of planted species from previous years will be met. Culvert controls

under roads will be tested during the first storms to assure that they are functioning properly. Threatened or endangered species present on site will be maintained at minimum and increased if possible. No definitive success criteria can be assigned to water monitoring as its quality is dependent on adjacent farming practices. Nonetheless suspended sediment, nutrient and pesticide levels in surface flow should be expected to trend down as vegetation on site matures.

Fifth year criteria

After the fifth year, coverage of non-natives on the vegetated area of the mitigation site will not exceed 5%. Native vegetation will have filled in gaps and a species composition of 90-95% natives will be reached. Native plants will have maintained without need for drip irrigation for last year. A target minimum of 60% survival of planted species from previous years will be maintained. Culvert controls under roads will be tested during the first storms to assure that they are functioning properly. Threatened or endangered species present on site will be maintained at minimum and increased if possible. No definitive success criteria can be assigned to water monitoring as its quality is dependent on adjacent farming practices. Nonetheless suspended sediment, nutrient and pesticide levels in surface flow should be expected to trend down as vegetation on site matures.

This report details the work conducted for the MLPP mitigation project, from weed control to planting, to various types of monitoring used to document successful accomplishment of the project goals in order to meet the success criteria. Work on the mitigation sites started in 2007 with weeding, followed by the first effort to restore native vegetation in 2008. The first vegetation surveys were conducted in 2009, and both North and South Finger sites met the first year success criteria in 2011.

II. LANDFORM AND HYDROLOGY

A. LANDFORM AND HYDROLOGY METHODS

In the initial stages of the restoration we considered it critical to have a topographic baseline against which future erosion and deposition on the site could be judged. Towards this end, a Terrestrial Laser Scanner (TLS) Survey, accurate to <5 cm vertically and <10 cm horizontally, was conducted on all the unvegetated slopes around South Finger. The survey results and data are included on the Appendix C DVD for future reference.

No modifications were made to the North Finger site in terms of landforms and hydrology. Modification of the South Finger site occurred in 2011. At that time a sediment basin was created on the east end of the site to act as a receiving basin for agricultural run-off in which water flows would be slowed so that sediment could settle out before the water entered the wetland area to the east. Two roads were elevated and culvert systems were installed. One culvert runs under the road between the sediment basin and the westernmost edge of the wetland-willow habitat, to allow retention time and allow the sediment to settle before the water goes into the wetland. Another culvert system was installed on the eastern end of the wetland to allow retention of water in the wetland until just before it starts to flow over the road and then will pass under the road and enter into the Moro Cojo. Both culverts were installed at an elevation that prevents the roads that they pass under from flooding (Figure 3).

FIGURE 3. CULVERTS INSTALLED AT SOUTH FINGER MITIGATION SITE FOR WATER CONTROL. LEFT PANEL IS AT THE WEST END OF THE SITE WHERE IT DUMPS INTO MORO COJO SLOUGH. RIGHT PANEL IS AT THE SEDIMENT BASIN ON THE EAST END OF THE SITE.

B. LANDFORM AND HYDROLOGY RESULTS AND DISCUSSION

From 2006 to present, topography at North Finger has remained remarkably consistent. Sediment depth readings, detailed in the monitoring section, reveal that there has not been net change in sediment during that time. That time period also

corresponds with much lower than usual rainfall, however, and in a higher rainfall year there may very well be more deposition from run-off. One issue that has occurred intermittently is the formation of erosion gullies along the east to southeast margins of North Finger, caused by the concentration of run-off from the farm fields. Gullies appear to form when watering activities and farm row direction cause areas of concentrated run-off into the upland brush habitat on the south side of the site. Farmers filled the first two gullies with sediment deposited on the west end of the site after being asked to do so by the landowner. Erosion gullies have the potential to erode sizeable portions of the southern upland brush habitat area if allowed to go untreated in the future.

With the clearing of equipment in the South Finger and the construction of the sediment basin in 2011, planting began in earnest. Previous years' work had been concentrated on the outskirts of the site but once the fencing was complete in 2011 the interior planting began. Culverts installed at the east and west ends of the sites had to be adjusted to insure that water levels were kept below the road elevations at each end. Once those adjustments were made, the central wetlands began to pond nicely, maintaining water depths of up to 1 m in the wet season. Willows began to recruit into the sediment basin in 2012 and were cleared out by the farmer in 2014. Periodic maintenance of the sediment basin will be necessary to prevent sediment accumulation from blocking the culvert, thereby allowing the road to flood, and to prevent willows from overtaking the sediment basin. Runoff and sedimentation are periodically heavy along the northern midpoint of South Finger. Straw bales were deployed there to prevent sediment deposition into the wetland from the farm road, but could be moved temporarily to allow in water that ponds at that point after heavy rains.

III. WEED CONTROL AND NATIVE PLANT ESTABLISHMENT

A. METHODS OF WEED CONTROL AND NATIVE PLANT ESTABLISHMENT

A.1 WEED CONTROL

Weed control started in 2007 after farm equipment was cleared from South Finger. Weeds were cleared using several different methods depending on the species requiring eradication. Methods included hand-pulling and/or shovel extraction, weed whipping, tarping, and herbicide application. Weeding continued onsite throughout the duration of the project as new weed seeds, either from the sediment seed bank or blown in from adjacent plant communities, continued to establish each spring. As the cover of native vegetation increased, the area requiring weed control decreased.

Weed control was the single most challenging task of the project. While clearing of South Finger provided an initially clear canvas for planning and planting, it also exposed many weed seeds to light and enabled growth of the weed population that has continued to the present. Weed control activities were scheduled during the growing season each year, from the time of the winter seasonal rains through to early summer. During that season of 6-8 months, a succession of primarily annual weeds was treated

as they germinated, to prevent both vegetative expansion and seed production. In many cases several iterations of treatment were required to ensure a particular species was finished growing and seeding for the year. Any flowering or seeding plant material was baled and disposed of offsite.

Weed control activities accounted for approximately 1-2 days of work for 2-3 people each week during the weed season over the course of 7 years--a very significant amount of strenuous labor. The field crew overcame a variety of obstacles during the course of the restoration, including extreme heat during the summer (particularly during the drought years); mud, with corresponding access difficulties, in the rainy season and during times of heavy irrigation; dangerous plants including stinging nettles and particularly poison oak; and logistical challenges.

A.2 Native plant establishment

Native plant establishment started in 2008 with the collection of native plant seeds and shoots onsite for propagation in a nearby restoration greenhouse. Seeds and shoots were planted and grown out to suitable transplant size, usually 1 gallon, while waiting for onsite construction to finish. An effort was mounted each fall to plant native plants, to replace the few that didn't survive the previous year and to continue to expand native plant cover. Fall planting was scheduled to take advantage of seasonal rains. When drought conditions prevailed, we supplemented by trucking water in and hand watering. Little evidence of browsing by herbivores was observed. Plant death, when it occurred, was almost always due to drought. Planting activities accounted for approximately 1-2 days of work for 2-3 people each week during the planting season.

B. Results and discussion for weed control and native plant establishment

The interior of the North Finger site had much more extensive cover of poison oak in the understory of oaks and willows. Therefore we concentrated our efforts on the oak and willow margins and in the upland brush habitat where there was much higher cover of non-native plants. Efforts included hand pulling and weed whipping and in the fall of 2015 we covered areas with mulch to smother the last flush of non-natives that might germinate after the winter rains. Drought conditions present the past few years made keeping newly planted natives alive difficult and we resorted to trucking in water in 2013-2015. Lupines in the upland brush habitat flourished in the early years of restoration and we are hoping that they seeded extensively to propagate new plants.

While the South Finger was the primary restoration area, the North Finger mitigation was greatly enhanced by increasing plant diversity and by working with the farmer to use the willows above the mitigation site/conservation easement for erosion control. We planted cottonwood trees and in the understory a native sedge, both of which improved amphibian habitat that is now mostly willows in the upper finger. We spent considerable time designing sediment detention ponds to help protect the North Finger. Finally, we convinced the farmer to back away from the willows and let them find a new edge between the farm and riparian corridor. This was highly successful. While in the short term farmers lost some

farm staging area, staging can be done in other places. In the long-term farmers reduced erosion and transport of sand to the conservation easement. The long finger of willows above the North Finger mitigation and conservation area extends east along the fence line in Figure 3. We also assisted farmers in developing a system for reducing and patching erosion gullies that can form along the side of the North Finger due to irrigation practices.

The South Finger site started off as mostly bare ground with a few oaks and willows interspersed. Once the culvert systems were installed, the wetland started to develop immediately. Although we planted bulrush, sedges, and other wetland plants, cattails recruited naturally to the site. Weeding efforts were concentrated in the high wetland and upland brush habitats. Methods utilized included weed whipping, hand pulling, and the use of tarps to smother and bake persistent weeds such as bristly ox tongue, a technique known as solarization. As with North Finger, drought made establishment of native plants difficult and we resorted to hand watering in 2013-2015. Drip irrigation was never established because it was deemed unnecessary.

Over the course of the project, from 2009 to 2015, over 5000 native plants were installed (approximately 1600 in North Finger and 3400 in South Finger).

IV. MONITORING

A. MONITORING METHODS

A monitoring program was established according to the guidelines set out in the Implementation plan. Table 3 lists the types of monitoring activities, frequency, and timing of each parameter in the monitoring program.

A.1 PLANTS

Plant composition was surveyed using two methods. Vegetation mapping was conducted onsite with a handheld differential GPS. Two ecologists walked each site, identifying major plant communities, areas of high non-native plant cover, and individual plant species. Major plant community perimeters were mapped while the GPS recorded position information. Back at the lab the data were downloaded and incorporated into a GIS.

Point-count transects were laid out in the major plant habitat types at the start of the project and then the locations were revisited at each sampling event using a GPS to navigate to transect endpoints. A meter tape was laid along the ground between endpoints, and one ecologist walked the tape, identifying plants at each 0.5 m interval along the tape. At each point, all layers of vegetation are identified, including the ground layer, grasses, herbaceous plants, woody shrubs, and trees. In this way the point-count method allowed us to capture the complexity of the plant canopy. Point-count data

were converted to percent cover after classifying all plants as native or non-native. Ratios of native to non-native plants were then plotted.

Percent cover of native and non-native plants from point-count transects in each habitat type were used to calculate percent areal cover of native and non-native plants across each Finger in order to assess whether or not plant cover criteria were met. Plant surveys generally took approximately half a day for 2 people to accomplish in the field, with further computation, graphing, and analysis done by a single person in the laboratory.

TABLE 3. MONITORING PROGRAM ACTIVITIES.

Parameter	Measurement Tool	Frequency	Timing
Plant composition	Vegetation mapping Point-count transects	Annually	Spring
Water quality	Handheld water quality meter, Turbidimeter, laboratory analysis	Seasonally	Winter storms
Water quantity	Staff plate	Seasonally	Winter storms
Habitat quality	Bird surveys Amphibian surveys	Annually to occasionally	Spring & Fall
Photomonitoring	Fixed-point photos Aerial imagery	Quarterly to annually	Varies

A.2 WATER

Water quality and quantity were measured periodically after winter storms. Stations were chosen at the lowest elevations within the Fingers where water tended to pool (Figure 4). Along the Moro Cojo stations were chosen to capture the variability in water quality conditions in the water body into which the Finger stations emptied. In addition, there were historical water quality data available for the Moro Cojo stations, which allow us to interpret the results in a larger spatial and temporal context.

After selected rain events when $\geq$ 2.5 cm rain fell in a 24 hour period, two field assistants visited each water quality station at the Fingers and in the Moro Cojo (Figure 4), a field effort that took 3-4 hours. At each station, after a preliminary check to ensure enough ponded water was at the station, a YSI 556 handheld water quality meter was inserted into the water and measurements were recorded for salinity, conductivity, pH, dissolved oxygen, temperature, and pressure. A cuvette was filled and inserted into the HACH 2100P portable turbidimeter for a measurement of suspended solids in the water. A water sample of volume approximately 100 ml was collected for nutrient analysis. Back at the lab the recorded data were entered into the water quality database and the nutrient sample was placed in a freezer and held at -10^{o}C until they were processed. If multiple days of $\geq$ 2.5 cm rainfall occurred over a longer time period, a two week time interval was allowed to elapse between water sampling events. In total, 270

water quality samples were collected from 2009 to 2015. Nutrient analysis was conducted using standard California state lab protocols on an Alpchem Analyzer from 2009 to 2013 and on an Lachat Quickchem Autoanalyzer 8000 from 2014 to 2015. Once nutrient analysis results were received, we incorporated those into the water quality database as well.

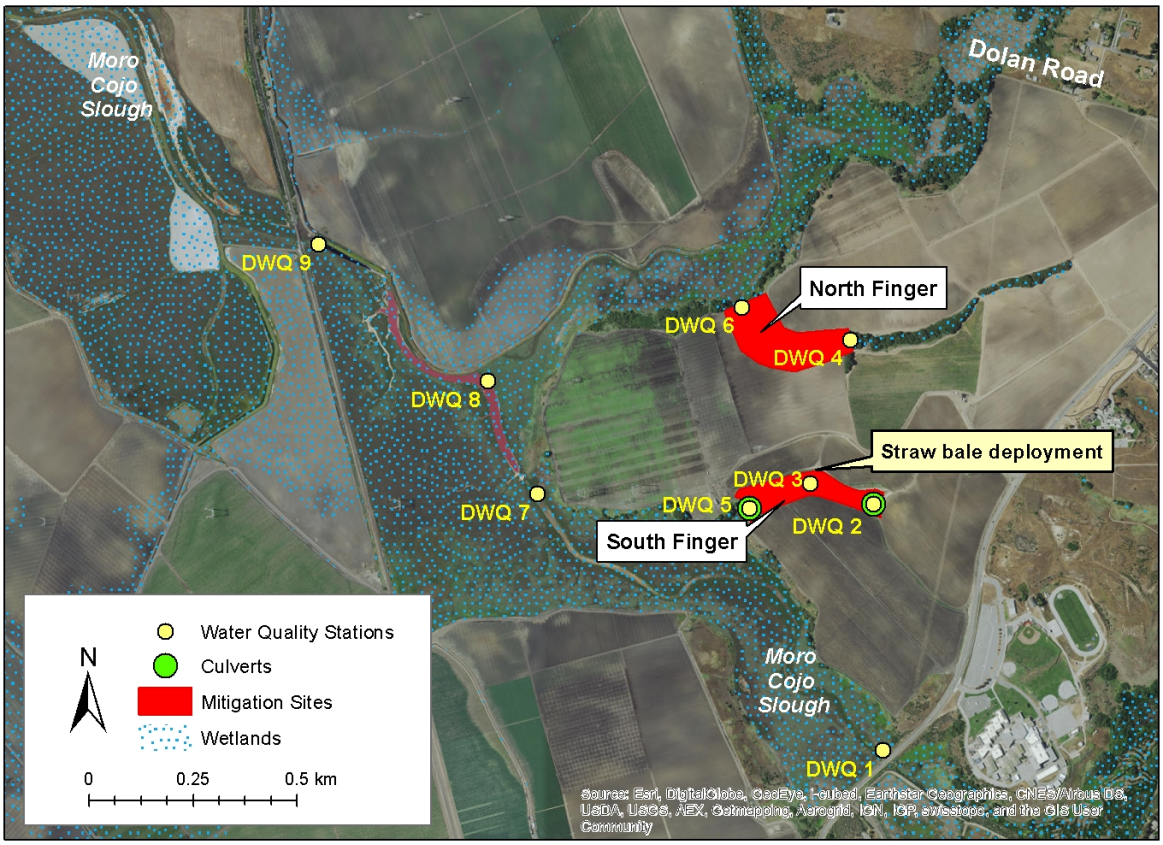


FIGURE 4. WATER QUALITY MONITORING STATIONS AND CULVERT LOCATIONS.

Staff plates were installed near all the water quality stations in North and South Finger (5 total). At each water sampling event, a measurement of water depth (if water was pooled) or sediment accumulation (if the station was dry) was recorded. Forty-seven staff plate readings were taken between 2012 and 2015. Back at the lab these data were entered into the water quality database and examined for trends.

A.3 HABITAT

We measured habitat quality by monitoring the Fingers for bird and amphibian usage. Twelve bird surveys were conducted annually during the time periods most likely to capture migratory bird activities. Two surveys each were conducted during April, May, June, September, October, and November in 2011-2014. Only spring-summer surveys were conducted in 2015. Rick Fournier, a local avian expert conducted surveys throughout North and South Finger, stopping at 9 points for 10-min timed counts, as well as recording while walking between survey points. For each observation, the

species, the number of individuals, the detection method, the bird activity, and the habitat occupied were recorded. These data were incorporated into a bird survey database.

Amphibian surveys were conducted in 2012, 2014, and 2015. In 2012 and 2014 the amphibian work consisted of a visual survey for terrestrial amphibians along the banks of the South Finger and the fringes of the North Finger by flipping boards or other cover along the wetland to identify amphibians as well as dip net and seine surveys in the South Finger to sample for aquatic amphibian larvae. In 2015, in addition to visual and dip net surveys, larval traps were deployed overnight in April and May for aquatic sampling. In early 2015, thirty plywood coverboards were deployed throughout South Finger to provide additional refuge for amphibians, to aid surveys. Coverboards were checked in April, May and November 2015. Amphibian surveys generally took about a day to accomplish and involved 1-3 people for set up and mapping of larval traps, checking of traps, dip netting, eyeshine surveys, and set up, mapping and checking of coverboards.

A.4 PHOTOMONITORING

Photomonitoring is used for qualitative assessment of general trends in plant community changes. Quarterly photomonitoring was conducted at multiple locations within each Finger by standing at fixed points facing the mitigation sites and taking high resolution images in multiple directions with a handheld digital camera. Images were taken in winter, spring, summer, and fall from 2006-2015, although not all seasons were sampled each year. Photos were cataloged by Finger and date for incorporation into a record of the mitigation process. Photomonitoring was accomplished by 1-2 persons, usually taking approximately 2-4 hours to finish depending on field conditions. See map in Appendix C for locations of photomonitoring stations.

In addition to the handheld camera ground-level photomonitoring, multiple unmanned aerial vehicle (AUV) surveys were conducted. A 3D Robotics Iris + quadcopter with a mounted GoPro Hero 3+ 10 megapixel camera was used to systematically map each Finger at altitudes of 50-70 m, taking images at 1 sec intervals. Individual images were stitched together using Autopano Giga 4.0 software to create high resolution mosaics of each site. These mosaics were used for vegetation mapping and to record overall site conditions after unusual events such as heavy rainfall. Aerial surveys were accomplished by 1 person, taking approximately an hour in the field followed by several hours in the laboratory processing photographs to create mosaics and georeference them into a project GIS.

B. Results and Discussion of Monitoring

B.1 Plants

The success criteria for the mitigation and enhancement of the site focus on the establishment of native plants and the eradication of non-native plants. Through the use of GPS-assisted vegetation mapping and annual vegetation point-count transects, we documented an increase in native plant cover to >95% by 2014 at both sites.

GPS-assisted vegetation mapping was conducted three times over the course of the project, first in 2009, then in 2013, and finally in 2015. Figure 5 shows the results of the final vegetation mapping. The major plant communities at both sites include upland brush, oak, and willow. Wetland occurs at both sites, although the greater slopes at South Finger cause the wetland to be partitioned into 2 separate community types. The North Finger is notable for having several large patches of elderberry (isolated elderberry plants also occur at South Finger). Table 4 lists the most common native plants for each plant community according to our most recent transects.

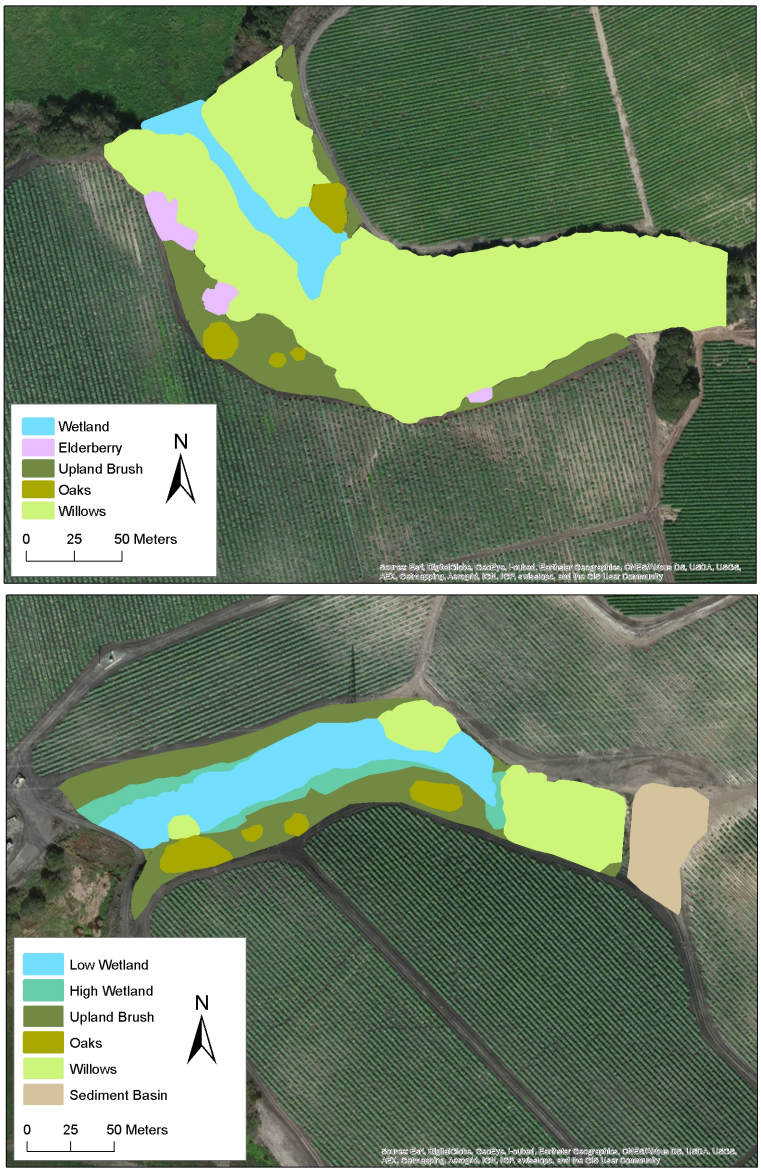


Figure 5. Vegetation maps of North and South Finger. Top panel (North) and Bottom panel (South) show areal extent of major habitat types.

Vegetation point-count transects were conducted annually at South Finger and most years at North Finger (Figures 6 and 7). We achieved >95% cover in most habitat types by 2014. At both sites the upland brush habitat was by far the most challenging to restore. This habitat had some of the highest cover of non-native plants at the start of the project and at both sites it is adjacent to the road and the agricultural fields, both of which may be sources of non-

native seeds in addition to the non-native seed bank in the soil. It is common to see the most widely distributed weed species (Table 4: bristly ox tongue, poison hemlock, mustard, wild radish and annual bluegrass) at the perimeter of the agricultural fields and along the farm roads. The change in non-native to native plant ratio is more dramatic at South Finger, which was highly disturbed at the start of the project, having served as a parking and storage lot for agricultural vehicles and equipment prior to being designated as a mitigation site.

By classifying the sites into major plant habitat types and using GIS to calculate areas, we then used the percent cover data from our transects to calculate percent areal cover of native and non-native species for each site overall (Figure 8). These calculations demonstrate that we achieved > 90% cover of native plant species by 2013 and > 95% cover by 2014. At South Finger in particular several years of dedicated weed eradication was necessary to eliminate the majority of the weeds. Even after 5-7 years of constant work, the upland brush habitat still presents a challenge due to the constant influx of new propagules. As the larger shrubs continue to grow (California lilac, yellow bush lupine, California sage brush, black sage), they will help to shade out some of the weeds on the periphery, but the edges of the property will probably always have some weed cover. Presumably the edges will serve as a buffer for the interior habitats.

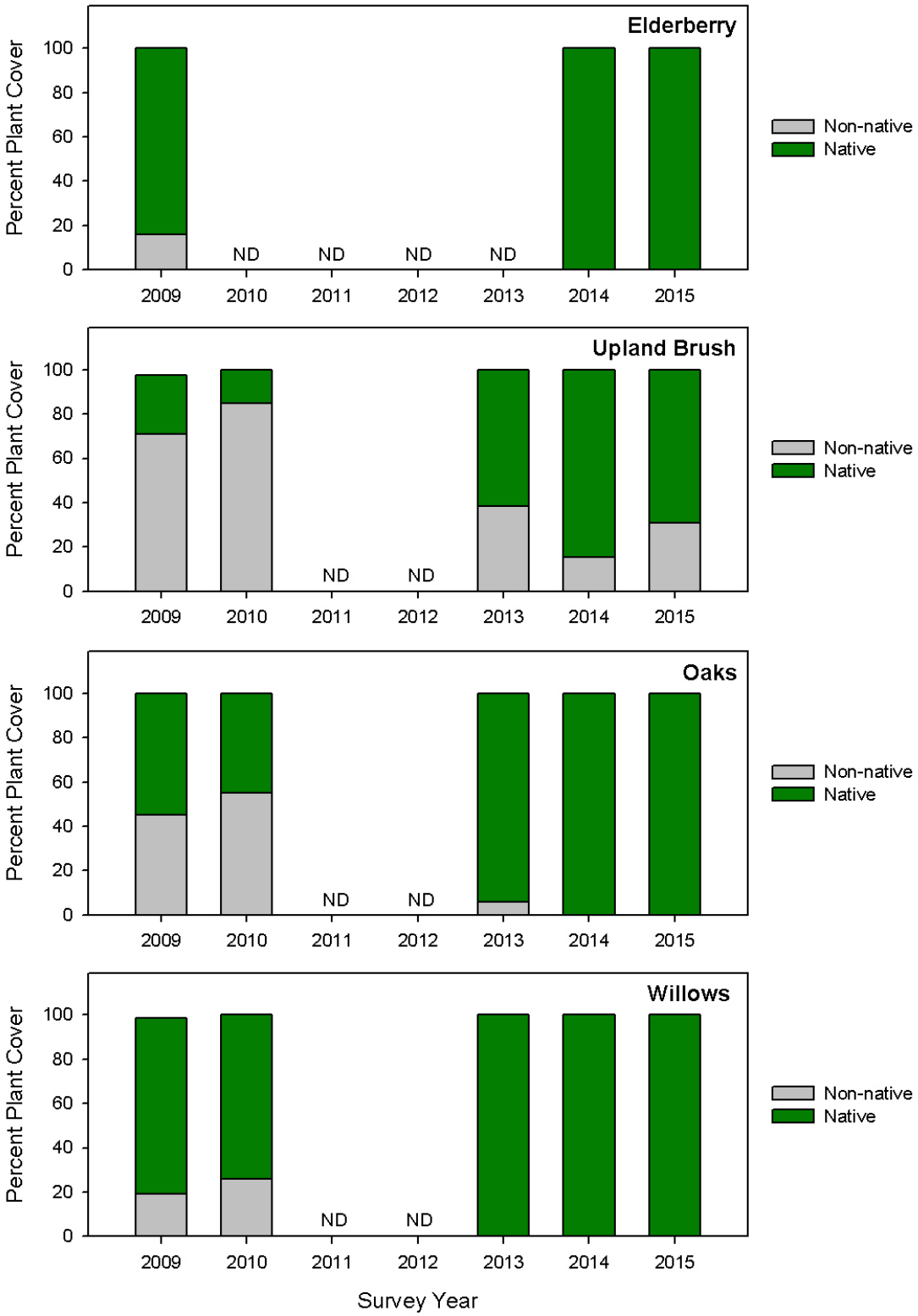


FIGURE 6. PERCENT COVER AND PLANT STATUS BY HABITAT TYPE AT NORTH FINGER. DATA DERIVED FROM PLANT SPECIES POINT-COUNTS. ND = NO DATA.

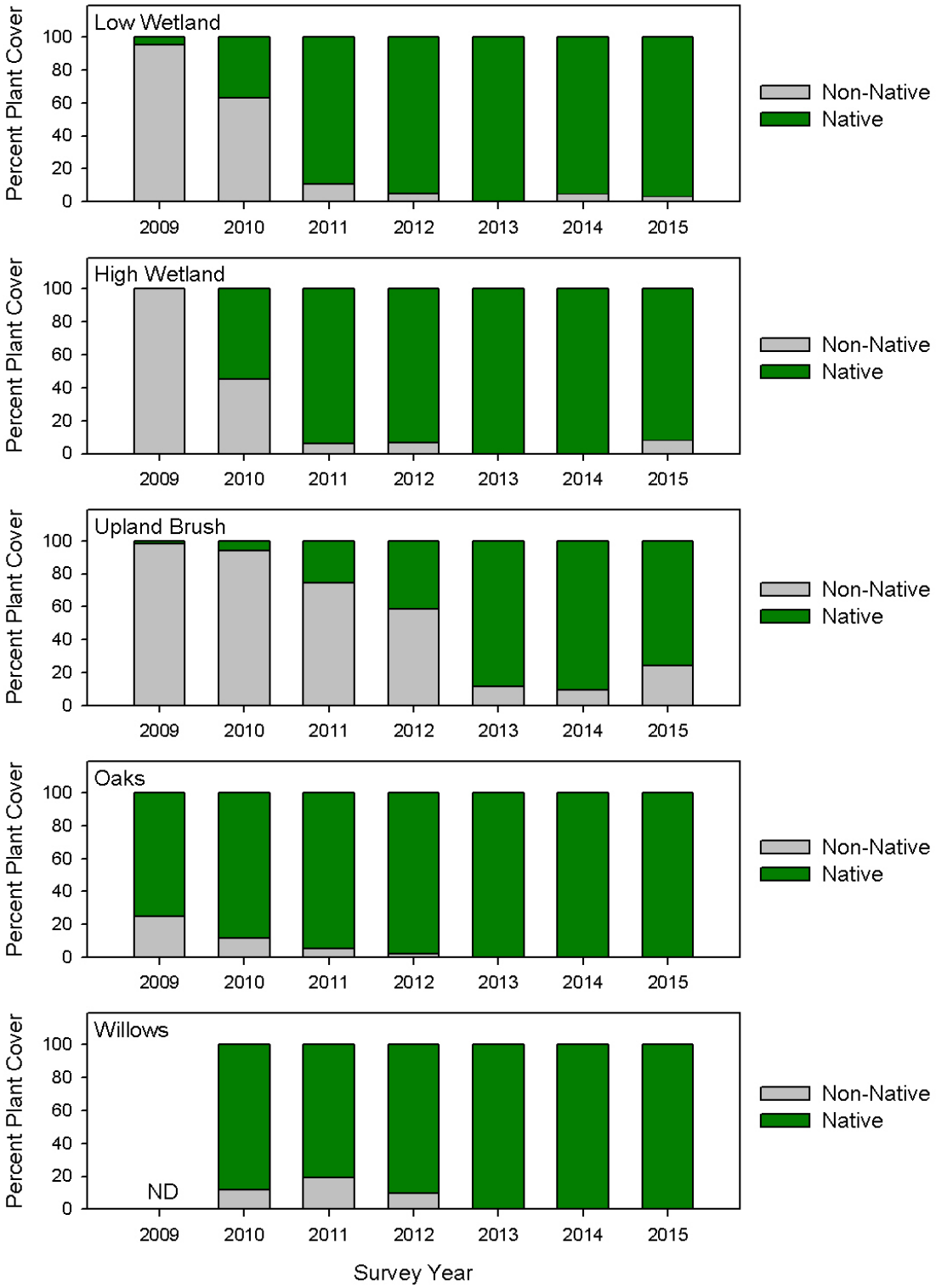
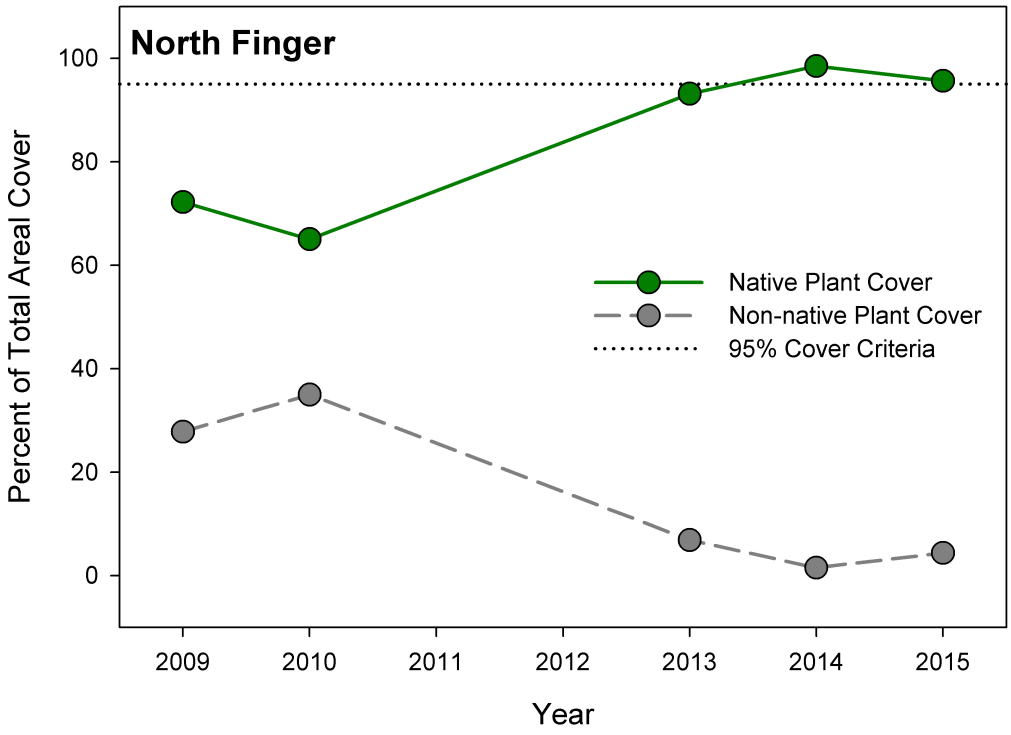


FIGURE 7. PERCENT COVER AND PLANT STATUS BY HABITAT TYPE AT SOUTH FINGER. DATA DERIVED FROM PLANT SPECIES POINT-COUNTS. ND = NO DATA.



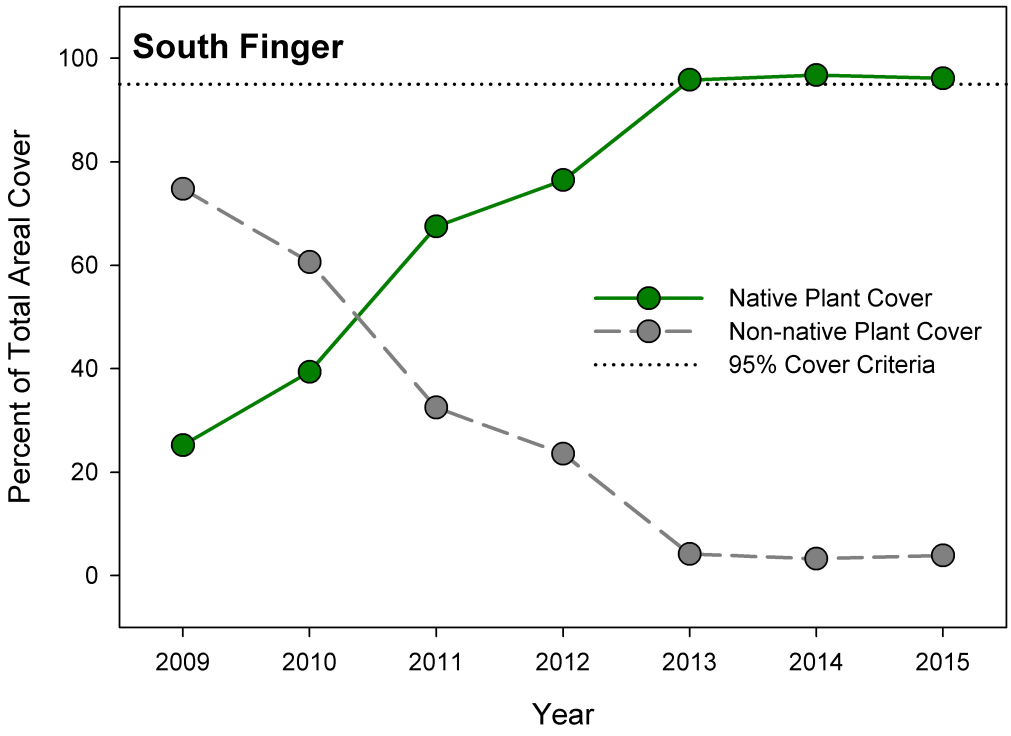


FIGURE 8. AREAL COVER BY PLANT STATUS AT NORTH AND SOUTH FINGERS. DATA DERIVED FROM TRANSECTS AND BEGETATION MAPS. THE DOTTED LINE DELINEATES THE 95% NATIVE PLANT COVER METRIC FOR THE 5TH YEAR SUCCESS CRITERIA.

TABLE 4. COMMON SPECIES FOUND IN EACH OF THE MAJOR HABITAT TYPES IN NORTH AND SOUTH FINGERS. NATIVE SPECIES ARE LISTED FIRST IN ALPHABETICAL ORDER, FOLLOWED BY NON-NATIVES, WHICH ARE INDICATED BY AN ASTERISK (*).

Wetland/ Low Wetland	High Wetland	Upland Brush/ Elderberry	Oak	Willow
Alkali heath	Alkali heath	Arroyo willow	California blackberry	Arroyo willow
Bulrush	Bee plant	Bee plant	Canyon gooseberry	California blackberry
Cattail	Bulriush	Black sage	Coast live oak	California manroot
Common rush	Cattail	California blackberry	Coyote bush	Cottonwood
Curvepod yellowcress	Common rush	California hedgenettle	Coyote mint	Creek dogwood
Ditch grass	Coyote bush	California lilac	California manroot	Horseweed
Irisleaf rush	Irisleaf rush	California sage brush	California hedgenettle	Mexican elderberry
Knotweed	Mexican rush	Coyote bush	Poison oak	Spearscale
Mexican rush	Narrowleaf bur reed	Creeping wild rye	Sticky monkey-flower	Stinging nettle
Narrowleaf bur reed	Santa Barbara sedge	Gum plant	Stinging nettle	Poison hemlock *
Pacific silverweed	Spikerush	Lizard tail	Willow herb	Wild radish *
Santa Barbara sedge	Toad rush	Mexican elderberry	Mustard *	
Spearscale	Annual bluegrass *	Pacific aster	Poison hemlock *	
Spikerush	Poison hemlock *	Salt grass		
Toad rush	Wild radish *	Sticky monkey-flower		
Weakleaf burrweed		Stinging nettle		
bristly ox tongue *		Yellowbush lupine		
Wild radish *		Mustard *		
		Wild radish *		
		Poison hemlock *		

B.2 WATER

Water quality parameters were measured at 3 sites in South Finger, 2 sites in North Finger, and 4 sites in the Moro Cojo near the junction with the Fingers. Overall, all parameters were highly variable (Table 5). When considering the function of the wetland as a healthy ecosystem that provides the service of improving water quality, a few parameters are particularly interesting to examine, including DO, nitrates, salinity, and turbidity (Figures 9 and 10).

Wetland systems have been shown to lower the concentration of many water contaminants, including nitrogen, phosphorus, and suspended solids (Mitsch 1994). Removal processes are driven by diverse mechanisms such as sedimentation, filtration, chemical precipitation and adsorption, microbial interactions, and uptake by vegetation (Watson et al. 1989). A longer residence time for water enables greater removal of contaminants. Although we consider each of the following parameters individually, it is important to remember that they interact with each other. For example, higher levels of nitrogen and phosphorus may cause lower dissolved oxygen in ponds by triggering higher growth of algae, which when it dies, then uses oxygen in the decomposition process (Hoelscher et al. 2015). Ammonia, which is toxic to fishes, is dependent upon pH and temperature of the water (Emerson et al. 1975) and the nitrification process of ammonium places high demands on dissolved oxygen in water (Walton et al. 2007). Moreover, the impacts of water chemistry may be heightened in a drought, which causes a decrease in surface area/volume and an increase in extremes of physical and chemical water quality parameters (Magoulick & Kobza 2003).

Dissolved oxygen is an important environmental variable that heavily influences the community of organisms that can live in a system. When DO falls below 2 mg/L, conditions are termed hypoxic, and living organisms such as fish, benthic invertebrates, amphibians, and other aquatic organisms begin to have difficulty maintaining normal reproductive and physiologic functions. As Figure 9 demonstrates, DO levels rarely get hypoxic in the wetlands of North and South Fingers. The Moro Cojo, conversely, is hypoxic quite often, and consequently has a very low diversity and abundance of benthic infauna when compared to other tidal wetlands around Elkhorn Slough (Oliver et al. 2009). Of the Fingers observations when DO levels were below 2 mg/L, two of them occurred at DWQ 6 in North Finger, which was rarely inundated with water during the last 5 years. The other observation is from DWQ 3 at South Finger, which is in the center of the wetland. Both stations, as well as DWQ 4, are likely to have lower water levels than stations DWQ 2 and 5. When water is shallow, it is more likely that water temperature will rise, and dissolved oxygen has an inverse relationship with water temperature, i.e colder water supports higher levels of DO. It becomes more likely that metabolic processes of aquatic organisms including fish, insect larvae, amphibians and even microalgae will consume most or all available DO in the water when water levels are low, leading to conditions of hypoxia and anoxia.

TABLE 5. WATER QUALITY AND NUTRIENT DATA FOR MORO COJO, NORTH FINGER, AND SOUTH FINGER.

Year	Site	N	Pressure (mmHg)	Temperature (°C)	DO (mg/L)	Conductivity (µS/cm^c)	pH	Salinity (ppt)	Turbidity (NTU)	NO_3-N (mg/L)	NH_3-N (mg/L)	NO_2 -N (mg/L)	PO_4 (mg/L)
2005-2006	MC	39	ND	17.3 10.0-29.6	8.2 0.02-22.3	9095 366-46005	7.4 6.3-8.8	7.2 0.2-39.2	137 11-509	0.41 0-5.90	0.51 0.10-8.30	0.02 0-0.13	1.36 0.02-8.08
	NF	6	ND	16.7 14.9-18.5	2.8 1.7-3.9	1992 762-3222	6.8 6.5-7.1	1.3 0.4-2.1	74 31-157	0.10 0-0.42	0.65 0.01-3.3	0.034 0-0.08	0.32 0.05-0.45
	SF	5	ND	18.9 14.5-25.7	6.3 2.4-9.6	3358 814-9151	6.7 5.5-7.6	1.9 0.5-5.0	69 34-133	0.58 0-2.0	1.40 0.03-6.38	0.01 0-0.02	0.63 0.05-1.63
2006-2007	MC	27	ND	18.6 12.3-29.9	7.6 0.2-23.1	17414 2219-39537	7.9 7.2-8.9	11.9 1.5-24.9	230 14-701	0.21 0-3.02	4.90 0-12.6	0.009 0.001-0.035	4.55 0.07-14.3
2008-2009	MC	17	770.6 764.6-782.3	14.2 10.2-18.5	4.2 0.4-13.7	5452 563-26549	7.7 6.8-8.3	3.8 0.4-20.8	88 12-395	0.27 0-1.82	1.81 0-10.51	0.006 0-0.024	5.178
	NF	3	771.8	16.4 12.3-18.6	5.1 2.4-4.5	1781 665-3581	7.5 6.6-8.3	1.1 0.4-2.2	83 29-134	6.17 0.04-18.17	0.10 0.02-0.25	0.019 0.013-0.024	ND
	SF	10	770.1 766-773.8	20.3 15.9-26.2	8.6 2.3-14.4	1135 548-2304	8.3 8.0-8.7	0.6 0.3-1.2	232 59-838	4.83 0-20.96	0.058 0-0.37	0.113 0.001-0.596	ND
2009-2010	MC	19	766.4 762.3-769.6	15.1 10.5-22.7	4.3 0.7-13.2	1436 212-5692	7.4 5.1-9.0	1.4 0.1-10.2	157 10-404	0.55 0-3.65	1.40 0.06-8.84	0.068 0.005-0.372	ND
	NF	7	766.5 761.9-771.7	14.9 10.7-25.9	5.5 2.3-9.9	642 338-1324	7.7 6.8-8.5	0.4 0.2-0.9	201 89-458	3.01 0.24-8.13	0.26 0.02-0.60	0.163 0.005-0.930	ND
	SF	14	766.3 762.6-769.5	18.1 14.2-25.9	7.9 3.3-14.1	697 235-3212	7.5 6.8-7.9	0.4 0.1-1.7	519. 25-1893	8.41 0.36-24.82	0.28 0.01-2.50	0.196 0.018-0.923	ND
2010-2011	MC	22	769.6 760.4-781.0	14.0 6.7-21.0	6.7 0.04-27.3	3696 258-12609	7.1 5.0-8.5	2.6 0.1-8.7	279 7-1846	0.78 0-14.14	5.43 0.01-21.50	0.066 0.009-0.315	0.16 0.02-0.31
	NF	1	767.6	19.2	5.0	655	7.3	0.4	101	0.36	0.34	0.063	ND
	SF	6	770.0 764.6-776.1	13.8 6.5-20.1	17.4 3.2-52.3	543 286-1058	7.0 3.7-8.7	0.3 0.2-0.7	261 14-492	28.51 0.2-94.59	1.74 0.02-9.88	0.162 0.009-0.552	0.07
2011-2012	MC	24	766.9 763.2-775.4	14.4 10.0-21.8	9.0 0.6-24.8	9916 1500-19632	7.7 6.1-8.6	6.9 0-15.5	295 4-1180	0.22 0-2.27	2.11 0.02-7.18	0.061 0-0.577	3.16 0.01-11.26
	SF	14	768.3 763.8-779.6	12.0 5.8-19.1	10.5 4.4-22.5	841 366-1485	8.4 7.4-9.9	0.6 0.2-0.8	109 4-286	5.74 0-18.38	0.50 0.06-2.30	0.239 0-1.136	0.44 0.05-1.15
2012-2013	MC	12	761.1 758.8-763.2	17.3 10.2-27.4	1.8 0-12.2	11731 1334-26031	7.4 5.6-8.3	7.7 1.0-16.0	412 16-1717	0.20 0-0.81	4.35 0.21-12.49	0.013 0.002-0.072	ND
	SF	6	761.2 759.3-762.9	15.3 6.2-27.6	14.9 6.73-22.15	1140 472-2739	8.5 7.7-9.8	0.7 0.4-1.4	738 102-2683	5.81 0.25-12.66	0.09 0.03-0.15	0.202 0.017-0.777	ND
2013-2014	MC	7	758.6 756.8-760.3	22.3 16.5-26.6	4.4 0.06-14.75	10696 6856-13335	7.4 5.9-8.2	6.2 3.8-7.8	369 24-744	ND	ND	ND	4.64 0.11-16.33
	SF	8	760.4 757.7-767.8	16.8 9.4-22.2	7.7 3.5-17.7	732 581-1189	8.0 7.3-8.6	0.4 0.3-0.6	674 43-2323	ND	ND	ND	0.75 0.10-1.26
2014-2015	MC	12	759.4 756.3-761.3	17.3 15.5-20.8	2.6 0.1-12.1	7903 1602-15325	7.2 5.5-8.2	4.5 0.8-9.0	137 25-565	0.02 0-0.07	2.47 0.07-5.34	0.027 0.011-0.045	3.68 0.98-6.24
	NF	2	759.9 759-760.8	16.3 16.2-16.3	3.1 1.3-4.9	6609 4363-8854	7.2 6.6-7.9	3.6 2.3-5.0	65 64-66	2.00	0.78	0.284	1.29
	SF	9	758.7 750.5-761.3	18.1 14.9-23.3	6.9 1.2-15.6	963 664-1174	7.6 7.2-8.4	0.5 0.3-0.7	501 26-1717	1.28 0-5.41	0.26 0.03-1.06	0.051 0.006-0.188	0.53 0.19-1.03

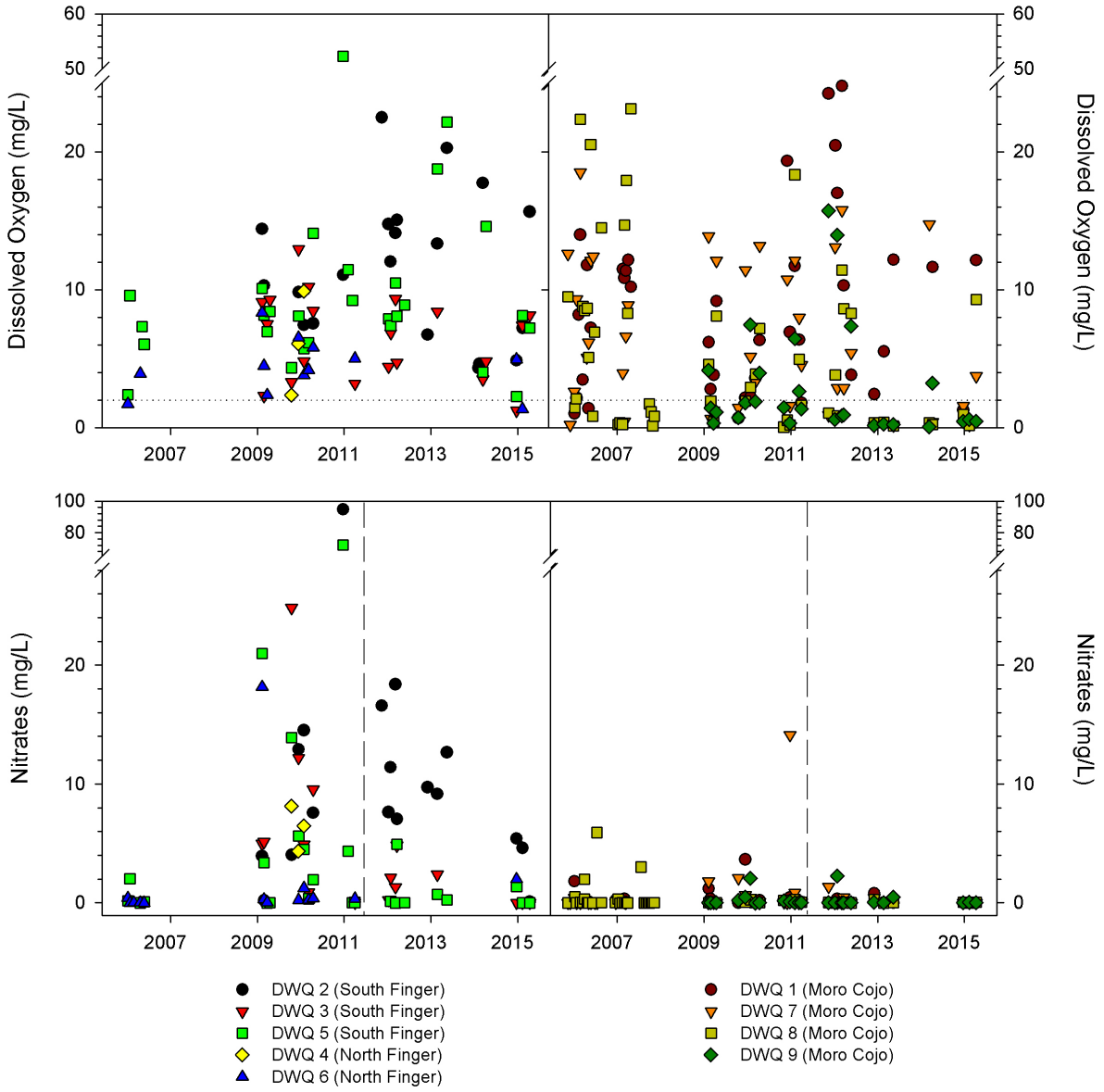


FIGURE 9. DISSOLVED OXYGEN AND NITRATE LEVELS AT ALL WATER QUALITY STATIONS. MORO COJO VALUES (RIGHT) ARE PRESENTED FOR COMPARISON TO NORTH AND SOUTH FINGER VALUES (LEFT). THE DOTTED LINE IN THE OXYGEN GRAPH INDICATES 2 MG/L, THE LEVEL AT WHICH CONDITIONS BECOME HYPOXIC. THE DASHED LINE IN THE NITRATES GRAPH INDICATES THE DATE THE SEDIMENT BASIN WAS INSTALLED.

Low dissolved oxygen levels can impact fish egg development. Effects range from a lowered rate of development to premature hatching to production of malformed larval fish (Alderdice et al. 2011). Low DO can also change fish behavior, including changes in activity level, increased use of air breathing, increased use of aquatic surface respiration, and vertical or horizontal habitat changes, all of which may cause the fish to be more vulnerable to predation (Kramer 1987). Additionally, low dissolved oxygen may change predator-prey interactions depending on the physiological tolerance of the predator and prey involved (Breitburg et al. 1997). Dissolved oxygen, temperature, pH,

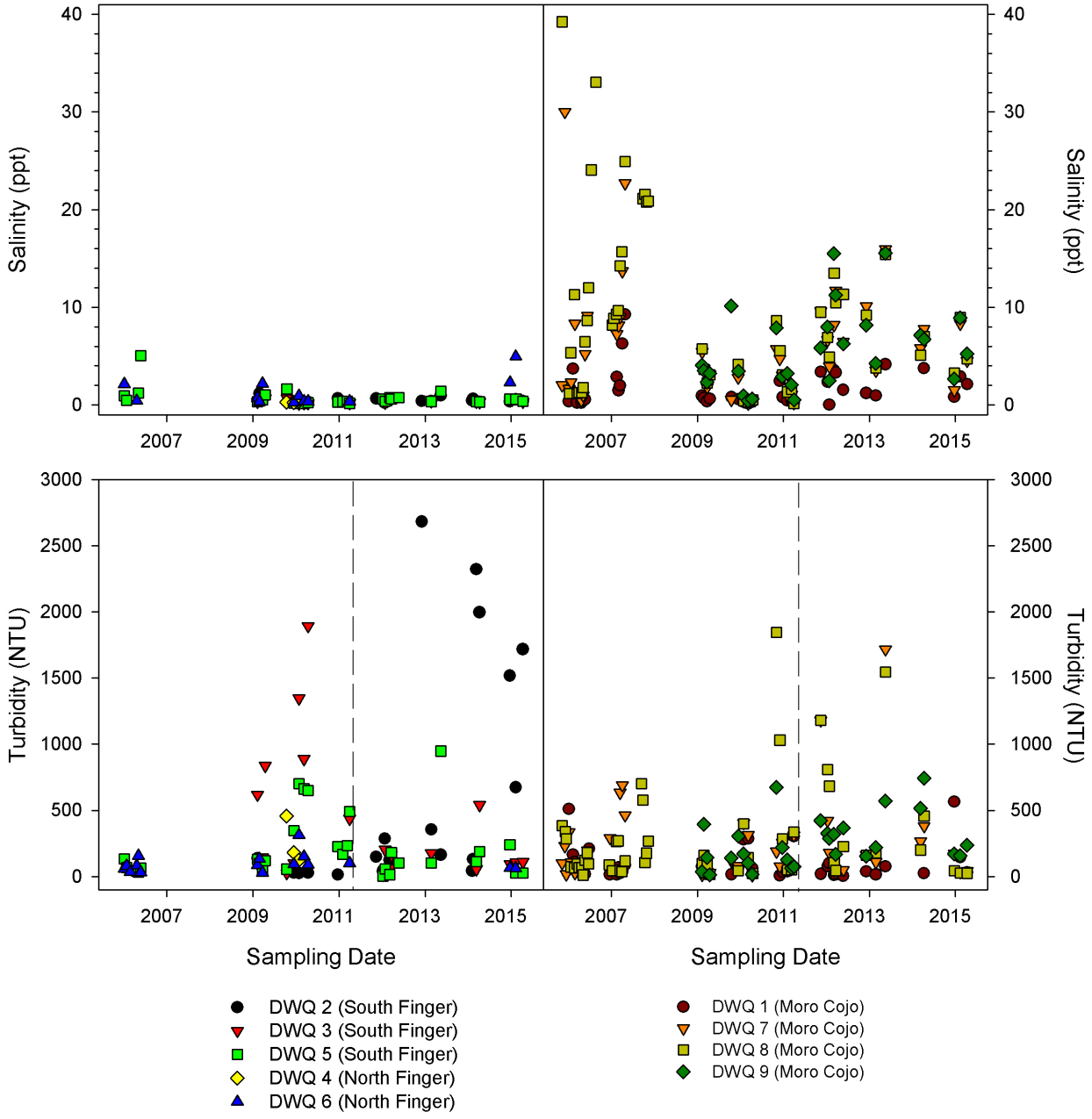


FIGURE 10. SALINITY AND TURBIDITY LEVELS AT ALL WATER QUALITY STATIONS. MORO COJO VALUES (RIGHT) ARE PRESENTED FOR COMPARISON TO NORTH AND SOUTH FINGER VALUES (LEFT). THE DASHED LINE IN THE TURBIDITY GRAPH INDICATES THE DATE ON WHICH THE SEDIMENT BASIN WAS INSTALLED.

salinity and water conductivity, organic carbons, and pollutants are important habitat factors that can affect survival, growth, maturation, and physical development of amphibians (Dodd 2009).

Nitrates are one of the commonly cited nutrients that cause eutrophication in natural water systems. Agricultural fields, in particular the fertilizers used, are one of the largest contributors. Given the high level of fruit and vegetable cultivation in the area around the North and South Finger, it is not surprising that some water samples contained higher nitrate levels than levels found in the Moro Cojo (Figure 9). The EPA has set the maximum contaminant level of nitrates in drinking water at 10 mg/L, but the effects off excess nitrates on natural water systems are seen at much lower levels. Exposure to high ammonium nitrate concentrations (180 mg NH_4NO_3) for as little as 48h caused 60% mortality in some larval amphibian species (García-Muñoz et al. 2011). The effects of nitrate combined with ambient UV-B radiation was shown to reduce larval mass and survival in Pacific tree frog larvae (Hatch & Blaustein 2003). Many species of amphibian larvae exhibit reduced feeding activity, swim less vigorously, showed disequilibrium and paralysis, suffered abnormalities and edemas, and eventually died when exposed to nitrate and nitrite (Marco et al. 1999). For example, Pacific tree frog larvae experienced 50% mortality when exposed to 1.23 mg/L nitrite for 15 days and 50% mortality when exposed to 5.5 mg/L nitrite for 4 days. Observations in the Moro Cojo of nitrite levels greater than 1 mg/L were observed, and although they may not cause mortality, there would almost certainly be sublethal effects (Marco et al. 1999).

Salinity remained low in the mitigation site, because the main source of water during the drought was freshwater runoff from the surrounding agriculture fields. During high water levels, the water from the Moro Cojo can flow into the lower parts of the South and North Fingers. Freshwater inputs from the slough are very positive to all the wetland ecosystems in the slough, including the Dolan mitigation sites. In contrast, saltwater inputs from the ocean can devastate the same wetlands and even their adjacent upland buffers. For example, reduction in biodiversity has been observed in freshwater aquatic ecosystems due to salinity increases, which are a symptom of changes to land use (Brock et al. 2005). Although responses are variable, both freshwater plant germination and zooplankton hatching can be decreased by increases in salinity (Brock et al. 2005), and aboveground vegetation of freshwater marsh plants can be killed by transient saltwater intrusion events (Flynn et al. 1995). Amphibians are the most endangered species in the Moro Cojo, and they have low tolerance to salinity because they are not good osmoregulators (Gomez-Mestre at al. 2004). Likewise, although little data are available on salinity effects on tadpoles, in general, the lower the salinity the better (Dodd 2009).

Unfortunately, salinity fluctuations are a major problem in the adjacent Moro Cojo, threatening these critically endangered freshwater ecosystems. Fortunately, however, the existing roads, dikes and culverts between the Dolan Ranch and the main slough make the North and South Fingers important refuges from an ocean salinity event. The mitigation work, particularly at South Finger, improved this refuge status. This was clearly demonstrated during the mitigation, when the tide gates failed at Moss Landing Harbor and salt water filled all the main slough inland of Castroville Boulevard in December 2014. We helped monitor the salinity changes with researchers from Moss Landing Marine Labs. The entire slough was elevated to the salinity of seawater and above. Adjacent to the Dolan

mitigation sites, the salinity of the slough was 40 ppt. The elevated salinities lasted until at least the next winter rains. The impacts to the endangered amphibian populations are undocumented, but were surely extremely negative. At a minimum, freshwater ponds for rearing young were completely unavailable to these animals that winter season. Even short-term pulses of high salinity water can have catastrophic effects on freshwater wetland communities, particularly vulnerable life history stages of threatened and endangered amphibians (Gomez-Mestre et al. 2004, Dodd 2009). Ocean salt water did not reach the pond in the South Finger and the pond just below North Finger. The Dolan fingers were and will remain refugia for the amphibians and the entire freshwater ecosystem. The mitigation work enhanced the refuge effect, while creating and enhancing a freshwater ecosystem that can be protected from salt water. This slough-wide saltwater intrusion event was very different from the occasional high salinities we documented (Figure 8). These were in very small water pockets on or next to the sites, often the bottom of ditches, where freshwater inputs were very limited after winter rains and were followed by significant evaporation.

The construction of the sediment basin and culverts around South Finger created the capacity for water to pond on the western side and middle of the site. Increased water residence time in the wetland of South Finger increases the ability of the wetland plants to filter sediments and take up nutrients. As shown in Figures 9, 10, and 11, both suspended solids (turbidity) and nitrates declined after the construction of the sediment basin, especially as the water moved from DWQ 2, the easternmost water quality station, to DWQ 5, the westernmost water quality station. Water quality instrumentation changed in 2014 and thus our ability to quantify low levels of nitrates was reduced, but the trend of decreased nitrates was present in 2013 and early 2014 and continued in 2015. Although this was not the intent of the mitigation, it is gratifying to see that the wetland is improving water quality onsite.

Staff plates showed a maximum water depth in the South Finger wetland of approximately 70 cm. Water depth averaged approximately 50 cm during the wet season. During the summer and fall, the sediment basin often filled with runoff from the surrounding farmland but rarely did the water level get high enough to spill into the wetland through the culvert. Occasionally runoff from the fields north of the South Finger wetland would collect in road along the site. Once water entered the wetland, straw bales were placed at the road-wetland interface along the fenceline to prevent sediment from entering the wetland (Figure 4).

Measurement of sediment depths revealed that sediment was not very mobile, except for occasional deposition on the north side of South Finger and at the east end of North Finger. Farmers then moved this sediment, either into erosional gullies or back into fields, so that sediment depth remained stable in both fingers throughout the mitigation work.

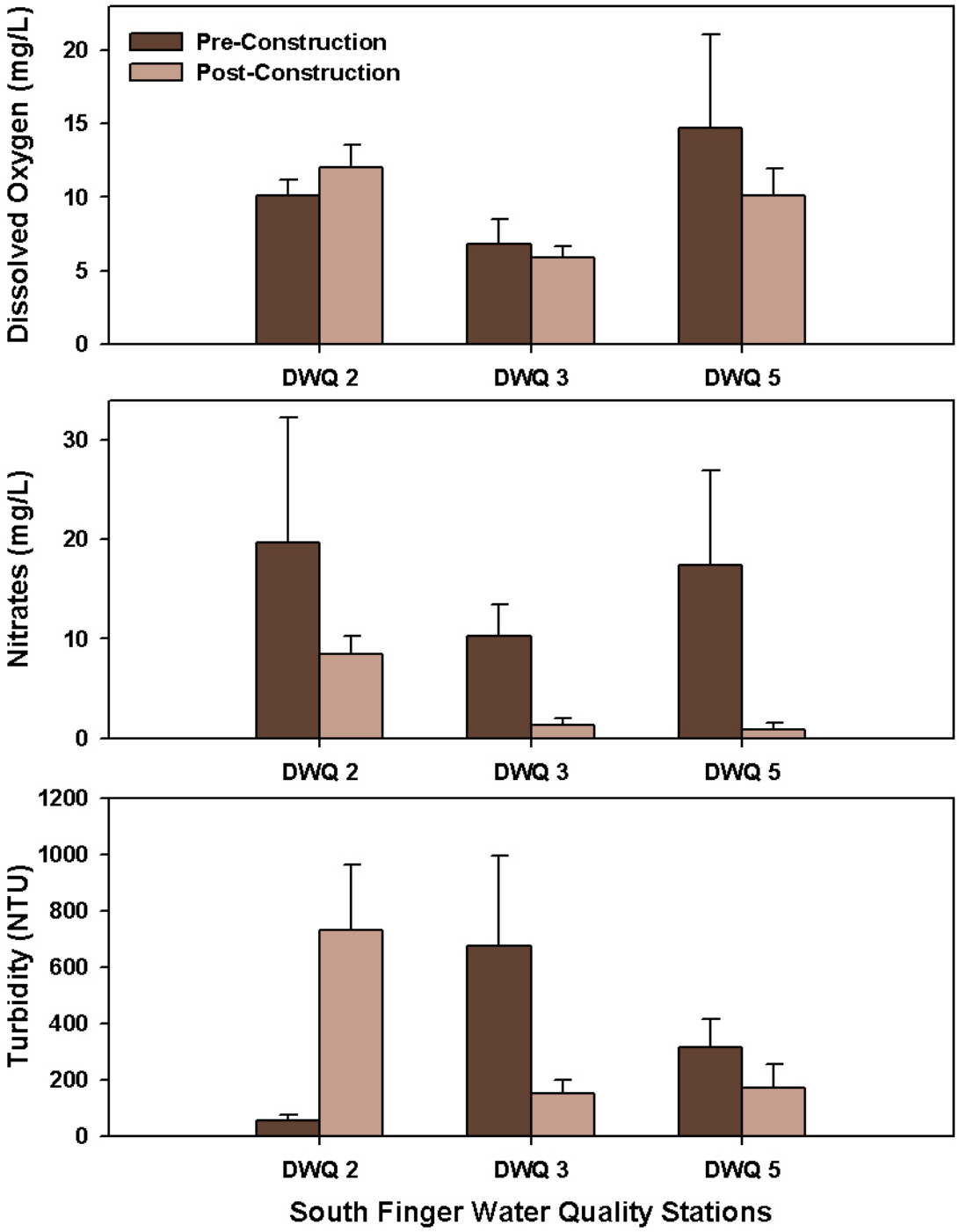


FIGURE 11. SELECTED WATER QUALITY AND NUTRIENT PARAMETERS FOR THE WETLAND IN SOUTH FINGER.

B.3 HABITAT

Measurement of ecosystem function improvement can be difficult, thus scientists and managers often rely on indirect effects to gauge recovery. In addition to ratios of native and non-native plant cover in the success criteria, habitat usage by animals is another measure of ecosystem function. For the North and South Finger mitigation, we surveyed habitat usage by both birds and amphibians, two groups that have been negatively impacted by development and agriculture.

A total of 4,057 bird observations over 54 surveys were made between 2011 and 2015. The total count was 8,213 individual birds and 113 unique species. Fifty percent of the observations were in the oak, willow, and upland scrub habitats and another 30% of the observations were in the grasses, sedges, and rushes of the high and low wetland.

Bird species richness and abundance are shown in Figure 12. There is some evidence of higher numbers of individuals and species in the earlier spring surveys, which may correspond to more water onsite, but in general habitat use is fairly consistent in spring and fall. Table 6 shows the top ten most frequently observed/most abundant species, which together account for about 50% of the observations. Not surprisingly, species

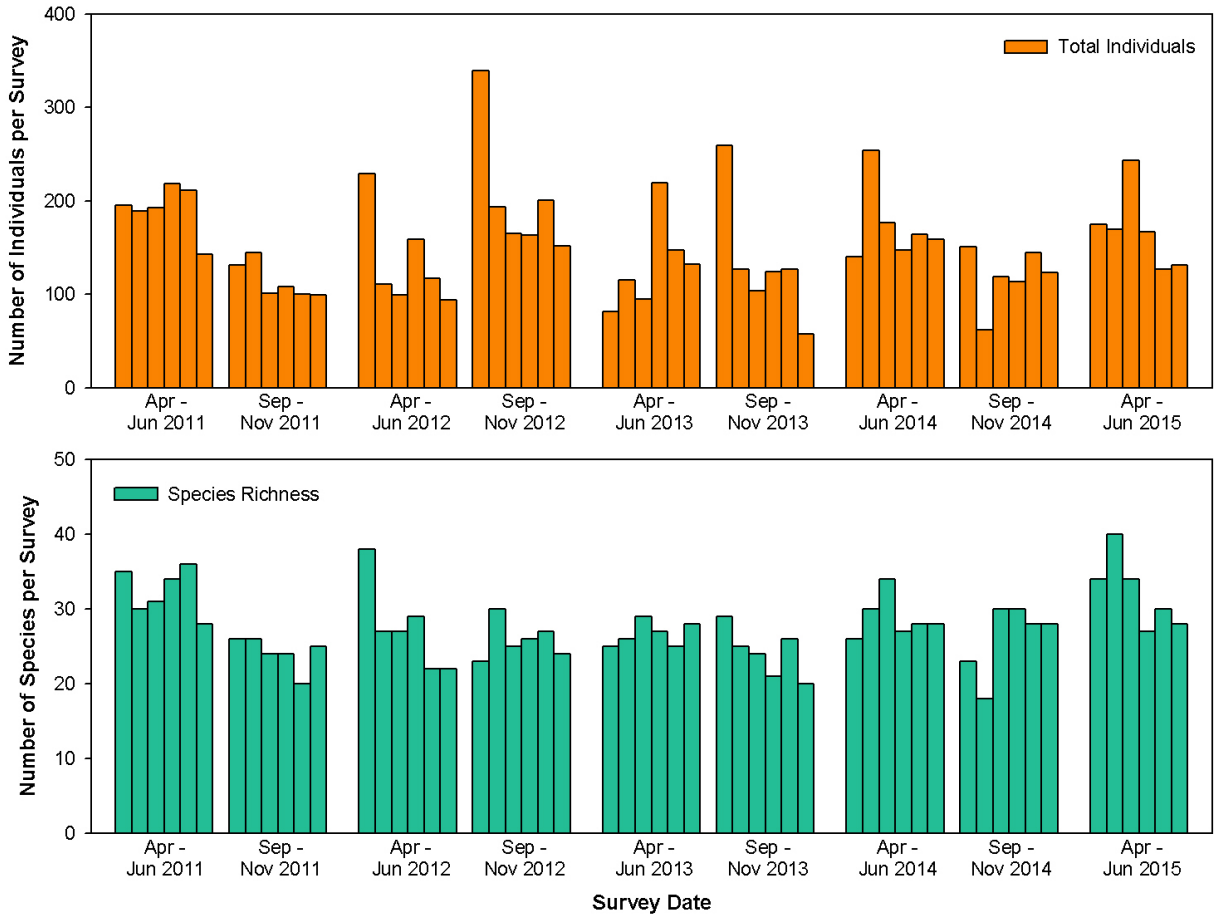


FIGURE 12. TOTAL NUMBER OF INDIVIDUAL BIRDS (TOP) AND BIRD SPECIES (BOTTOM) FOR EACH SURVEY.

descriptions for these birds describe them as being commonly found in brushy areas, hedgerows, and riparian areas. Table 7 is a complete list of all bird species recorded at the mitigation site.

TABLE 6. TOP TEN MOST FREQUENTLY OBSERVED BIRDS OF NORTH AND SOUTH FINGER.

Common Name	Frequency of Occurrence
Song sparrow	12.9
Bewick's wren	7.4
Western scrub jay	6.2
American crow	5.0
Common yellowthroat	4.1
American goldfinch	3.5
Black phoebe	3.1
Barn swallow	3.1
House finch	3.1
Cliff swallow	2.8

Observations of habitat use included feeding, bathing, singing, flying and resting at the beginning of the mitigation work. By 2015, birds had also been seen to engage in courtship displays (Anna's hummingbird, downy woodpecker, white-tailed kite, cinnamon teal), copulate (white-tailed kite), carry nesting material (California towhee, American crow, common yellowthroat), nest (white-tailed kite), and carry food to presumed nests (song sparrow, American crow). In 2015, a pair of cinnamon teals were observed drumming in April (a courtship behavior) and later in the spring a family of cinnamon teals (adult male, adult female, 7 new chicks) were observed swimming in the wetland. Migratory birds were also observed using the Fingers (Black-headed grosbeak, cedar waxwing, Pacific-slope flycatcher, Swainson's thrush, yellow warbler, Wilson's warbler) as a stop on their way between breeding and wintering grounds. Rare vagrants included Baird's sandpiper, clay-colored sparrow, rufous hummingbird, and willow flycatcher.

Amphibians are among the most threatened group of vertebrates, facing extinction and large-scale declines worldwide (Collins & Crump 2009). Santa Cruz long-toed salamander (SCLTS), California tiger salamander (CTS), and California red-legged frogs (CRLF) have all been found within a mile of the mitigation site (CNDDB 2014). All three species' ranges have been reduced due to a wide variety of human impacts to habitat, including habitat fragmentation, urban encroachment, construction of reservoirs and water diversions, contaminants, agriculture, and livestock grazing. Introduction of non-native predators and competitors also continues to threaten the viability of many populations (USFWS 1999, 2002, 2014). SCLTS, CTS and CRLF breed in ponds and migrate to upland grassland, scrub or woodland habitat during the nonbreeding season, where they spend a substantial portion of their life underground in small mammal burrows or among the roots of scrub and woodland trees and shrubs. SCLTS, CTS and CRLF are vulnerable to predation and vehicle traffic during their nocturnal migrations from breeding ponds to upland habitats, migrations which range from 400 ft to greater than 1 mile (USFWS 1999, 2002, 2014).

Amphibian surveys in 2012 revealed the presence of slender salamanders (*Batracoseps* sp., likely *B. gavilanensis*) under boards, woody debris and potted plants and thousands of Pacific chorus frog tadpoles (*Pseudacris regilla*) in the ponded area of the wetland, both in South Finger (Dayton 2012). North Finger is dominated by willow thickets in sandy soil and no suitable breeding habitat or amphibians were detected. In 2014, only the South Finger was surveyed, and again, thousands of Pacific chorus frog tadpoles were found in

TABLE 7. COMPLETE LIST OF BIRD SPECIES REPORTED AT THE MITIGATION SITE.

Acorn Woodpecker	European Starling	Red-tailed Hawk
Allen's Hummingbird	Fox Sparrow	Red-winged Blackbird
American Coot	Gadwall	Rock Pigeon
American Crow	Golden-crowned Sparrow	Ruby-crowned Kinglet
American Goldfinch	Great Blue Heron	Savannah Sparrow
American Kestrel	Great Egret	Say's Phoebe
American Pipit	Great Horned Owl	Semipalmated Plover
American Robin	Great-tailed Grackle	Snowy Egret
Anna's Hummingbird	Greater Yellowlegs	Solitary Sandpiper
Baird's Sandpiper	Green Heron	Song Sparrow
Band-tailed Pigeon	Hairy Woodpecker	Sora
Barn Owl	Hermit Thrush	Spotted Towhee
Barn Swallow	House Finch	Swainson's Thrush
Bewick's Wren	House Wren	Swamp Sparrow
Black Phoebe	Hutton's Vireo	Townsend's Warbler
Black-crowned Night-Heron	Killdeer	Tree Swallow
Black-headed Grosbeak	Least Sandpiper	Tricolored Blackbird
Black-necked Stilt	Lesser Goldfinch	Turkey Vulture
Blue-gray Gnatcatcher	Lincoln's Sparrow	Varied Thrush
Blue-winged Teal	Loggerhead Shrike	Vaux's Swift
Brewer's Blackbird	Mallard	Virginia Rail
Brown-headed Cowbird	Marsh Wren	Warbling Vireo
Bushtit	Mourning Dove	Western Kingbird
California Quail	Northern Flicker	Western Meadowlark
California Thrasher	Northern Harrier	Western Scrub-Jay
California Towhee	Northern Mockingbird	Western Tanager
Canada Goose	Northern Rough-winged Swallow	Western Wood-pewee
Cedar Waxwing	Northern Shoveler	Whimbrel
Chestnut-backed Chickadee	Oak Titmouse	White-crowned Sparrow
Cinnamon Teal	Olive-sided Flycatcher	White-faced Ibis
Clay-colored Sparrow	Orange-crowned Warbler	White-tailed Kite
Cliff Swallow	Pacific-slope Flycatcher	Willow Flycatcher
Common Gallinule	Peregrine Falcon	Wilson's Snipe
Common Raven	Prairie Warbler	Wilson's Warbler
Common Yellowthroat	Purple Finch	Wrentit
Cooper's Hawk	Red-necked Phalarope	Yellow Warbler
Downy Woodpecker	Red-shafted Flicker	Yellow-rumped Warbler
Eurasian Collared-Dove	Red-shouldered Hawk	

the ponded area of the wetland (Dayton 2014). Likewise in 2015, thousands of Pacific chorus frog tadpoles were found in the ponded area of South Finger. Slender salamanders were found sheltering under coverboards as well as a few Pacific tree frogs, some voles, mice, and a few ant colonies. Coverboards were left onsite at South Finger to aid future amphibian surveys. For the first time, 8 California red-legged frog tadpoles were also found in minnow traps (Figure 13, Dayton 2015). This represents a significant find in that the South Finger mitigation site was literally a parking and storage lot for agricultural vehicles in 2005.

CRLF are likely to be able to persist in a greater variety of habitats than SCLTS and CTS (Dayton 2015). The lack of suitable upland habitat in the area of the South Finger wetland and the lack of ponded freshwater at North Finger wetland are likely important factors in the lack of detection of SCLTS and CTS at the site. The mitigation sites are within dispersal distance of known breeding locations in the Moro Cojo, although occasional salinities as

high as 9.2 ppt at DWQ 1 indicate that salt water intrusion may become a threat to populations of SCLTS, CTS and CRLF in the Moro Cojo.

Mammals were not surveyed for this work, but frequent observations of tracks and scat of deer, raccoon, coyotes and bobcats show that the habitat has become a refuge and foraging area for wildlife.

FIGURE 13. CALIFORNIA RED-LEGGED FROG TADPOLE CAPTURED IN A MINNOW TRAP IN SOUTH FINGER. ALSO PRESENT IN THE PHOTO ARE STICKLEBACK FISHES AND A PACIFIC CHORUS FROG TADPOLE.

B.4 PHOTOMONITORING

For this mitigation project photomonitoring has been used qualitatively; however it has the ability to dramatically portray the changes in plant communities and habitat quality that the quantitative data reflect (Figures 14 and 15). All photomonitoring images, including aerial imagery, were archived for future use (see Appendix C and accompanying DVD).

V. Farmer and Landowner Interactions

Because this project involved a number of different individuals and entities, coordination was of primary importance. Initial meetings were held between agencies, the MLPP and scientists to determine the goals and scope of the project. Extensive negotiations were then undertaken between MLPP, the Landowners, and the Monterey County Ag Trust to work out the extent and stipulations of the Conservation Easement. Another round of discussions then ensued between MLPP, the landowners, the Ag Trust, the scientists, and the farm leaseholders to establish the rights, responsibilities, and obligations of each party. The sediment basin was planned and constructed via various combinations of MLPP, the landowners, farmers, scientists and consulting engineers. Frequent communication was required between the leaseholders, farm workers, and the restoration crew so that both groups could share schedules and not impede the other group's activities. And lastly, frequent conversations and reports were exchanged between MLPP, the restorationists, and the monitoring scientists to allow adaptive management of the restoration plan and the workflow. Results of all of these interactions are discussed below.

Figure 14. Compilation of photos from a South Finger photomonitoring site shows the development of the native plant community.

Interactions and discussions with the farmers resulted in several actions. The sediment basin in the South Finger was designed and constructed to help manage water drainage and help minimize pesticide, sediment and fertilizer runoff into Moro Cojo. Since the boundaries of the mitigation area were not always clear to the farmers, a fence was installed to mark the boundaries (Figure 2). Signage in both English and Spanish is being put up on the fence to inform future workers of the Conservation Easement. Signs will have 6 lines of text (3 each in English and Spanish): Fragile Water Habitat, Please Do Not Disturb, Conservation Easement. Discussions were held about the timing of sediment removal from the sediment basin, and maintenance criteria were discussed. Contacts were made with the Monterey County Resource Conservation District so that the farmers could receive specific advice on erosion control and other farm practices. The purposes and goals of the restoration were presented to the farm crew leaders as a means of getting their buy-in on the project. We hope that this will have a positive impact on some of their practices that are detrimental to the restoration, including equipment and personnel incursions and over-spraying. We continue to maintain good relations with the farmers.

FIGURE 15. SOUTH FINGER MITIGATION SITE IN 2014, WITH THE ORIGINAL CONDITION IN 2005 (INSET).

VI. Mitigation Summary

Over the course of the mitigation work, native plants have become the dominant vegetation onsite, covering 95% of the acreage of both North and South Finger and meeting the success criteria for years one through five (Table 8). Success criteria were met each year through weed control to remove non-native vegetation, planting of native vegetation, and watering, if needed, to enhance native plant survival. Construction of the berms, the sediment basin, and a culvert system enabled the sites to pond water, which enhanced survival of native plants. Fencing was constructed to delineate mitigation site boundaries and encourage farmers to restrict spraying and driving to farm property.

Water quality parameters were not negatively impacted by the mitigation activities. In fact, the construction of the sediment basin allowed the South Finger wetland to begin taking up excess nitrates and the movement of the water through the wetland allowed turbidity decreases before outflows entered the Moro Cojo. The culvert system may have helped protect the mitigation sites from salt water flooding in December 2014. Although no definitive success criteria were assigned to water quality as it is dependent on adjacent farming practices, suspended sediments and nutrient levels appear to have decreased as a result of mitigation without compromising dissolved oxygen levels.

Ecosystem development, including in animal species usage was demonstrated through monitoring. Bird usage increased from 63 species in 2011 to 113 species in 2015; birds were observed to first use the habitat and later nest at the mitigation site. Amphibians were present at the site as soon as the wetland began to hold water, and in early 2015, California red-legged frog tadpoles were discovered in South Finger. There is evidence that other wildlife extensively uses the area.

Table 8. Success criteria for the mitigation project.

Year	Non-native cover (%)		Increase in native cover from yr 1 (%)		Survival of planted species from previous years (%)	
	Target	*Achieved*	*Target*	*Achieved*	*Target*	*Achieved*
2011 (year one)	≤ 30	28.5				
2012 (year two)	≤ 20	19.7		80.3		
2013 (year three)	≤ 15	5.7	40-60	94.3	60	85
2014 (year four)	≤ 10	2.2	50-60	97.8	60	70
2015 (year five)	≤ 5	4.1		95.9	60	70

VII. Permit Compliance Summary

This work was undertaken to fulfill Condition 12 of the Combined Coastal Development and Use Permit (PLN990233) for the MLPP. The CDFW-mandated 2:1 acreage requirement required 12.78 acres of wetland to be enhanced. The combined acreage of the restored North Finger (8.18 acres) and South Finger (4.6 acres) exceeds this requirement.

There were 7 conceptual goals identified as guidelines for the selection of the site (see Section I.A):

- Eradication of invasive non-native plant species
- Management of habitat in and around wetlands in a manner conducive to enhancing wildlife habitat values
- Revegetation of barren and degraded areas with native plant species
- Minimization of sedimentation and soil erosion through the use of vegetation cover and other surface erosion control measures
- Improvement of stormwater detention facilities to protect/enhance water quality of the slough from agricultural and urban runoff
- Management of water and drainage to accommodate agricultural uses on adjacent lands
- Identification of practices to minimize erosion, control irrigation drainage, and minimize pesticide and fertilizer runoff into wetlands.

The selected Dolan Ranch site allowed all of these conceptual goals to be addressed. Most of these goals were included in the specific Success Criteria for the mitigation plan which governed the project implementation, while others were addressed via discussions with the farmers (Section III.D.).

The final success criteria (from Section I.D.) and results were as follows:

1. Coverage of non-natives on the vegetated area of the mitigation site will not exceed 5%.
   Result: Goal Fulfilled (Section IV.B.1)

2. Species composition of 90-95% natives will be reached.
   Result: Goal Fulfilled ((Section IV.B.1)

3. Native plants will have been maintained without need for drip irrigation for last year.
   Result: Goal Fulfilled ((Section IV.B.1)

4. A target minimum of 60% survival of planted species from previous years will be maintained.
   Result: Goal Fulfilled ((Section IV.B.1)

5. Culvert controls under roads installed and tested.
   Result: Goal Fulfilled (Section II.B)

6. Threatened or endangered species maintained at minimum and increased if possible..
   Result: Goal Fulfilled (Section IV.B.3)

7. Suspended sediment, nutrient and pesticide levels in surface flow trending down.
   Result: Goal Fulfilled (Section IV.B.2)

In summary, all of the success criteria of the mitigation have been met, all of the conceptual goals have been fulfilled, and all of the requirements of the Combined Coastal Development and Use Permit are now complete. The mitigation has been a complete success, and serves as a shining example of what can be done when industry, government, agriculture, scientists, and restorationists work towards a common goal.

VIII. ACKNOWLEDGEMENTS

This work would not have been possible without the support and vision of Kathy Genasci at MLPP.

Melanie Mayer Gideon shepherded the project in its initial stages through various departments at the Monterey County offices.

Sherwood Darington of the Monterey County Ag Trust provided guidance and support in developing the Conservation Easement.

None of the shovel work would have gotten done without lots of people working long hours onsite to weed, plant, and monitor the mitigation sites. The Coastal Conservation and Research, Inc. crew of restorationists included Cara Clark, Jane Echenique, Scotty Gabara, Nora Grant, Sarah Jeffries, Kevin O'Connor, Niko Oliver, Kellie Ray, Jasmine Ruvalcaba, Sue Shaw, Dorota Szuta, and Paul Tompkins.

The monitoring activities were overseen by Creative Environmental Conservation, Inc., and thanks go out to Kamille Hammerstrom, Gage Dayton, Rick Fornier, Jim Oakden, Sierra Ryan, and Peter Slattery. John Oliver of Moss Landing Marine Labs was involved in many aspects of the project.

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APPENDIX A - IMPLEMENTATION PLAN FOR THE DOLAN PROPERTY OFFSITE MITIGATION

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Implementation Plan for the Dolan Property Offsite Mitigation

Prepared for LSP Moss Landing, LLC – Moss Landing Power Plant

Prepared by Melanie Mayer Consulting

July 9, 2006

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1. INTRODUCTION

As a result of the demolition of the fuel oil tank farm at the Moss Landing Power Plant, Duke Energy was required to perform environmental mitigation (Figure 1). Specific conditions for the development of these wetland mitigation plans are found in the Combined Coastal Development and Use Permit (PLN990233). Monterey County Planning Department and the California Department of Fish and Game (CDFG) have approved Duke's plans for both on and off site mitigation (Melanie Mayer Consulting 2002, Melanie Mayer Consulting 2005). On May 4, 2006 the Moss Landing Power Plant was purchased by LS Power and the Moss Landing Power Plant's name was changed from Duke Energy Moss Landing, LLC to LSP Moss Landing, LLC. Through the purchase and sale agreement, LSP Moss Landing, LLC has assumed the Tank Farm Demolition Coastal Development permit as well as the requirement to complete the required environmental mitigations.

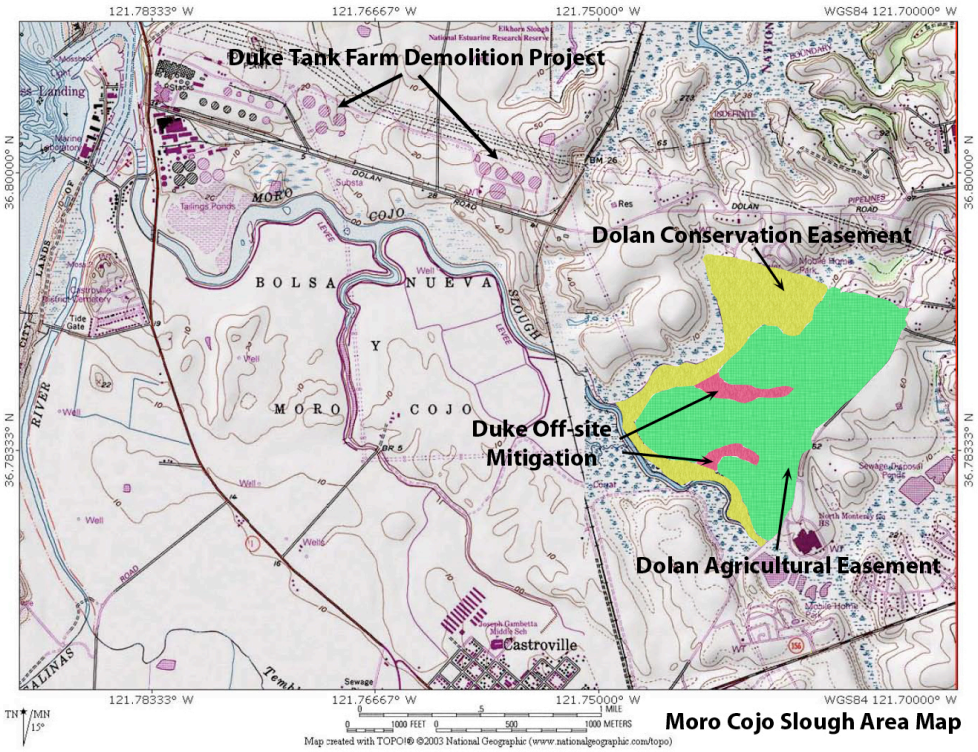

Figure 1: Area Map

The demolition of the fuel oil tank farm involved the disturbance of 6.39 acres of wetlands on the property. On-site mitigation for the project involved the preservation and enhancement of two existing ponds on the Moss Landing Power Plant property, covering over 13 acres. These ponds were part of the oil spill containment and the drainage systems

for the property. They provide unique wetland ecosystems that are ecologically important to protect and enhance (Melanie Mayer Consulting 2005). 12.78 acres or twice the disturbed acreage will be mitigated at an off-site location.

This document, the Implementation Plan for the Dolan Property Offsite Mitigation, is an updated and detailed implementation plan consistent with the 2002 general mitigation plan. This plan includes a brief history of the project, a description of the site to be enhanced, and a detailed plan for implementing restoration on the site owned by the Dolan family. The Moss Landing Power Plant (MLPP) mitigation site is a portion of a larger parcel that is being placed under a conservation easement to the Monterey County Agricultural & Historical Land Conservancy. The easement protects the site from future development and also greatly improves the ecological value of MLPP's investment in off-site mitigation, since the company will be contributing to a larger wetland restoration and conservation effort in the Moro Cojo Watershed. Once restored, the mitigation site will greatly exceed in size and quality of habitat the ponded areas that were lost as a result of the MLPP on-site tank removal project.

2. History: Consistency with Monterey County's Moro Cojo Slough Management and Enhancement Plan (1996)

Both the selection of the Dolan property as an off-site mitigation location and the implementation plan for this site are consistent with the 1996 Moro Cojo Slough Management and Enhancement Plan (Habitat 1996).

The Moro Cojo Slough Management and Enhancement Plan (MCSME) evaluated five alternatives to enhance resources within the lower Moro Cojo watershed. Each of the five design alternatives suggested actions to protect significant biotic resources, increase overall habitat values within the slough environs, resolve existing resource problems and land use conflicts and provide passive recreational /educational uses. The preferred alternative- Winter/Spring Freshwater Conditions, aims to create areas for freshwater impoundments within the lower slough watershed between Moss Landing Road and Castroville Boulevard. The plan also includes the creation of buffers between wetlands and agricultural land uses, specifically in areas upstream of the Southern Pacific Railroad Tracks.

2.1 Site selection consistent with concepts of the MCSME plan

The Duke Energy Mitigation and Enhancement Plan (Melanie Mayer Consulting 2002) established specific criteria for prioritizing mitigation sites within the Moro Cojo Slough Watershed that are most consistent both with the type of habitat that was impacted by the tank removal project and with the 1996 MCSME plan. The 12 criteria established that the site was both ecologically valuable and that landowners demonstrated some interest in working with MLPP to develop a management agreement. Monterey County Planning Department and the California Department of Fish and Game (CDFG) approved the 2002

plan and concepts. However, subsequent negotiations with landowners of the initial preferred sites proved unsuccessful. Plan implementation was delayed while an appropriate site could be identified.

Recently, the Monterey County Agricultural & Historical Land Conservancy negotiated with the Dolan family to place habitat (122 acres) and agricultural (281 acres) conservation easements on adjacent parcels in the upper Moro Cojo watershed (Figure 2). MLPP committed $50,000 to the purchase of the habitat conservation easement to secure a location for their off-site mitigation and fulfill permit conditions.

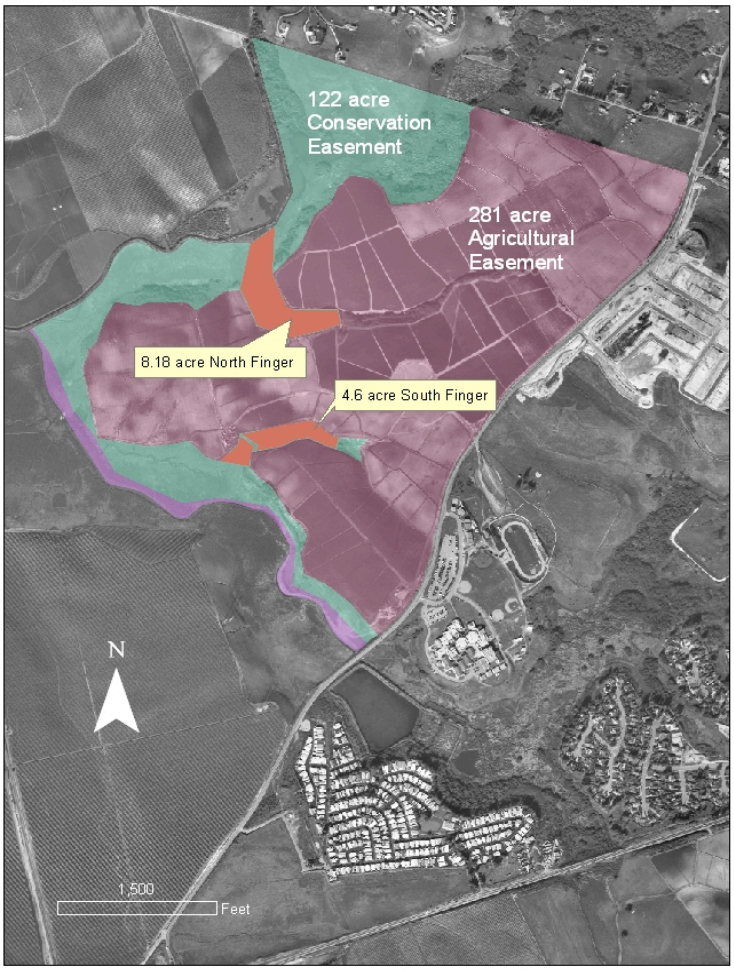

Figure 2: Dolan Property Map

Criteria	Description	Analysis of Dolan Property
Cooperative Ownership	Willingness of landowners to participate	Excellent- Dolan has signed a commitment to place the parcel under a conservation easement.
Sustainability	Stable and enduring land use and tenure	Excellent- Conservation easement will be overseen by Monterey Agricultural and Historical Trust in perpetuity.
Hydrology/ Wetness	Hydrologic patterns suitable for wetland persistence	Very Good- There is greater drainage area into the Dolan site than into all sites previously considered, i.e., it will be the wettest for the longest period of time.
Wildlife Habitat	Potential to support a diversity and quantity of wildlife species	Excellent- The large size of the Dolan parcel and the adjacent wetlands of the Moro Cojo Slough insure a higher diversity of species (habitat area is the most significant landscape factor determining species diversity).
Wetland Flora	Potential to support a diversity and quantity of wetland plant species	Excellent-The large size of the Dolan parcel and the adjacent wetlands of the Moro Cojo Slough insure a higher diversity of species (habitat area is the most significant landscape factor determining species diversity).
Threatened and Endangered Species	Contains elements needed to support listed species and is nearby sites known to have listed species	Excellent-Santa Cruz long-toed salamanders, red legged frogs, and tiger salamanders occur nearby the Dolan easement.
Wildlife Corridor/ Contiguousness	Potential to improve habitat between intact habitats to create a larger one	Excellent-The Dolan conservation easement is contiguous with several hundred acres of degraded wetlands in the slough which also can be enhanced
Number of Acres for Mitigation	Size of parcel	Excellent-MLPP's mitigation site (12.78 acres) is a key piece of a larger protected area. The entire Dolan conservation easement is 122 acres.
Groundwater Recharge	Potential to contribute to groundwater recharge	Very Good-Sandy soils on the upper portion of the site are ideal for groundwater recharge
Soils	To what extent will soils at the site support creation of a wetland	Very Good-The lower portions of the site are historic wetland soils.
Consistent with Area Planning	Is mitigation of the site in line with existent plans?	Site is consistent with both the 1996 Moro Cojo Slough Restoration and Enhancement Plan and the approved 2002 Duke Energy Wetland Mitigation and Enhancement Plan.
Proximity to MLPP Wetlands	Distance to MLPP's on-site wetlands	Good-The Dolan site is 2.3 miles from the on-site wetlands at the Moss Landing Power Plant.
Regional Need	How important is the restoration of the mitigation site relevant to regional needs.	High-The site is part of a significant arm of the Moro Cojo Slough, the largest restorable freshwater wetland on the central coast.

Table 1: Site selection criteria for Dolan Property

The Dolan site was not considered in the original plan because it was not available in 2002 when the plan was prepared. However, when measured against the same selection criteria, it compares favorably to any of the sites considered under the 2002 plan (Table 1). The location and habitat types on the Dolan site are most similar to the previously proposed Lyon site which also ranked high against the selection criteria.

Man-made freshwater ponds were lost in the MLPP tank removal project. The conservation easement established on the Dolan Property makes up part of a historical freshwater arm of the Moro Cojo Slough, thus it is a logical location to mitigate for the disturbance. The Dolan site ranks highest by most of the selection criteria used in the 2002 general mitigation plan (Melanie Mayer Consulting 2002). Many of these high ranks stem from the very large area of the habitat conservation easement on the Dolan parcel, and its contiguousness with an even larger area of wetlands in the upper Moro Cojo Slough (Figure 2). Larger habitat areas also permit greater heterogeneity of ecological conditions and thus more complex mosaics of native habitats and communities. The Dolan site is comparable to previous approved sites and is an acceptable site for the mitigation.

2.2 Implementation consistent with concepts of the MCSME plan

This off-site implementation plan recommends many of the actions outlined in the Winter/Spring Freshwater Conditions Alternative of the MCSME Plan. The references in parentheses below correspond to specific actions suggested in the MCSME Plan that will be addressed within this off-site implementation plan. The conservation easement was purchased from a willing landowner for the conversion of marginal agricultural land adjacent to the slough (A-2). As part of the agreement with the landowners, sediment basins will be constructed to minimize sediment inputs into the slough (A-3). Its location between agricultural land and the slough makes the conservation easement an ideal location to construct a buffer for filtering runoff (B-3, L-1).

3. Regional and site description.

Prior to the 1750's, indigenous people known as the Ohlone, inhabitated the Moro Cojo Region. The earliest known accounts of the region were from the Spanish explorers during the late 1500's (Gordon 1996). Their journals described the greater Monterey Bay region as an environment much wetter than today with large wetlands over lowland areas and native grasses and oak woodland covering much of the uplands. The area has rainfall patterns characteristic of other Central California coast areas without high mountains immediately inland. The average yearly rainfall is 17 inches. The Ohlone likely practiced land management within the Moro Cojo Watershed as they did in other areas, periodically burning grass and woodland and cutting shrubs. By the mid-1700's Spanish missionaries and large ranching families began to graze herds of cattle and sheep in the area converting many of the upland native grasslands to non-native species.

In the 1930's and 40's agricultural activities began to claim land within the Moro Cojo Watershed. Many of the wet areas were ditched, and levees and berms were constructed to drain the land and facilitate farming adjacent to the slough.

The property now owned by the Dolan Family likely changed from ranch land to farmland within this time frame. The upper portion of this property (the parcel now under agricultural easement) has been intensively farmed producing various crops, most recently strawberries. The lower portion of the site, historically too wet to farm, retains some characteristics of freshwater coastal wetland and riparian forest but has been significantly disturbed by land use activities on adjacent properties.

MLPP's off-site mitigation is composed of two significant fingers of the Moro Cojo Slough (Figure 2). The Dolan Family has entered into agreement with the Monterey County Agricultural and Historic Land Conservancy, Inc. to place a conservation easement over a 122 acre parcel that includes the mitigation sites. The purpose of the easement is to "enhance and protect the natural resources on the property, to preserve and protect the sloughs, wetlands, natural resources, and habitat on the property, and to preserve the open space characteristics of the property." (Easement Deed 2005) The Conservation Easement pursuant to Civil Code section 815.1 will run with the land in perpetuity. The landowner will also fence the perimeter of the mitigation site that borders the agricultural easement to prevent the farm activities from encroaching on the easement.

3.1 Morphology and Soils

The morphology of the two fingers that make up the mitigation site has changed significantly as a result of sediment inputs from neighboring fields. The soils in the area reflect the topography on the site as the coastal wetland transitions into the adjacent foothills (Figure 3). Below are the soil type descriptions for the immediate area according to the Monterey County NRCS soil map.

- DbE Diablo clay The Diablo series consists of well drained soils on uplands. These soils formed in material underlain by calcareous sandstone and shale. Permeability is slow and the available water capacity is 7 to 12 inches. Roots penetrate to a depth of 40 to 60 inches. This is a moderately steep soil on uplands. Slopes are mostly about 20 percent. Runoff is rapid, and the erosion hazard is moderate.

- Ad Alviso silty clay loam, drained The Alviso series consists of very poorly drained soils that formed in alluvium derived from sedimentary rocks. These soils are in basins and on tidal flats that have branched meander channels flushed by sea and freshwater. The vegetation is mostly hydrophytic plants.

- ShE Santa Ynez fine sandy loam. The Santa Ynez series consists of moderately well drained soils that formed on terraces in alluvium derived from sandstone and granitic rock. This soil is found on hilly areas with 15 to 30 percent slopes. Runoff is rapid and the erosion hazard is high. Plant roots can generally penetrate to a depth of 60 inches or more.

- Rb Rindge muck. The Rindge series consists of very poorly drained organic soils that formed in reed and tule residue and mixed mineral alluvium in freshwater marshes, sloughs and drainage channels. Runoff is very slow or water ponds on the surface. There is no erosion hazard. In some places the water table has been lowered by artificial drainage using open ditches, tide gates or pumping. If this soil dries out it is very difficult to re-wet.

The sandier soil from the fields is carried downhill towards the fingers by overland flows during precipitation events. The heavier sand is deposited at the top of the fingers while the lighter silt is carried along and deposited near the base of the fingers. As part of the easement agreement the landowner has committed to having sediment basins above each of the mitigation sites. In addition to reducing sedimentation into the mitigation site, the basins will reduce stress on the wetland vegetation below, by providing a water source during a portion of the dry season.

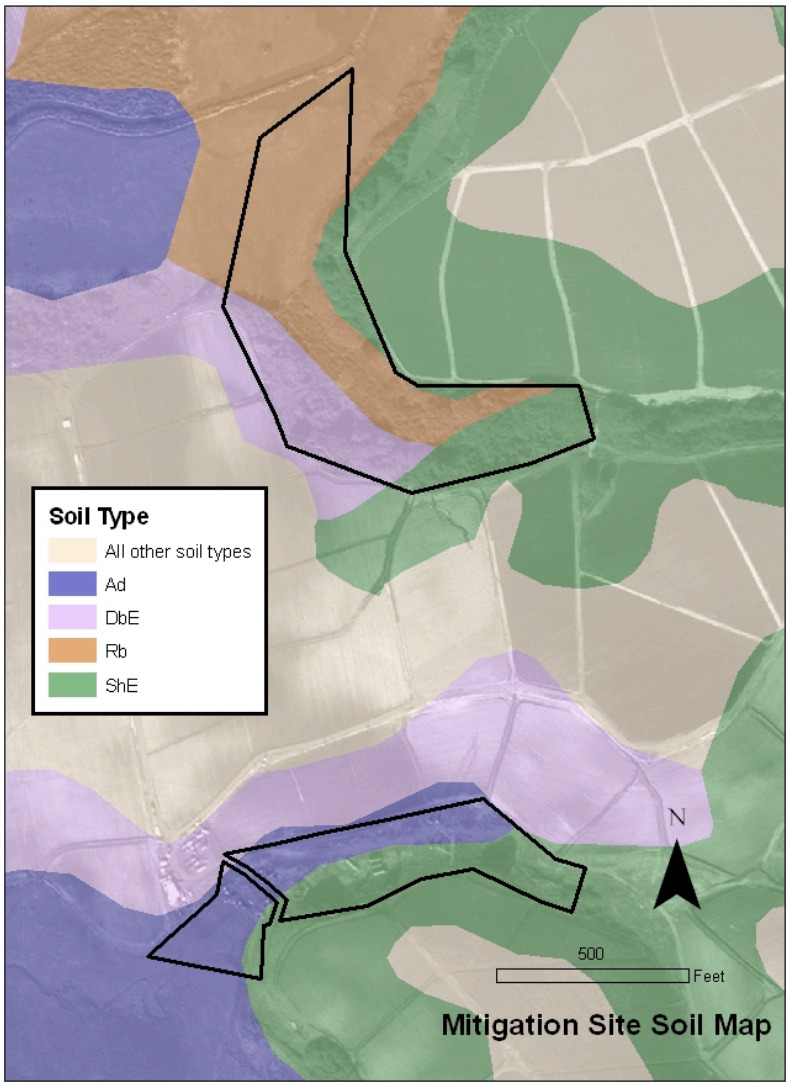

Figure 3: Soil Map

3.2 Hydrology

Hydrology on the Dolan Property is typical of strawberry cultivation on the hills surrounding Moro Cojo Slough. The North Finger drains approximately 100 acres of agricultural land while the South Finger drains approximately 60 acres of agricultural land (Figure 4). Both Fingers drain into a prominent arm of Moro Cojo Slough, an impaired water body listed on the California 303d list. Primary threats to the resources of the slough are nutrient inputs, inadvertent release of hazardous materials and persistent pesticide residue. In addition to creating additional habitat, wetland construction like that proposed for the mitigation site can help to improve water quality in the Slough.

The slopes of the hills on the Dolan Property vary from 10% to 30%. Runoff can be high velocity when strawberry fields are covered with plastic and can carry large pulses of fine grain sediment. Surface water flow is dependent on both precipitation and irrigation patterns. Sedimentation is an issue on both of the Fingers. This has been addressed to some extent by recent improvements in furrow alignment. The landowner has agreed to have sediment basins above each of the fingers to further minimize sediment entering the mitigation sites. The necessary placement and size of the basins will be determined prior to their construction.

Elevating existing agricultural roads is proposed for each finger to improve them and to control water levels. On the South Finger the road will cross the mouth of the finger as it enters Moro Cojo Slough. Currently the road limits connectivity between the Finger and the rest of the Slough. However, an improvement is being designed that will place culverts beneath the road of sufficient size to allow passage of water. The culverts should be equipped with adjustable flaps to moderate water flow from the mitigation site.

The road proposed for improvement on the North Finger crosses above the top of the mitigation site. This road will help to reduce sediment from entering the site and will hold a quantity of water behind it as a source of water for the mitigation site during the dry season.

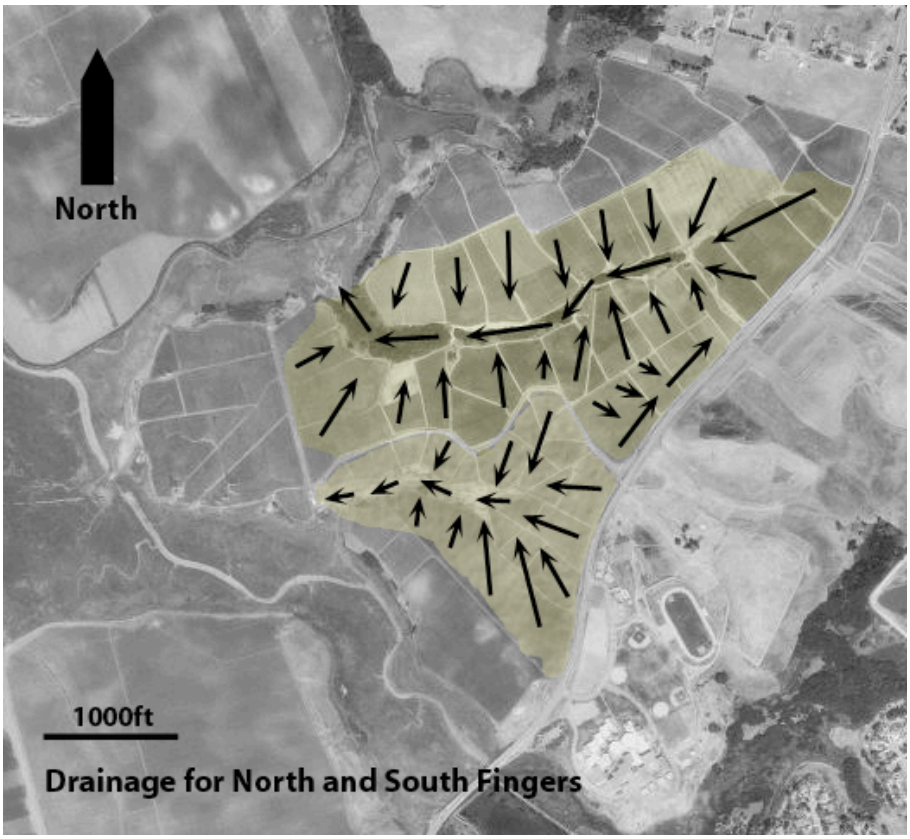

Figure 4: Parcel Drainage Patterns

3.3 Vegetation

The upper portion of the North Finger (8.18 acres) is currently dominated by arroyo willow with a number of mature coast live oaks interspersed. Although these two tree species are native their domination of the site is likely a result not of natural plant community distribution but of the excessive accumulation of sediment. The magnitude of these inputs is one disturbance that prevents a healthy understory of wetland plants from establishing on the site. There is a wider range of native and non-native plant species on the lateral edges of the Finger where there is less sediment deposition. There is also a wider range in the freshwater marsh area. Construction of a sediment basin and the installation of a diversity of wetland plants will enhance the composition and health of the mitigation site.

The South Finger is mostly unvegetated (4.6 acres) with the exception of a few live oaks and marginal plant communities. The establishment of vegetation on this site has been hindered both by consistent sediment inputs and the intermittent movement and storage of agricultural equipment. The removal of the equipment and the construction of sediment basins will provide the opportunity for a more robust plant community to develop. However, to avoid the invasion of non-native plants as often occurs after a long history of disturbance, the site will be planted with early successional native wetland plants. The lower portion of the site is populated with freshwater marsh plants typical of Moro Cojo Slough. Table 2 lists all of the plant species currently on the sites. Figures 6 and 7 shows where each of the species is located within plant zones on the site.

Table 2: Mitigation Site Plant List

Location: North Finger		**Date of Survey: 10/28/05**	
Species:	**Common Name**	**Non/Native**	**Location**
Anthemis cotula	Mayweed	Non native	15
Artemesia biennis	Biennial Sagewort	Non native	17
Baccharis douglasii	Douglas Baccharis	Native	17
Baccharis pilularis	Coyote Bush	Native	7,18
Berula erecta	Cut-leaved Water Parsnip	Non-native	10
Brassica nigra	Mustard	Non-native	2,5,6,16
Carex barbarae	Santa Barbara Sedge	Native	6,10
Chenopoduim sp.	Coast Goosefoot	Non-native	11
Circium vulgare	Bull Thistle	Non native	15,17
Conium maculatum	Poison Hemlock	Non-native	6,9,17
Conyza canadensis	Horseweed	Non-native	2
Cyperus eragrostis	Nutsedge	Native	19
Eleocharis sp	Spike Rush	Native	15,19
Epilobium ciliatium	Willow Herb	Native	16
Frankenia salina	Alkalai Heath	Native	15
Gnaphalium straminium	Cotton Batting Plant	Native	2
Juncus sp	Rush	Native	15,17
Plantago coronopus	Cut leaf Plantain	Non Native	15
Polypogon monspeliensis	Rabbit's Foot Grass	Non-native	19
Potentilla anserina	Silvertip	Native	12, 19
Rubis ursinus	California Blackberry	Native	4,8,17,18
Rumex crispus	Curly Dock	Non-native	11
Salicornia virginica	Pickleweed	Native	15
Salix lasiolepis	Arroyo Willow	Native	2,4
Sambucus mexicanus	Elderberry	Native	5, 13
Scirpus californicus	Bulrush	Native	11
Scirpus pungens	Three Square Bulrush	Native	15
Solanum nigrum	Black Nightshade	Non-native	5
Solidago spp.	Goldenrod	Native	16
Sonchus asper	Sow Thistle	Non-native	6
Spergularia sp.		Non-native	15
Toxicodenderon diversilobum	Poison Oak	Native	17
Typha latifolia	Cattail	Native	11
Urtica dioica	Stinging Nettle	Non-native	4,5,8
Xanthium spinosum	Spiny Clotbur	Native	5,16
	Vegetation debris		14

Table 2 (cont)

Location: South Finger		**Date of Survey: 10/28/05**	
Species:	**Common Name**	**Non/Native**	**Location**
Anagallis arvensis	Scarlet Pimpernel	Non-native	3,4
Atriplex triangularis	Spearscale	Native	4,5
Brassica nigra	Mustard	Non-native	3,4,6,10
Chenopodium sp.	Coast Goosefoot	Non-native	3,8
Circium vulgare	Bull thistle	Non native	8
Conium maculatum	Poison Hemlock	Non-native	4,6,10
Cotula coronopifolia	Brass Buttons	Non-native	3,4
Cyperus eragrostis	Nutsedge	Native	4
Distichlis spicata	Salt Grass	Native	4,5,8,12
Eleocharis macrostachya	Spike Rush	Native	4,12
Epilobium ciliatum	Willow Herb	Native	4
Frankenia salina	Alkali Heath	Native	9
Gnaphalium stramimeum	Cotton-batting Plant	Native	3,4
Hordeum brachyantherum	Meadow Barley	Native	4
Malva parvilfora	Cheeseweed (Mallow)	Non-native	3,4
Picris echioides	Oxtongue Thistle	Non-native	3,4
Plantago lanceolata	English Plantain	Non-native	4
Polygonum spp.	Knotweed	Non-native	4
Polypogon monspeliensis	Rabbit's Foot Grass	Non-native	4
Potentilla anserina	Silver Tip	Native	8
Quercus agrifolia	Coast Live Oak	Native	1
Raphanus sativus	Wild Radish	Non-native	3,4,10
Rubus discolor	Blackberry	Non-native	4,6
Rumex conglomeratus	Cluster Dock	Non-native	3,4,8
Rumex crispus	Curly Dock	Non-native	3,4,8
Rumex maritimus	Golden Dock	Native	4
Salix lasiolepis	Arroyo Willow	Native	2
Sambucus mexicanus	Elderberry	Native	6
Scirpus maritimus	Sea Clubrush	Native	4
Solanum nigrum	Black Nightshade	Non-native	4,5
Sonchus asper	Sow Thistle	Non-native	4
Sparganium eurycarpum	Bur-reed	Non-native	4
Toxicodendron multiflorum	Poison Oak	Non-native	6
Typha latifolia	Cattail	Native	4
Urtica dioica	Stinging Nettle	Non-native	4,6
Vulpia spp.		Non-native	3
Xanthium sp.	Spiny Clotbur	Non-native	8,11

Figure 5: North Finger Vegetation Map (# refer to plant species found on table 2)

Figure 6: South Finger Vegetation Map (# refer to plant species found on table 2)

3.4 Species of Concern

As of October 2005, The Fish and Game Natural Diversity database has no reported occurrences of rare or endangered plants or animals on the mitigation site. There was at one time a population of burrowing owls within the greater vicinity but local sources have stated that they are no longer present. Areas of the Moro Cojo Slough adjacent to the mitigation sites support Santa Cruz Long Toed Salamanders, California Tiger Salamanders and Red Legged Frogs.

Both the Santa Cruz Long Toed Salamander and the California Tiger Salamander breed primarily in pools and swales which fill with winter rains and dry completely by summer. Both of these salamanders occur directly north of the mitigation site in an arm of Moro Cojo Slough. They spend much of their lifecycles estivating underground in adjacent oak woodland or grassland habitat. Red-legged frogs require aquatic habitat for breeding but also use a variety of other habitat types including riparian and upland areas. Red-legged frogs occur at North County High School just east of the mitigation site. Adult frogs often utilize dense, shrubby or emergent vegetation closely associated with deep-water pools with fringes of cattails and dense stands of overhanging vegetation such as willows (NDDB 2005). Once restored through implementation of this mitigation plan, the range of vegetation classes (marsh, riparian forest and oak buffer) in close association to each other on the mitigation site will create valuable habitat for these species of concern.

4.0 Goals and Approaches

There are several principals that guide development of a restoration plan for a particular site. The first is to reference the site's historical condition as an ecological model. The historical model should embrace large spatial and temporal scales to make it as realistic and robust as possible. The spatial scale includes the site, the local watershed, and the larger regional watershed. The historical record before European arrival describes the water source of the Moro Cojo Slough and vast portions of the lower Salinas Valley drainage as primarily freshwater draining from the Coast Range with occasional saltwater stings reaching deep inland from the Monterey Bay (Gordon 1996). The upper fingers of these systems were once riparian corridors with willow, cottonwood, and alder trees transitioning into oak woodland. So, at the scale of the mitigation site, the historical model is freshwater marsh and riparian woodland. The historical model can rarely be entirely restored however; it provides the general direction for restoration, informing the project's goals and objectives.

Secondly, it is necessary to understand that the Dolan site is located within a human disturbance landscape, where native ecosystems are subjected not only to natural disturbance patterns but also to disturbance from human activity, such as agriculture and development. Restoration goals on sites within this eco-region should consider that these artificial disturbance regimes create significant barriers to achieving idealized ecological states. The Mitigation site contains freshwater marsh, riparian wetland and oak

woodlands all of which provide important habitat for wildlife and help to buffer the larger Moro Cojo ecosystem from agricultural inputs.

Strategies to develop these buffers and minimize the impacts from human perturbation on wetland ecosystems should be developed within the restoration plan. Most importantly, it is necessary to develop positive relationships with the landowner and the farmers on the property adjacent to the mitigation site. The management decisions and techniques that the farmers use have a profound effect on the condition of the mitigation sites.

Lastly, restoration is a natural process, the main focus of which should not be on static plans, but on an active process of adaptive management that responds to ecological changes within the system. Each restoration site is a spatial and temporal mosaic without a static ecological state. The Off-Site Implementation Plan for the Dolan Property lays out an approach and objectives to meet stated goals, but on-the-ground restoration must be an iterative process of assessment and response to the changing natural conditions on the site.

The goal of restoration on the Dolan site is to re-establish wetland hydrology and diverse, native plant communities in areas currently dominated by monocultural willow stands, weeds and large unvegetated areas. The site has been highly disturbed by human activity and both landform changes and vegetation management will be necessary steps in restoration. The construction of low berms and minor landform changes will slow water flow, reduce excessive erosion and create a range of microhabitats for flora and fauna. Native plant communities will be established either by collecting local propagules and direct seeding them or cultivating propagules in a greenhouse and replanting them on the site. The implementation section below identifies native plants that are most appropriate for this region and habitat type. Although not exhaustive, the plant species on this list would likely have occupied these sites under natural, pre-human disturbance conditions.

5. Enhancement Design

This wetland mitigation and enhancement plan involves four primary tasks. Timing of the tasks is guided by the wet/dry cycle of the seasons and may occur only once throughout the project or may be repeated multiple times throughout a project year. The tasks are: (1) create changes in landform and hydrology, (2) control weeds, (3) establish native plants and (4) monitor progress towards goals.

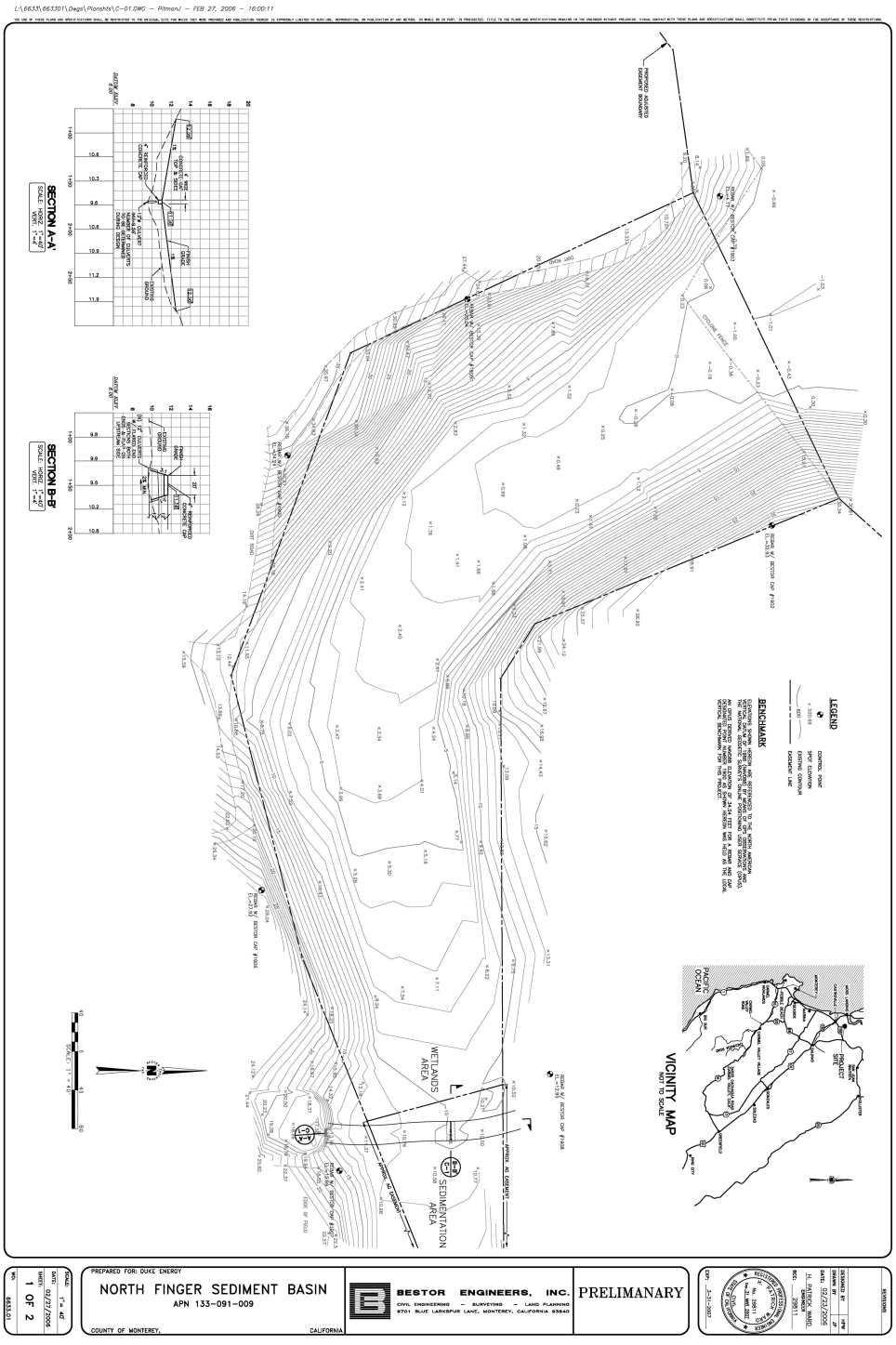

Figure 7 North Finger road and sediment basin

Off-Site Implementation Plan for Dolan Property – July 2006
MMC -21

Figure 8 South Finger road and sediment basin

Off-Site Implementation Plan for Dolan Property – July 2006
MMC -22

5.1 Landform Change

The first task will be to slow the water flowing across the site by changing the land morphology. The most significant change to water flow will be as a result of the construction of sediment basins on adjacent agricultural land above each of the two fingers. During moderate precipitation events these basins will capture much of the water from adjacent agricultural drainages and meter it out slowly onto the site. While not required, sediment catch basins above these mitigation areas are very desirable. Sedimentation and erosion can be quite damaging to wetland habitats and these catch basins will help to prevent this from occurring.

The elevated road crossings will also significantly change the hydrology on the sites. The removable flaps on the culverts under the roads will improve control of water flowing on and off the sites and will help to create additional wet areas for native habitat to develop. Figures 7 and 8 shows the placement and construction details of the roads. The general locations of the sediment basins are also represented on the figures though further design work will be needed before their construction.

Additionally, small vegetated berms (less than 6") will be constructed strategically across the sites to slow overland flow and reduce erosion. Berms will be constructed in locations where erosion control has been a problem, especially along the steeper lateral banks of both Fingers. They will be vegetated with native grasses. These landform changes may be modified throughout the project to improve their performance.

5.2 Weed control

Although there is native vegetation on both the North and South Fingers, there is significant amount of invasive weeds in and amongst them. Although the goal is to eventually remove all non-native plants from the sites, there is a small variety of species that are of particular priority for weed control (Table 3). The California Invasive Plant Council has listed these species as amongst "California's exotic pest plants of greatest ecological concern."(Cal IPC 2005) They have high potential for invasiveness, a large ecological amplitude and distribution and have a great ecological impact to ecosystems that they invade. Removal of these non-native plants can be accomplished by weed whipping, burning with a propane weed torch, or hand pulling. To successfully manage weeds timing of control measures is critical. Appropriate timing is dependent on species, precipitation and other environmental factors. The use of herbicides should be avoided wherever possible but will be used where necessary. Other non-native species present on the sites are listed in Table 2. The vegetation survey was conducted in the October of 2005 so it is likely that additional annual species had already died back and will re-emerge in the spring.

Table 3: Plants on the Cal IPC list

Priority invasive plant removal			
	Common Name	**Scientific Name**	**IPC rating**
1	Blackberry	*Rubus discolor*	High
2	Hemlock	*Conium maculatum*	Moderate
3	Knotweed	*Polygonum spp*	Moderate
4	Curly Dock	*Rumex crispus*	Low
5	Bristly Ox Tongue	*Picris echioides*	Low
6	Wild Radish	*Raphanus sativus*	Low
7	Sow Thistle	*Sonchus asper*	Evaluated but not listed

The listed species are difficult to eradicate and will require diligence and specific management practices to control them. Following are some of the common management approaches:

1. Blackberry – Larger plants can be dug out of the ground with a shovel, or pulled if the seed stalk is present. New starts can be treated by weed whipping, hand pulling, or burned with a propane weed torch. Plants that are pulled should be discarded, as they will continue to grow and set seed even if left on the ground surface.

2. Hemlock – This plant can be effectively eliminated by weed whipping and then treating the new sprouts with a propane weed torch. As with most dense stands of weeds, this may require multiple applications, but as long as seed production is prevented, the stand will not persist beyond 2-3 years. Filling the space left after the initial treatments with dense fast growing plants such as coyote brush or yellow lupine will ensure the area is not re-colonized by weedy species.

3. Knotweed – Knotweed has an extensive root system and sprouts easily from small pieces of plant material. Complete eradication is likely to take more than one year. Although there are a number of potentially successful mechanical control options, like hand pulling, weed whipping and covering, larger patches will likely require integrating herbicide use as a control strategy. Selection of an appropriate herbicide is very important as knotweed often grows in wet areas.

4. Curly Dock – Same as Blackberry. Larger plants can be dug out of the ground with a shovel, or pulled if the seed stalk is present. New starts can be treated by weed whipping, hand pulling, or burned with a propane weed torch. Plants

that are pulled should be discarded, as they will continue to grow and set seed even if left on the ground surface.

5. Bristly Ox Tongue – This plant can be removed by repeated weed-whipping and hand pulling. A propane weed torch can be used on seedlings if necessary. As with most weedy species, replacement with more robust and aggressive native species is the most effective long-term means for eliminating invasive weeds.

6. Wild Radish – Can be managed with similar control measures as Hemlock

7. Sow Thistle – Can be managed with similar control measures as Bristly Ox Tongue.

5.3 Native Plant Establishment

The re-establishment of native plant communities should be done in conjunction with weed control. Native plants provide considerable ecological benefit as habitat for native animal populations, specifically cover and forage. Covering bare ground has the additional benefit of controlling erosion and reducing opportunistic weed invasion. Native plants used in the restoration must be native to the region of the enhancement site, and not just native to California. Whenever possible, plants installed as part of the enhancement, should be from seed stocks or cuttings collected from the site or from the Moro Cojo Slough watershed.

Three plant community types will be restored on the mitigation sites: freshwater coastal marsh, riparian wetland and oak woodland as a wetland buffer.

Freshwater coastal marsh has been significantly reduced in California as a result of development farming and grazing activities. This habitat is characterized by standing or slow moving water, mostly below 500' above sea level with wet or semi-dry soils, and a wet substratum. Typical plants within this community include the native smartweeds *Polygonum*, *Salt bush*, western goldenrod, *Scirpus* (tule), *Carex* (sedge) and *Juncus* (rush).

Riparian wetland is a fairly restricted community because it is dependent on the presence of or proximity to non-seasonal water source. The water source may be either surface or sub-surface. Surface flow on the Fingers is seasonal but is augmented by regular irrigation of the adjacent fields. Typical species of this community include box elder, Fremont and black cottonwood, white alder, black walnut, big-leaf maple, *Salix spp.* (willows), elderberry, mule fat, and smaller plants such as California blackberry, horsetails, and creek monkeyflower.

Wetland buffer of coastal live oak woodlands are typically found below 5000 feet within a 50-mile radius of the coast, out of the influence of salt spray. Soils are typically well drained. Coastal live oak woodlands are common adjacent to marshland and in ravines and moister drainages between hillsides, as is the case on the mitigation sites. In order for the marsh and riparian areas on the mitigation sites to develop and function

properly it is important that they are buffered from the adjacent agricultural activities by hardy upland vegetation. These woodlands will provide valuable edge habitat in their own right especially for the amphibian species of concern but will also act as a physical barrier for the marsh and riparian areas below them. Typical understory species include California blackberry, coffee berry, lupines, black sage and toyon. A developed litter layer from these species will help to control erosion initiated from surface water runoff.

These plant communities will be established in zones across the sites where they would naturally occur. Restoring the relic freshwater coastal wetland habitat at the base of the Fingers will enhance connectivity between the Fingers and the rest of the Moro Cojo Slough. In-planting cottonwood, alder and lower riparian plant strata on the North Finger will diversify the riparian woodland that occupies a large portion of the site. On both the North and South Fingers the upper edges of the sites will transition into oak woodland habitat.

Figure 9 shows generally where each of these plant community zones will be established on the site. A planting map that considers specific characteristics such as slope, aspect, soils and other microhabitat characteristics will be created prior to planting.

As initial phases of these tasks are implemented, a monitoring program will track progress towards the realization of project goals. Monitoring will focus on ensuring that wetland hydrology has been re-established on the site that native plants survive to become fully established, that weeding and replanting is carried out as needed, and that non-native plants do not re-invade the site. In addition regular presence/absence surveys for plant and animal species of concern will be conducted. Monitoring will entail site visits, aerial photos and periodic vegetation mapping.

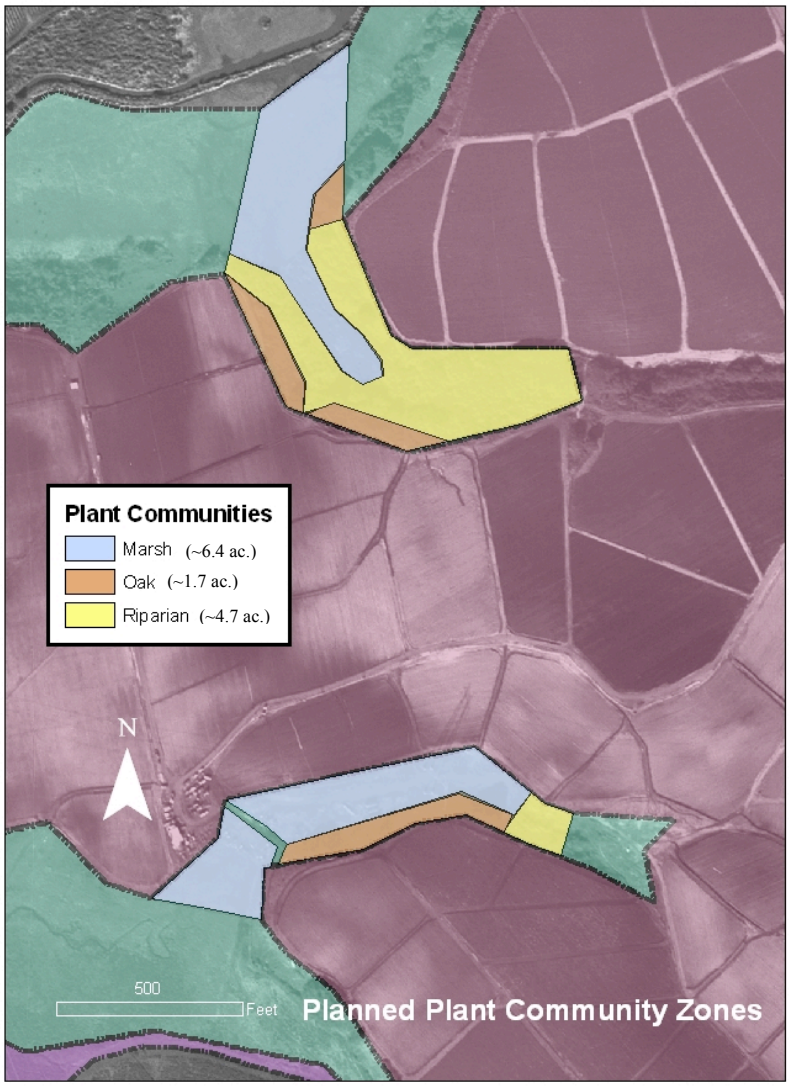

Figure 9: Planned Plant Community Zones

6 Implementation Schedule

6.1 Site Preparation

The landowner has agreed to perform a number of site improvements which will assist restoration. These include fencing the perimeter of the conservation easement to prevent encroachment and removing agricultural debris and cows from the conservation easement..

The land owner has agreed to have sediment basins constructed upstream of the mitiation site which will benefit the habitat on the sites by reducing sediment entering them and by slowing the flow of water across them. However, they will need to be regularly maintained by the landowner. To assure that they continue to function the plumbing should remain intact, the sediment should be removed regularly and the associated berms should be kept free of erosion.

Additionally as discussed in the hydrology section, the land owner has proposed to construct engineered elevated roads at the base of the South Finger and across the top of the North Finger to minimize disturbance from agricultural activity and to moderate water flow on the mitigation sites. It is likely that elevating the existing roads and construction of the sediment basins will require a grading permit and streambed alteration approval. These items should be in place before construction begins. We suggest the landowner work with the Natural Resources Conservation Service to design and permit these projects.

Ideally all of these tasks will be completed before implementation of the mitigation plan begins. However, as long as agricultural debris and cows are removed from the site, the other tasks can be done concurrently with the restoration work.

6.2 First Year Schedule

Initial restoration efforts will focus on weed control and establishment of native plants on the South Finger as the North Finger is a more stable system with a mature overstory of native tree species. When human disturbance on the South Finger is reduced the system is likely to respond with aggressive weed invasions and will need to be controlled. The focus for the first year is to control invasive species and to start cultivating early successional native plants that can be installed on the sites at the end of the year. The following sections refer to both North and South Fingers unless otherwise specified.

<u>January – April: Planting and Weeding:</u>

- Meet with landowner and farm tenant to discuss the year's agricultural management plans.

- In spring, install culvert flaps under roads to hold back more water into the summer.

- Remove non-native invasive species by hand-weeding, mowing weed-whipping, or treating with a propane weed torch. Primary focus will be curly dock, fennel, hemlock, bristly ox tongue, and knotweed.

- In areas where weeds are under control, sow creeping wild-rye, California brome and meadow barley, as available from local greenhouse stocks. Grasses planted on site should be grown from seeds and/or cuttings taken from the Moro Cojo or Elkhorn Slough watersheds.

- Plant coast live oak, cottonwoods, maples, sycamore if these plants are available from existing local greenhouse stocks.

- Install drip irrigation as needed for the upland edge plants.

- Propagate plants in greenhouses from collected seeds and cuttings. These plants will be transferred to 1-gallon or larger pots for out planting during the second year. Plant additional plants as required in order to fill smaller open or weedy patches. The number of plants required should be determined by the size of the planting areas and the composition of the plants used and must account for natural attrition, damage by herbivorous pests, and other factors. The sizes of the planting areas are calculated by mapping areas that were either unvegetated or dominated by non-native plants.

- Selecting the correct composition of species and the juxtaposition of adjacent plant types is critically important to accurately create complex native plant communities. This should be done by biologists/ecologists who are experienced in local native plant community restoration.

- Inspect roads and sediment basins to assure that there are no critical failure or erosion issues.

<u>April – August:</u>

- Construct low berms to slow water at critical erosion points. Utilize bio-engineering techniques to reduce severe erosion.

- Control weeds in the enhancement area. Primarily focus on curly dock, blackberry, hemlock, bristly ox tongue, and curly dock, but also include mowing of non-native Mediterranean grasses.

- Transfer plants propagated in January to 1-gallon or larger pots. Propagate plants for direct out-planting.

- Transfer greenhouse plants as needed in supercells to 1-gallon or larger pots.

- Propagate plants as needed in supercell cones for direct out-planting.

Late Spring – Late Fall:

- Collect grass seeds for broadcasting and planting in year two. Continue to control weeds. Towards the end of this period, broadcast seed mixes. Mixes can include creeping wild rye, meadow barley, and juncus and scirpus (in the wet areas).

- Out-plant greenhouse stock of potted and supercell plants. Planting should occur at the beginning of the rainy season, which will not likely be before middle of November. Augment rainfall if needed by installing drip irrigation.

- Remind landowner/farm tenant to remove sediment from basins.

- Check that sediment basin plumbing is intact and functioning.

- Remove culvert flaps to allow more water to pass during winter.

6.3 Second Year Schedule

After the initial work to eradicate weeds, the sites must be periodically monitored to remove re-growth of invasive plants from established in-ground seed banks and to remove weedy plants not removed during the first year. It is important that weed eradication is continued past the first year and that it is done in a manner that prevents the setting of a new viable seed crop. Years of effort can be lost in a single season, if invasive plants are allowed to set seed. As early successional plants become established on-site, slower growing but longer lived native plants will be grown in the greenhouse and out-planted.

January-April:

- Meet with landowner and farm tenant to discuss the year's agricultural management plans.

- Plant greenhouse propagates (grown in supercells and in 1-gallon or larger pots).

- Replant, as needed, into previously planted areas to prevent invasion of weeds into open spaces.

- Install additional irrigation as needed to supply newly planted areas.

- Assess functionality of berms and other bio-engineering techniques to reduce critical erosion points. Adjust berm heights, orientation and other techniques as necessary.

- In spring, install culvert flaps to holdback more water into the summer.

September – April: Fall Planting and Spring Weeding

- Plantings will be focused on large areas where there is little or no vegetation. It is advantageous to plant these areas because there is less competition from non-native plants. Also, these bare areas can benefit from any vegetation that will help to control erosion.

- Additional planting will be focused on the smaller open or weedy areas present throughout the North and South Fingers.

April – December: Maintain Planted Areas

- The enhancement sites will be maintained for the remainder of the year in response to and as part of monitoring. This will involve installation and repair of irrigation as needed, removal of new weeds, and replacement of installed plants as needed.

- At the onset of winter rains, inventory and prepare plants for out-planting.

- Remind landowner/farm tenant to remove sediment from basins.

- Check that sediment basin plumbing is intact and functioning.

- Remove culvert flaps to allow more water to pass during winter.

6.4 Third Year Schedule

Discuss the year's agricultural management plans with landowner and farm tenant. Manage the culvert flaps and assure the sediment basins are intact and functioning. By the third year the major weed problems will have been addressed and only minor invasions are expected to occur. Nonetheless, the bank of invasive plant seeds will continue to sprout, grow, and set additional seed if not checked with control measures. Major erosion issues will have been addressed. Fill in bare areas with native plants as needed.

6.5 Fourth Year Schedule

Discuss the year's agricultural management plans with landowner and farm tenant. Manage the culvert flaps and assure the sediment basins are intact and functioning. Invasive plants can still establish as seed sources exist on areas adjacent to the mitigation sites. Continue to identify potential erosion spots and either notify the farm tenant or take corrective action. Early successional plants will begin to senesce as longer-lived native plants replace them. Continue to fill in bare areas with native plants as needed.

6.6 Fifth Year Schedule

Discuss the year's agricultural management plans with landowner and farm tenant. Manage the culvert flaps and assure the sediment basins are intact and functioning. Invasive plants can still establish as seed sources exist on areas adjacent to the mitigation sites. Continue to identify potential erosion spots and either notify the farm tenant or take corrective action. Early successional plants will continue to senesce as longer lived native plants replace them. Continue to fill in bare areas with native plants as needed.

7. Success Criteria

Success criteria are the guideposts by which to measure the extent that a project has achieved its restoration goals. Goals for this project should be flexible and able to accommodate new insights, unplanned courses of plant growth, temporary setbacks or successes, and amended objectives. Performance standards will provide a gauge for the success of restoration efforts.

7.1 First Year criteria

The primary objective of the first year is to make significant progress in removing the most invasive non-native species (e.g. curly dock, pampas grass, bristly ox tongue, bull thistle, hemlock, and fennel). After the first year, coverage of non-natives on the vegetated area of the mitigation site will not exceed 30%. Baseline data on plant coverage for year-end will be mapped using GIS. Any threatened or endangered species present on site will be maintained at minimum and increased if possible.

The goal is to have no failure of roads, sediment basins, engineered berms and erosion control measures. They will all maintain their integrity and function as designed. This will be particularly important to monitor during the first winter storms. Culvert controls under roads will be tested during the first storms to assure that they are functioning properly. Some orientation and size adjustments of the erosion control berms may need to be made to improve their utility.

7.2 Second Year criteria

After the second year, coverage of non-natives on the vegetated area of the mitigation site will not exceed 20%. Native vegetation will be planted as needed to fill in gaps left by weed removal. Threatened or endangered species present on site will be maintained at minimum and increased if possible.

The goal is to have no failure of roads, sediment basins, engineered berms and erosion control measures. They will all maintain their integrity and function as designed. Culvert controls under roads will be tested during the first storms to assure that they are functioning properly. The erosion control berms orientation and size should not need to

be adjusted unless the adjacent agricultural activities change significantly.

7.3 Third Year criteria

After the third year, coverage of non-natives on the vegetated area of the mitigation site will not exceed 15%. A 40-60% increase in cover of native species from year one will be reached. Native vegetation will be planted in gaps as needed to reach this target for species composition of native plants. A target minimum of 60% survival of planted species from previous years will be met. No new critical erosion points will initiate on site. Culvert controls under roads will be tested during the first storms to assure that they are functioning properly. Threatened or endangered species present on site will be maintained at minimum and increased if possible.

7.4 Fourth Year criteria

After the fourth year, coverage of non-natives on the vegetated area of the mitigation site will not exceed 10%. A 50-60% increase in cover of native species from year one will be reached. Native vegetation will be planted in gaps as needed to reach the target for species composition of native plants. A target minimum of 60% survival of planted species from previous years will be met. Culvert controls under roads will be tested during the first storms to assure that they are functioning properly. Threatened or endangered species present on site will be maintained at minimum and increased if possible. No definitive success criteria can be assigned to water monitoring as its quality is dependent on adjacent farming practices. Nonetheless suspended sediment, nutrient and pesticide levels in surface flow should be expected to trend down as vegetation on site matures.

7.5 Fifth Year criteria

After the fourth year, coverage of non-natives on the vegetated area of the mitigation site will not exceed 5%. Native vegetation will have filled in gaps and a species composition of 90-95% natives will be reached. Native plants will have maintained without need for drip irrigation for last year. A target minimum of 60% survival of planted species from previous years will be maintained. Culvert controls under roads will be tested during the first storms to assure that they are functioning properly. Threatened or endangered species present on site will be maintained at minimum and increased if possible. No definitive success criteria can be assigned to water monitoring as its quality is dependent on adjacent farming practices. Nonetheless suspended sediment, nutrient and pesticide levels in surface flow should be expected to trend down as vegetation on site matures.

8. Monitoring

The main goal of monitoring the site is to ensure the success of enhancement measures; to assess the re-establishment of native ecosystems (e.g. plants, animals, water retention, and water quality); to reduce the severity of on-site erosion and to ensure the reduction of non-native species, which can have significant negative impacts on native ecosystems. Monitoring will be referenced to baseline data accumulated at the beginning of the project

period, at least each year during the growing season (late winter through spring), and periodically to document important enhancement activities or events (e.g., construction, flooding, lowest water, weed control, herbivore damage, wildlife use, special status species). Another site assessment will be conducted at the beginning of the implementation phase of the project to serve as a baseline for monitoring. At that time, all non-native plants within the project area will be located and identified. Invasive non-native species present at the sites will be identified. Critical erosion points will be documented. GIS will be used to quantify the success of the implementation tasks. Ground level photographs will be taken quarterly from set photo points to document implementation activities, habitat changes and to augment GPS/GIS data. Aerial photographs will be taken yearly. Monitoring will also involve assuring that the roads, culverts, constructed berms and sediment basins are intact and functioning as designed. Regular tasks will be to assure that sediment is removed from the basins and that the culvert flaps are set at the appropriate height in accordance with the season. Monitoring visits will occur quarterly, but more often immediately after practices have been completed and during the winter and spring when significant precipitation and plant growth occurs. Monitoring will be conducted on a yearly cycle but visits will be seasonal depending on what is being monitored (Table 4). Monitoring activities will be documented in quarterly letter reports submitted to Monterey County and CDFG.

8.1 Monitoring Activities

- Monitor sites for weed invasions. Timely monitoring is the key to the successful control of weeds after the first major eradication effort. Weeds are likely to invade disturbed areas, such as excavation sites and individual planting locations, where they can overcome newly planted native species. New invasions can be avoided by simply pulling weeds from around native plants during monitoring activities. Infestations should be controlled immediately, whenever possible. The sites will be monitored regularly to direct planting and weed control activities. Particular vigilance will be given to the presence of new weed invasions. Yearly vegetation surveys will document progress towards control of weeds.

- Monitor planted areas to identify problems that may affect revegetation goals and implement strategies for reducing impacts. Common problems associated with planting of native plants on restoration sites are inadequate hydration delivery (either too much or too little water), invasion of non-native species, and grazing by herbivores. Plant loss can be minimized if newly planted propogules are monitored and problems are rectified early. Some solutions to these problems include installing irrigation systems, adjusting berm heights, erecting fencing and weed barriers. Yearly vegetation surveys will document progress towards establishing native plants.

- Identify and document surface water quality, and sediment loads. Water quality parameters that will be analyzed are temperature, dissolved oxygen, pH, salinity, and turbidity. This will be done with a multiprobe, turbidimeter and other field instruments. Water samples will be submitted for laboratory analysis of nitrate

(NO_3-N) and total ammonia (NH_3-N). These compounds may be entering the mitigation sites from adjacent agricultural operations, and should be monitored because of their toxicity to fish and amphibians. Surface flows on both the North and South Fingers are intermittent throughout the winter, so water quality monitoring will take place only during significant storm events. Water samples will be submitted to a qualified laboratory for analysis.

- Monitor water flow on the sites. Changes to agricultural practices, vegetation and landform from roads and sediment basins, will affect the quantity of water flowing on and off of the sites. Water flow can be controlled to a certain extent by opening and closing the flaps on the culverts under the roads. Regular management of the flaps will minimize flooding during the winter and capture water on the site for a longer period into the summer. Staff plates will be installed at appropriate locations to monitor water levels.

- Document and quantify ecosystem development, including positive growth and increased cover of native plants, increase in native plant and animal species diversity, and decrease in the cover of non-native weeds. This will be done by mapping areas that are dominated by weeds, dominated by native vegetation, covered with water, etc. Mapping will be done with a GPS unit and these data will be used to develop GIS maps that will accurately depict changes at the site over time. Point-quadrat surveys will be used to sub-sample the site in order to determine rate of increase in coverage of planted and existing plant communities to quantify the success of planting and maintenance of the currently disturbed areas. Bird populations will be monitored using fixed monitoring plots, visited monthly Aerial photos will be used to cross reference ground survey techniques.

- Document the volume and location of on-site gully erosion points through digital photographs and cross sectional diagrams. Improvement will be measured by a reduction in volume of existing features and the absence of new features forming.

- Review CDFG Natural Diversity Database records of the site to identify endangered or threatened species known to occur or have occurred at the site. Monitor and document populations of endangered or threatened species that are potentially present. These surveys will be conducted according to standardized protocols. Document nuisance species such as a rodent feeding on the crops of neighboring landowners. This compliance monitoring will be reported to regional agencies to document the success of the project. This will be done during appropriate times of year, dependant on the species.

Table 4: Monitoring Schedule

Monitoring activity	Measurement Tool	Frequency of monitoring	Timing of monitoring	Progress criteria
Weed Invasions	Vegetation Map	1/year	Spring	% cover weeds
Native Plant Communities	Vegetation Map	1/year	Spring	% cover weeds Diversity of native plants
Water Quality	Multiprobe Turbidimeter Lab analysis	Seasonally	Winter storms	Turbidity Nutrients
Water quantity	Staff plate	Seasonally	Winter storms	Flood levels
Erosion Points	Aerial Photos Field Photos Diagram cross sections	1/year	Spring	Erosion point count Volume of critical erosion points
Species of Concern	Vegetation Map Fixed plots Presence/absence surveys	Depends	Depends	Presence/absence Population trends

8.2 Remedial Actions

Restoring natural systems does not always result in predictable outcomes. There are many variables such as precipitation patterns, grazing pressure from herbivores and the management of adjacent lands that are difficult to control, but contribute substantially to the success or failure of a restoration project. At the same time that monitoring measures progress toward a set of goals, it can also provide early indicators to problems with a management activity or approach. Adaptive management is the practice of learning from this feedback loop and adjusting management appropriately. If the proposed restoration activities are not successful, management will be adjusted to improve the situation.

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APPENDIX B - DEED OF CONSERVATION EASEMENT BETWEEN DOLAN FAMILY AND MONTEREY COUNTY AGRICULTURAL AND HISTORIC LAND CONSERVANCY, INC.

Stephen L. Vagnini
Monterey County Recorder
Recorded at the request of
First American Title

CRKATHLEEN
1/30/2007
8:00:00

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Titles: 1/ Pages: 27

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Taxes
Other
AMT PAID

After recording, please return to:

Monterey County Agricultural and
Historic Land Conservancy, Inc.
P.O. Box 1731
Salinas, CA 93902

DEED OF CONSERVATION EASEMENT

This Deed of Conservation Easement is made on this 24 day of January 2007 by Josephine S. Dolan, as Trustee of the Josephine S. Dolan Trust, dated November 30, 1999 and Glen E. Dolan, as Trustee of the Glen E. Dolan Trust, dated November 30, 1999 and Stacy Dolan, an unmarried woman (Grantors) in favor of the Monterey County Agricultural and Historic Land Conservancy, Inc. a California nonprofit corporation ("Grantee"), for the purpose of forever conserving the wetlands, habitat and natural resources on and the open space character of the property which is the subject of this Easement.

WITNESS THAT:

A. The Grantors are the joint owners in fee simple of that certain real property (the "Property") located in Monterey County, California, comprising a portion of Monterey County Assessor's Parcel Numbers 133-091-007 and 133-091-009 and legally described in Exhibit A ("Legal Description"), attached to and made a part of this Conservation Easement, which consists of approximately 121.775acres of land.

B. The Property possesses significant wetlands, sloughs, open space, natural resource, wildlife habitat and scenic values ("Protected Values") of great importance to Grantors, the people of Monterey County and the people of the State of California. The Property remains in undeveloped and natural condition, provides unimpeded scenic views of the coast, contains extensive riparian vegetation, creating food source and habitat for wildlife, and contains a portion of the Moro Cojo Slough.

C. The Grantee is a 501(c) 3, "qualified conservation organization," as defined by section 170(h) of the Internal Revenue Code, California Public Resources Code section 10221, California Civil Code section 815.3, and, as certified by a resolution of its Board of Directors, accepts the responsibility of enforcing the terms of this Conservation Easement and upholding its conservation purposes forever.

D. The State Coastal Conservancy ("Conservancy"), an agency of the State of California, has made a grant of funds to the Grantee to support the acquisition of this Conservation Easement. The grant of funds from the Conservancy represents a substantial investment by the People of the State of California in the long-term conservation of the Property in perpetuity. The rights vested herein in the Conservancy

arise out of the Conservancy's statutory role in fostering the conservation of coastal wetlands and sloughs, natural resources, habitat and open space in California (Public Resources Code Section 31000, et seq.) and its role as contributor of, and fiduciary for the public investment represented here.

A. The Grantors intend to grant this Conservation Easement for valuable consideration to the Grantee for the exclusive purpose of assuring that, under the Grantee's perpetual stewardship, the Property will be conserved and maintained forever for the significant natural resources on the Property, and for the protection and preservation of wetlands, habitat and open space, and that uses of the land that are inconsistent with these conservation purposes will be prevented or corrected.

B. The conservation purposes of this Conservation Easement are recognized by, and the grant of this Conservation Easement will serve, the following clearly delineated governmental conservation policies:

Section 815.1 of the California Civil Code, which defines perpetual conservation easements:

California Constitution Article XIII, Section 8 and Revenue and Taxation Code Sections 421.5 and 422.5, under which this Conservation Easement is an enforceable restriction, requiring that the Property's tax valuation be consistent with restriction of its use for purposes of conservation of natural resources. 3.

The federal and state Endangered Species Acts, 16 USC § 1531 *et seq.* and California Fish and Game Code § 2050 *et* seq.• respectively, which seek to prevent the extinction of endangered plants and animals.

The Keene-Nejedly California Wetlands Preservation Act, Chapter 7 of Division 5 of the Public Resources Code, which states that "the remaining wetlands of this state are of increasingly critical economic, aesthetic, and scientific value to the people of California ."

The Monterey County General Plan, as amended in 1982, which includes among its environmental goals to protect wetlands (#1), wildlife habitat (#7), wildlife (#9). and environmental sensitive areas such as the Moro Cojo Slough (#11).

The Moro Cojo Slough Management and Enhancement Plan adopted by the Monterey County Board of Supervisors on October 22, 1996.

Resolution No .03-405, approved by the Board of Supervisors of Monterey County on the 9th day of December, 2003 which expresses support for the acquisition of a conservation easement on the Property, and finds that such protection is consistent with the County's General Plan.

NOW, THEREFORE, for the reasons given, and in consideration of their mutual promises and covenants, terms, conditions and restrictions contained herein, and other good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, the Granters voluntarily grant and convey to the Grantee, and the Grantee voluntarily accepts, a perpetual Conservation Easement, as defined by Section 815.1 of the Civil Code of California, and of the nature and character described in this Conservation Easement, and covenant, agree and declare as follows.

1. Purpose

The purpose of this Conservation Easement is to enhance and protect the natural resources on the Property, to preserve and protect the sloughs, wetlands, natural resources, and habitat on the Property, and to preserve the open space characteristics of the Property. To the extent consistent, the purpose of this Conservation Easement is also to enable the adjacent property to remain in productive agricultural use by preventing uses of the Property that will impair or interfere with the adjacent property's agricultural productive capacity, its soils, and its agricultural character, values, and utility.

2. Rights of Grantee

To accomplish the purpose of this Conservation Easement, the following rights are granted in perpetuity to Grantee through this Conservation Easement:

{a.) To preserve and protect the Conservation Values of the Property;

(b.) To enter upon the Property at reasonable times, with reasonable prior notice, for reasonable durations, for the purposes of (1) monitoring compliance with and otherwise enforcing the terms of this Conservation Easement; (2) undertaking any permitted restoration or enhancement activity; provided that such entry shall not unreasonably interfere with the use and quiet enjoyment of the Property by Grantors, and that Grantors, their personal representatives, heirs, successors and assigns shall not unreasonably withhold access;

(c.) To prevent,terminate, or mitigate any activity on the Property or use of the Property that is inconsistent with the purpose of this Conservation Easement and to require the restoration of such areas or features of the Protected Property that may be damaged by any inconsistent activity or use;

(d.} Subject to the prior written consent of the Grantors, which shall not be unreasonably withheld:

i. To undertake activities for the purpose of restoring or enhancing the Protected Values, provided that such activities are consistent with the purpose of the Conservation Easement

ii. To remove and control invasive non-native vegetation and restore and enhance native plant and wildlife habitat, consistent with sound conservation practices.

iii. To undertake research or educational activities that require no surface alteration or other development of the land.

(e.) To place a sign on the Property at a location approved by the Grantors which is visible from the nearest public roadway identifying that the Property is protected by a conservation easement and acknowledging contributions and funding assistance from various public and private entities.

3. Permitted Uses and Practices

The following uses and practices are not necessarily an exhaustive recital of uses and practices consistent with this easement However, these uses and practices are . permitted by the Grantor, the Grantor's agents, successors and assigns under this easement, provided that they are undertaken in accordance with the easement purpose and terms, that all applicable governmental approvals and permits are properly obtained and that they do not threaten, impair or degrade the Protected Values.

(a.) Distribution of water, for agricultural production only, on an annual basis to the adjacent farmland that is encumbered by an agricultural conservation easement that was recorded prior to this Conservation Easement. The Grantors are prohibited from transferring, encumbering, leasing, selling,or otherwise separating such water rights from title to the Property itself.

(b.) Construction of erosion and other control facilities designed to prevent pollution, sedimentation, siltation or other impairment of the wetlands and sloughs on the Property, including but not limited to sediment ponds, percolation ponds, pipelines for erosion control,grassed waterways, and other structures or facilities, provided that Grantors obtain Grantee's prior written approval, which consent shall not be unreasonably withheld.

(c.) Construction of new roads on the Property to support natural habitat and adjacent agricultural land, provided that Grantors obtain Grantee's prior written approval, which consent .shall not be unreasonably withheld. All new road construction shall incorporate generally accepted erosion control measures.

(d.) Cultivation of plants or crops on the Property, but only if the plants or crops serve a bioremediation function, such as preventing sedimentation and leaching or drawing out pesticides and other contaminants from the soil and preventing them from reaching riparian habitat, wetlands, and sloughs on the Property. The cultivation of plants or crops shall be permitted pursuant to acultivation plan that has been approved by the Grantee and that serves to preserve and enhance the Protected Values of the Property.

(e.) Control of predatory and other animals that threaten the adjacent farmland or crops or animals on the adjacent farmland by the use of selective control techniques, consistent with policies promulgated by the Monterey County Agricultural Commissioner.

(f.) Non-commercial recreational activities that do not require and do not result in any surface alteration or other development of the land.

(g.) Removal and control of invasive non-native vegetation and restoring and enhancing native plant and wildlife habitat, consistent with sound conservation practices.

(h.) Construction and maintenance of a perimeter fence around the Property, provided that the fence does not interfere with the movement of wildlife.

4. Prohibited Uses and Practices

Grantors promise that they will not perform, nor knowingly allow others to perform, any act on or affecting the Property that is inconsistent with this Conservation Easement. This Conservation Easement authorizes the Grantee to enforce these covenants in the manner described herein. However, unless otherwise specified, nothing in this Conservation Easement shall require the Grantors to take any action to restore the condition of the Property resulting from causes beyond Grantors' control including, without limitation, fire, flood, storm, earth movement, and the non-permitted acts of unrelated third parties so long as Grantors have taken reasonable steps to control and/or stop such acts, or from any prudent action taken by Grantors under emergency conditions to prevent, abate or mitigate significant injury to the Property resulting from such causes. Grantors understand that nothing in this Conservation Easement relieves it of any obligation or restriction imposed by law on the use, possession or ownership of the Property.

The following uses and practices, though not necessarily an exhaustive list, are inconsistent with the purposes of this easement and are prohibited on the property:

(a.) The impairment of ttie Protected Values, except as otherwise expressly provided in this easement.

(b.) The establishment of any residential, commercial or industrial uses on the Property.

(c.) The cultivation of any areas on the Property, except for a restoration program that is consistent with the Purpose of the Conservation Easement.

(d.) The disturbance of habitat areas or restored habitats on the Property.

(e.) The construction, placement, or erection of any sign or billboards excepting the following:

i. A sign or signs identifying that the Property is protected by a conservation easement and acknowledging contributions and funding assistance from various public and private entities.

ii. A sign or signs reasonably necessary for the identification of the Property or to advertise its sale or lease.

iii. Signs necessary to control unauthorized or dangerous activities.

(f.) The construction, reconstruction, enlargement or replacement of any building, structure, road or improvement except as specifically provided in the Permitted Uses and Practices section above.

(g.) The division, subdivision, partition, or *de facto* subdivision of the Property. However. this paragraph does not prohibit a voluntary conveyance to a

governmental or nonprofit entity exclusively for conservation or public access purposes.

(h.) The use of motorized vehicles off of the existing or subsequently approved roadways, except as used for restoration activities or as used in the case of fire fighting or other emergency.

(i.) Tree cutting, pruning, cutting down, or other destruction or removal of live trees except as required for restoration activities or approved construction under the terms of this easement.

Q.) The dumping or accumulation of trash, ashes, garbage, waste, or other unsightly, offensive or hazardous material on the Property.

(k.) Any use or activity that causes or is likely to cause significant degradation of soil or water quality, erosion or unlawful or unhealthful pollution of air, land, or water.

(I.) Any activities that adversely affect existing or future restored wetland or riparian areas. Specifically prohibited are the following:

i. Removal of riparian vegetation, except when authorized by Grantee and when necessary for the purposes of the enhancement of wildlife habitat.

ii. Placement or construction of impervious surfaces. including paving of roads.

(m.) Animal grazing or the establishment or maintenance of any commercial feedlot.

(n.) Exploration for, or development and extraction of, minerals and hydrocarbons.

(o) Storage or disassembly of abandoned or inoperable automobiles, trucks, or other vehicles or equipment.

(p.) Alteration of land forms by grading or excavation of topsoil,earth, or rock.

(q.) Uses of the Property that would unreasonably interfere with the use or enjoyment of adjacent lands.

(r.) The use or application of agrochemicals, including, but not limited to, fertilizers, herbicides and biocides, on the Property.

5. Baseline Data

In order to establish the present condition of the Protected Values. Grantee has examined the Property and prepared a report (the "Baseline Documentation Report") containing an inventory of the Property's relevant features and conditions, its improvements and its natural resources (the "Baseline Data"). A copy of the Baseline Documentation Report has been provided to Grantor, and another shall be placed and remain on file with Grantee. The Baseline Documentation Report has been signed by

Grantor and Grantee, and thus acknowledged to represent accurately the condition of

the Property at the date of the conveyance of this Easement. The parties intend that the Baseline ,Data shall be used by Grantee to monitor Grantor's future uses of the Property, condition thereof, and practices thereon. The parties further agree that, in the event a controversy arises with respect to the condition of the Property or a particular resource thereof, the parties shall not be foreclosed from utilizing any other relevant document, survey, or report to assist in the resolution of the controversy.

6. Subdivision

The Grantors agree the Property encompasses portions of two existing legal parcels which under existing law and regulations might be sold or conveyed separately from one another as separate legal parcels. It is agreed that there shall be no sale or conveyance of any one or more portions of the Property separate from any other portion of the Property and that such sale or conveyance is inconsistent with the purpose of this Easement. Therefore, Granters covenant and agrees:

(a) Grantors and their successors in interest will not, without the prior written consent of Grantee, sell, alienate or convey any portion of the Property separately or apart from any other, and Granters and their successors in interest will at all times treat the Property as a single integrated economic unit of property.

(b) Granter will not apply for or otherwise seek recognition of additional legal parcels within the Property based on certificates of compliance or any other authority. The division, subdivision, de facto subdivision or partition of the Property, whether by physical, legal or any other process, is prohibited except that after the prior written approval of Grantee, subdivision or lot line adjustments may be permitted solely for purposes that maintain, enhance or expand the purpose of the Conservation Easement on the Property or that serve to consolidate the Property into one single, indivisible parcel encompassing, at least, all of the Property. Subdivision or lot line adjustment shall not diminish or impair the conservation purposes herein, or open space character. Grantor's request for Grantee's written approval of a subdivision or lot line adjustment must be accompanied by a map, a statement of the purpose, and any other information requested by Grantee. Grantee shall have as long a period to reply to the request as is reasonably necessary, and Granters shall take no other steps towards subdivision or lot line adjustment unless and until Grantee approves the request or modification of the request.

Such approval may be granted, withheld or conditioned by Grantee in the exercise of its sole discretionary judgment regarding the consistency or inconsistency of the proposed transaction with the purpose of this Conservation Easement, which judgment exercised in good faith will be final and binding.

7. Development Rights

Granters hereby grant to Grantee all development rights except as specifically reserved herein, that were previously, are now or hereafter allocated to, implied, reserved, appurtenant to, or inherent in the Property, and the parties agree that such rights are released, terminated and extinguished, and may not be used on or transferred to any portion of the Property as it now or hereafter may be bounded or described, or to any other property adjacent or otherwise, nor used for the purpose of calculating permissible lot yield of the Property or any other property. This Conservation Easement shall not create any development rights.

8. Water Rights

Granters shall retain and reserve all ground water appropriative, prescriptive, contractual or other water rights appurtenant to the Property and shall not transfer, encumber, lease, sell, or otherwise separate such quantity of water rights from title to the Property itself.

9. Rights Retained by Grantors

The Grantors retain the right to perform any act not specifically prohibited or limited by this Conservation Easement. These ownership rights include, but are not limited to, the right to sell, lease or otherwise transfer the Property to anyone it chooses, as well as the right to privacy and the right to exclude any member of the public from trespassing on the Property and any other rights consistent with the Purpose of this Conservation Easement.

10. Responsibilities of Grantors and Grantee Not Affected

Other than as specified herein, this Conservation Easement is not intended to impose any legal or other responsibility on the Grantee, or

in any way to affect any existing obligation of the Granters as owner of the Property. Among other things, this shall apply to:

(a} Taxes – The Granters shall be solely responsible for payment of all taxes and assessments levied against the Property. If the Grantee ever pays any taxes or assessments on the Property, or if the Grantee pays levies on Grantor's interest in order to protect Grantee's interests in the Property, the Granters will reimburse the Grantee for the same.

(b) Upkeep and Maintenance - The Grantors shall be solely responsible for the upkeep and maintenance of the Property, to the extent it may be required by law. The

Grantee shall have no obligation for the upkeep or maintenance of the Property. If Grantee acts to maintain the Property in order to protect Grantee's interest in the Property, Granters will reimburse Grantee for the same.

(c}.Uability and Indemnification – In view of Grantee's negative rights, limited access to the land, and lack of active involvement in the day-to-day management activities on the Property Granters shall indemnify, protect, defend and hold the Grantee, their officers. directors, members, employees, contractors, legal representatives, agents, successors and assigns harmless from and against all liabilities, costs, losses, orders, liens, penalties, damages, expenses, or causes of action, claims, demands, or judgments, including without limitation reasonable attorney's fees, arising from or in any way connected with injury or the death of any person, or physical damage to any property, or any other costs or liabilities resulting from any act, omission, condition, or other matter related to or occurring on or about the Property, regardless of cause, unless due to the negligence *or* willful misconduct of Grantee. Grantee shall be named additional insured on Grantor's general liability insurance policy.

Grantee shall have no responsibility for the operation of the Property, monitoring of hazardous conditions on it, or the protection of Granters, the public or any third parties from risks relating to conditions on the Property. Grantee shall not be liable to Grantors or other person/entity in connection with consents given or withheld, or in connection

with any entry upon the Property occurring pursuant to this Conservation Easement, or on account of any claim, liability, damage *or*

expense suffered or incurred by or threatened against Grantors or any other person or entity, except as the claim is the result of Grantee's or Grantee's agents and assigns negligence, gross negligence, or intentional misconduct.

11. Monitoring

The Grantee shall manage its responsibilities for the Conservation Easement, including, but not limited to, annual monitoring, such additional monitoring as circumstances may require, record keeping, and enforcement, for the purposes of preserving the Property's Protected Values in perpetuity. Monitoring shall be consistent with the monitoring protocols, which are attached as Exhibit B and incorporated by this reference.

12. Enforcement

The Grantee may take all actions necessary to ensure compliance with the terms, conditions, covenants and purposes of this Conservation Easement. The Grantee shall have the right to prevent and correct violations of the terms of this Conservation Easement. With reasonable advance notice to the Grantors, the Grantee may enter the Property for the purpose of inspecting to verify compliance with this Conservation Easement. If the Grantee finds what it believes is a violation, it may at its discretion take appropriate legal action to ensure compliance with the terms, conditions, covenants and purposes of this Conservation Easement and shall have the right to correct violations and prevent the threat of violations. Except when an ongoing or imminent violation could irreversibly diminish or impair the habitat and open space values or the limited agricultural productivity character of the Property, the Grantee shall give the Grantors written notice of the violation and thirty (30) days to correct it, before filing any legal action.

If a court with jurisdiction determines that a violation may exist or has occurred, the Grantee may obtain an injunction, specific performance, or any other appropriate equitable or legal remedy. A court may also issue an injunction requiring the Granters to restore the Property to its condition prior to the violation. In any case where a court finds that a violation has occurred, the Grantors shall reimburse the Grantee for all its expenses incurred in stopping and correcting the violation, including but not limited to reasonable attorney's fees. The failure of the Grantee to discover a violation or to take immediate legal action shall not bar it from doing so at a later time. Grantee's

remedies under this section shall be cumulative and shall be in addition to all remedies now or hereafter existing at law or in equity.

Without limiting Grantor's liability, the Grantee shall apply damages recovered for the purpose of corrective action to the cost of undertaking any corrective action on the Property. Should the restoration of lost values be impossible or impractical for whatever reason, the Grantee shall apply any and all damages recovered to furthering the

Grantee's mission, with primary emphasis on conservation easement acquisition or enforcement.

Failure or refusal to exercise any rights under the terms of this Conservation Easement by Grantee in the event of a breach by Grantors of any term herein shall not constitute a waiver or forfeiture of Grantee's right to enforce any term, condition,covenant or purpose of this Conservation Easement or any other term herein.

13. State Interest

This Easement was acquired by Grantee pursuant, in part, to a grant of funds from the Conservancy, for the purpose of preserving the habitat, scenic and open space resources and other Protected Values of the Property, and no use of the Property inconsistent with that purpose is permitted, except by specific act of the legislature. The Grantee is further obligated to use, manage, operate and maintain the Easement as described in the "USE MANAGEMENT, OPERATION AND MAINTENANCE" section of Conservancy Grant Agreement No. 05-015, an unrecorded agreement, an executed copy of which is on file at the office of Grantee and at the office of the Conservancy.

14. No Security for Debt

This Easement. (including any portion or interest in it) may not be used as security for any debt without the written approval of the Grantee and the State of California, acting through the Executive Officer of the Conservancy, or its successor.

15. Transfer of Easement

If the Grantee should desire to assign or transfer its interest in this Conservation Easement to another qualified private nonprofit organization or to an appropriate public entity, the Grantee must first request and obtain written permission from the Grantors and from the Executive Officer of the Conservancy or its successor. The request shall state the name of the proposed transferee, the reasons for the transfer,and such other information as may be requested. Such approval will not be unreasonably withheld, however, the Grantor and/or the Executive Officer of the Conservancy has the right to recommend alternative transferees. If written consent is given for the proposed transfer by the Grantors and the Conservancy , the Grantee may transfer this Conservation Easement to: 1) a private nonprofit organization that, at the time of transfer, is a "qualified organization" under Section 170(h) of the U.S. Internal Revenue Code and under Section 815 .3(a) of the Civil Code of California and has similar purposes to preserve natural habitat, open space, and agricultural lands, as well as agreeing to assume the responsibilities imposed by this Conservation Easement; 2) if no such private nonprofit organization is willing to assume the responsibilities imposed by this Conservation Easement, to any public agency authorized to hold interests in real property as provided in section 815.3(b) of the Civil Code of California. Such a transfer may proceed only if the organization or agency expressly agrees to assume the responsibility imposed on the Grantee by the terms of this Conservation Easement and is expressly willing and able to hold this Conservation Easement for the purposes for which it was created.

16. *Executory Limitation*

If Grantee shall cease to exist for any reason, or to be a qualified organization under section 170(h) of the Internal Revenue Code, as amended, or to be authorized to acquire and hold conservation easements under California law, or if any of the essential provisions of this Conservation Easement are violated, then Grantee's right, title, and interest in the Conservation Easement shall automatically vest in the State of California for the benefit of the Conservancy or its successor, upon acceptance of the Conservation Easement and approval by the State Public Works Board; provided, however that the State, through the Executive Officer of the Conservancy or its successor may designate a nonprofit organization or another public agency to accept the right, title and interest, in which case vesting

shall be in that agency or organization rather than in the State. The designation of a nonprofit organization or another public agency shall be subject to the approval of the Grantors, which approval shall not be unreasonably withheld.

The Conservancy shall notify the Granters in writing not less than 30 days prior to any designation. identifying the proposed designee. If the Granters fail to respond to the notice of designation within 30 days of the date of the notice, Grantors shall be deemed to have approved the proposed designation. Granters shall have the right to recommend a suitable nonprofit organization or public agency for consideration by the Conservancy.

For purposes of this paragraph, the essential provisions of this Easement" are those set forth in Paragraphs 11 through 15.

17. Amendment of Easement

This Conservation Easement may be amended only with the written consent of the Granters, the Grantee, and the Executive Officer of Conservancy or its successor. Any such amendment shall be consistent with the purposes of this Conservation Easement and with the Grantee's easement amendment policies, and shall comply with Section 170(h) of the Internal Revenue Code, or any regulations promulgated in accordance with that section, and with Section 815 et seq. of the Civil Code of California, or the Public Resources Code of California, or any regulations promulgated thereunder. No amendment shall diminish nor affect the perpetual duration of this Conservation Easement. No amendment shall diminish the Purpose of this Conservation Easement nor the rights of the Grantee under the terms of this Conservation Easement.

1IL Transfer of Property Interest

Any time the Property itself, or any interest in it, is transferred by the Grantors to any third party, the Grantors shall notify the Grantee in writing at least thirty (30) days prior

to the transfer of the property or interest, and the document of conveyance shall expressly incorporate by reference this Conservation Easement. Any document conveying a lease of the Property shall expressly incorporate by reference this Conservation Easement. Failure of the Grantors to do so shall not impair the validity of this Conservation Easement or limit its enforceability in any way.

1ft. *Termination of Easement*

If circumstances arise in the future such as render the purpose of this Easement impossible to accomplish, this Easement can only be terminated or extinguished, whether in whole or in part, by judicial proceedings in a court of competent jurisdiction, and the amount of the compensation to which Grantee and the Conservancy shall be entitled from any sale, exchange, or involuntary conversion of all or any portion of the Property subsequent to such termination or extinguishment, shall be determined, unless otherwise provided by California law at the time, in accordance with Section 20. No inaction or silence by Grantee shall be construed as abandonment of the Easement.

Other than pursuant to eminent domain or in lieu of eminent domain, no other voluntary or involuntary sale, exchange, conversion or conveyance of any kind of all or part of the Property, or of any interest in it, shall limit or terminate the provisions of this Easement.

20. *Compensation*

The amount of the compensation to which Grantee and the Conservancy shall be entitled from any sale, exchange, or involuntary conversion of all or any portion of the Property subsequent to any termination or extinguishment of this Easement, shall be determined as the difference, at the time of the termination or extinguishment; between the fair market value of the unrestricted fee interest and the fair market value of the Property encumbered by this Conservation Easement. That difference shall be determined by an appraisal approved by Grantee and the Conservancy and conducted at the Grantor's expense. An independent qualified licensed appraiser shall perform the appraisal. Nothing herein shall prevent Grantee or the Conservancy from having an appraisal prepared at their own expense.

The Conservancy shall be paid for its respective proportionate share of the proceeds for the value of the Easement: 92.31%. The proportionate share is based on the proportion of the acquisition price for the Easement paid by the Conservancy.

21. Condemnation

Should all or part of the Property be taken in exercise of eminent domain by public, corporate, or other authority so as to abrogate the restrictions imposed by the Easement, Grantors and Grantee shall join in appropriate actions at the time of such taking to recover the full value of the taking and all incidental or direct damages resulting from the taking, which proceeds shall be divided in accordance with the proportionate values of Grantor's and Grantee's interests as specified in Section, unless otherwise provided by applicable law. All expenses incurred by Grantors and Grantee

in such action shall be first paid out of the recovered proceeds. If, pursuant to this section, Grantee is entitled to receive any proceeds, whether by agreement or by court order, for a public taking of all or any portion of the Easement, Grantee shall provide to the Conservancy a share of the proceeds proportionate with its contribution towards the purchase price of the Easement according to the following percentage: 92.31%.

Termination of the Easement through condemnation is subject to the requirements of section 10261 of the Public Resources Code. Should this easement be condemned or otherwise terminated on any portion of the Property, the balance of the Property shall remain subject to this Easement. In this event, all relevant related documents shall be updated and re-recorded by Grantee to reflect the modified easement area.

22. Partial Extinguishment or Taking

Should this Easement be extinguished on a portion of the Property or should a portion of the Property be taken through the exercise of eminent domain, the balance of the Property shall remain subject to this Easement. In this event, all relevant related documents shall be updated and re-recorded by Grantee to reflect the modified Easement.

23. *Interpretation*

(a.) This Conservation Easement shall be interpreted under the laws of California, resolving any ambiguities and questions of the validity of specific provisions so as to give maximum effect to its conservation purposes.

(b.) References to authorities in this Conservation Easement shall be to the statute, rule, regulation, ordinance or other legal provision that is in effect at the time this easement becomes effective.

(c.) No provision of this Conservation Easement shall constitute governmental approval of any improvements, construction or other activities that may be permitted under this Conservation Easement.

24. *Perpetual Duration*

This Conservation Easement pursuant to Civil Code section 815.1 hall run with the land in perpetuity. Every provision of this Conservation Easement that applies to the Grantors or Grantee shall also apply to their respective agents, heirs, executors. administrators, assigns, and all other successors as their interests may appear.

No merger of title, estate or interest shall be deemed effected by any previous, contemporaneous, or subsequent deed, grant, or assignment of an interest or estate in the Property, or any portion thereof, to Grantee, or its successors or assigns, it being the express intent of the parties that this Conservation Easement not be extinguished by, or merged into, or any other interest or estate in the Property now or hereafter held by Grantee or its successors or assigns.

25. Notices

Any notices to Grantors, Grantee *or* the Conservancy required *by* this Conservation Easement shall be in writing and shall be personally delivered or sent by first class mail, to the following addresses, unless a party has been notified by the other of a change of address:

To Grantors:

Glen and Jo
Dolan 549
Dolan Road
Moss Landing, CA 95039

Stacey Dolan
13870 Avenue
25
Chowchille, CA

93610 To the Grantee:

Monterey County Agricultural and Historic Land Conservancy, Inc.

P.O. Box 1731
Salinas, CA 93902
Attn: Board
President

To the Conservancy:

Coastal Conservancy
1330 Broadway, 13th
Floor Oakland, CA
94612
Attn: Executive Officer

26. Grantor's Environmental Warranty

This Conservation Easement is not intended to create environmental liability in the Grantee or the Conservancy. The Granters warrants that it has no actual knowledge of a release or threatened release of hazardous substances or wastes on the Property and hereby promises to defend and indemnify Grantee and the Conservancy and their officers, agents and employees against all litigation, claims, demands, penalties and damages, including reasonable attorneys' fees, arising from or connected with any release of hazardous waste or violation of federal, state *or* local environmental laws.

Notwithstanding any other provision herein to the contrary, the parties do not intend this Conservation Easement be construed such that it creates in or gives the Grantee or the Conservancy:

(a) The obligations or liability of an "owner" or "operator" as those words are defined and used in environmental laws. as defined below, including, without limitation, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (42 USC section 9601 et seq. and hereinafter "CERCLA");
(b) the obligations or liability of a person described in 42 USC section 9607 (a)(3) or (4);
(c) the obligations of a responsible person under any applicable Environmental Laws, as defined below;
(d) the right to investigate and remediate any Hazardous Materials, as defined below, associated with the Property; or
(e) Any control over Grantor's ability to investigate, remove, remediate, or otherwise clean up any Hazardous Materials associated with the Property.

The term "Hazardous Materials" includes, without limitation, (a) material that is flammable, explosive, or radioactive; (b) petroleum products; and (c) hazardous materials, hazardous wastes, hazardous or toxic substances, or related materials defined in the CERCLA (42 USC section 9601 et seq.), the Hazardous Materials Transportation Act (49 USC section 5101, et seq.), the Hazardous Waste Control Law (California Health and Safety Code section 25100 et seq.), and in the regulations adopted and publications promulgated pursuant to them. or any other applicable federal, state, or local laws, ordinances, rules, or regulations now in effect or enacted after this date.

The term "Environmental Laws" includes, without limitation, any federal, state or local or administrative agency statute, regulation, rule, ordinance, order or requirement relating to pollution, protection of human health, the environment or Hazardous Materials.

27. Grantors' Title Warranty - No Prior Conservation Easements

Grantors represent and warrant that Grantors own the entire fee simple interest in the Property. including the entire mineral estate. Grantors further represent and warrant that Grantors have good fee simple title to the Property and that any and all financial liens or encumbrances existing as of the date of recording of this Conservation Easement have been or will be subordinated. Exhibit C sets forth all non-financial encumbrances.

Grantors hereby promise to defend the same against all claims that may be made against it. Grantors represent and warrant that the Property is not subject to any other conservation easement whatsoever.

28. *Severability*

If any term. provision, covenant, condition or restriction of this Conservation Easement is held by a court of competent jurisdiction to be unlawful, invalid, void, or unenforceable or ineffective, the remainder of the agreement shall remain in full force and effect and shall in no way be affected, impaired, or invalidated.

29. ***Acceptance***

As attested by the signature of its President affixed hereto, in exchange for consideration, the Grantee hereby accepts without reservation the rights and responsibilities conveyed by this Deed of Conservation Easement.

To Have and To Hold, this Deed of Conservation Easement unto the Grantee, its successors and assigns, forever.

In Witness Whereof, the Grantors and Grantee, intending to legally bind themselves, have set their hands on the date first written above.

Witness: Grantors:

Josephine S. Dolan
Trustee of the Josephine S. Dolan Trust
Dated November 30, 1999

Glenn E. Dolan
Trustee of the Glen E. Dolan Trust
dated November 30, 1999

Stacey Dolan

Accepted:

Witness: Grantee:

Monterey County Agricultural and
Historic Land Conservancy, Inc.

By Richard Nutter
President

A.P.N. Notary Form File No.:

STATE OF California)SS
COUNTY OF Monterey)

On **January 18, 2007**, before me, **Donald Turner, Notary Public** personally appeared **Richard Nutter,** personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies) and that his/her/their signature(s) on the instrument the person(s) or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Signature Donald Turner

This area for official notarial seal

DONALD TURNER
Commission # 1710793
Notary Public — California
Monterey County
My Comm. Expires Jan 9, 2011

My Commission Expires: January 9, 2011

Notary Name :Donald Turner
Notary Registration Number:1710793

Notary Phone: 831-784-7663
County of Principal Place of Business: Monterey

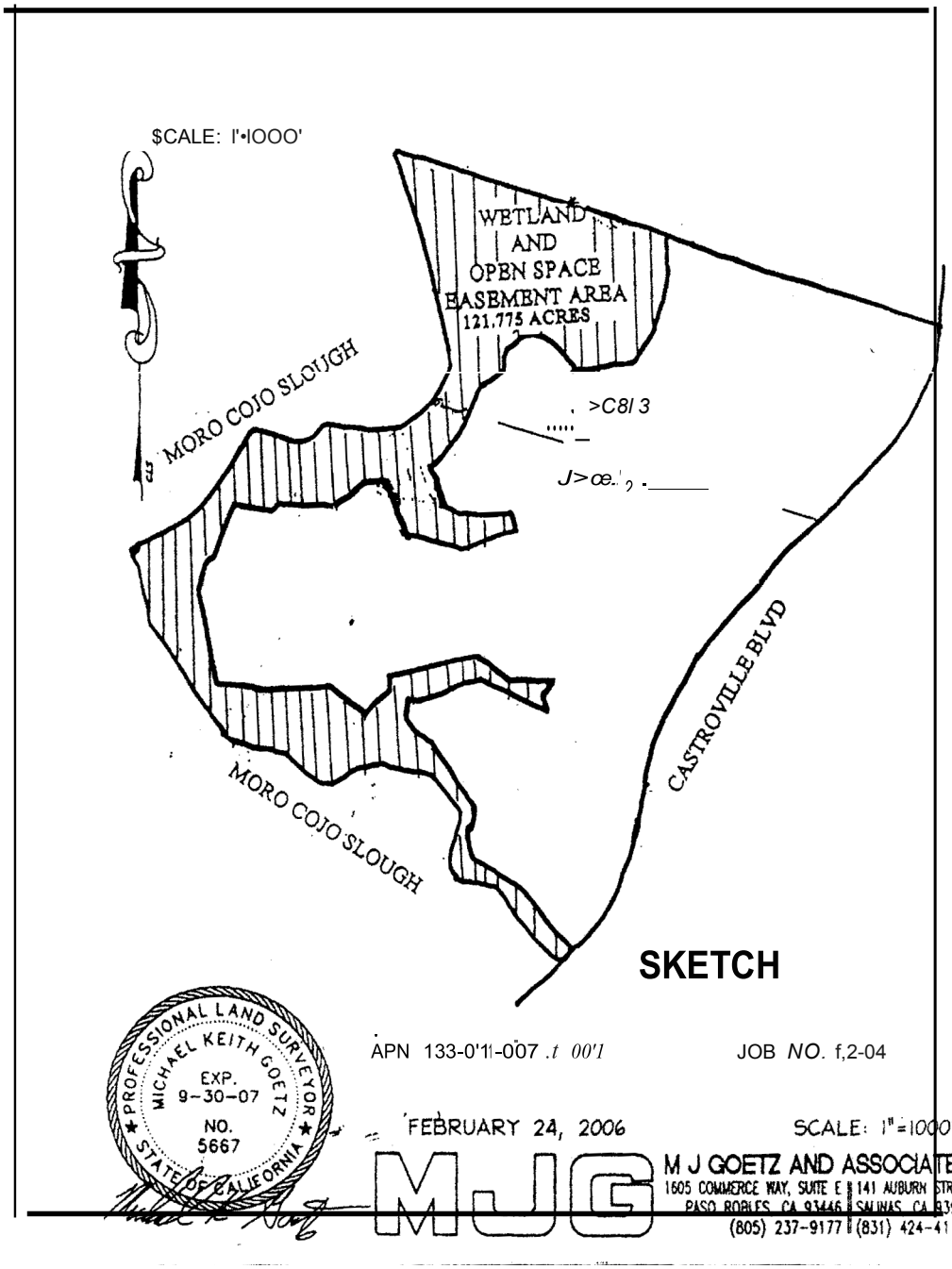
$CALE: I'•IOOO'
WETLAND
AND
OPEN SPACE
EASEMENT AREA
121.775 ACRES
MORO COJO SLOUGH
MORO COJO SLOUGH
CASTROVILLE BLVD
SKETCH
APN 133-0'11-007 .t 00'1
JOB NO. f,2-04
FEBRUARY 24, 2006
SCALE: I"=1000'
PROFESSIONAL LAND SURVEYOR
MICHAEL KEITH GOETZ
EXP.
9-30-07
NO.
5667
STATE OF CALIFORNIA
MJG
M J GOETZ AND ASSOCIATES
1605 COMMERCE WAY, SUITE E
PASO ROBLES, CA 93446
(805) 237-9177
141 AUBURN STREET
SALINAS, CA 93901
(831) 424-4114

EXHIBIT B

Monitoring -Protocols

The Grantee shall undertake annual inspections of the Property to monitor compliance with the easement tenns. The grantee may undertake additional Property inspections as are reasonable and warranted under the circumstances. An inspection is reasonable and warranted, if, for example, there is reason to believe that a material violation of an easement provisions has occurred or is imminent.

2 . A representative of the Conservancy may accompany the grantee on any annual or other site inspection.

3 Prior to the site inspection for annual monitoring, the grantee shall provide advance notice to the grantors and the Conservancy of the date and time of the inspection. At the request of either the. granters or the Conservancy, the date of the inspection will be rescheduled to provide at least 15 days advance written notice to both the grantors and the Conservancy.

4 Prior to any other site inspection, the grantee shall provide the Granters and the Conservancy with advance notice of the site inspection and the reasons for the site inspection, in a manner that is reasonable in light of the circumstances.

5 During any annual or other Property inspection, the Grantee shall document the conditions on the Property through photographs or through other appropriate means.

6 Within a reasonable time following the inspection of the Property, the Grantee shall prepare and provide to the Gtantors and to the Conservancy a written report, including documentation, detailing the results of the inspection and any actions taken based on the inspection .

EXHIBIT C

1. General and special taxes and assessments for the fiscal year 2007-2008, a lien not yet due *or* payable.

2. The lien of supplemental taxes, if any, assessed pursuant to Oiapter 3.5 commencing with section 75 of the California Revenue and Taxation Code.

3. An easement for Pole lines and incidental purposes in the document recorded April 27, 1942 as Volume 763, page 229 of Official Records.

4. An easement for Transmission towers and incidental purposes in the document recorded October 19, 1949 as Volume 1167, page 391 of Official Records.

5. An easement for Pipe line and incidental purposes in the document recorded November 20, 1951 as Volume 1342, page 253 of Official Records.

6. An easement for Transmission towers and incidental purposes in the document recorded December 27, 1954 as Volume 1576, page 500 *ex* Official Records.

7. An easement for Transmission towers and incidental purposes In the document recorded November 5, 1958 as Volume 1907, page 21 of Official Records.

8. An easement for Transmission lines and incidental purposes in the document recorded September 29, 1965 as Reel 426, page 530 of Official Records.

9. An easement for Pipe lines and incidental purposes in the document recorded March 3, 1969 as Reel 595, page 939 of Official Records.

10. An easement for Public utilities, well site, driveway and incidental purposes in the document recorded April 26, 1983 as Reel 1629, page 121 of Official Records.

11. Terms, provisions, covenants, restrictions and conditions contained in a document executed pursuant to the · California Land Conservation Act of 1965 (Williamson Act) and recorded December 22, 1997 as 9775588 of Official Records.

12. Terms, provisions, covenants, restrictions and conditions contained in a document executed pursuant to the California Land Conservation Act of 1965 (Williamson Act) and recorded December 22, 1997 as 9775589 of Official Records.

13. Any claim that any portion of the land is or was formerly tidelands within the bed of any tidal slough.

END OF DOCUMENT

APPENDIX C – PHOTO AND TLS SURVEY ARCHIVES

Appendix C – Photo and TLS Survey Archives

Photos

The folder organization naming convention is that of month and year of the photos contained within each folder. Subdirectories are then titled "N Finger," "S Finger," and "misc." N Finger and S Finger folders contain the quarterly photomonitoring photos, if there were any taken in that particular month and year. Misc folders contain all other onsite photos, including restoration crews at work, water quality monitoring stations and data collection, examples of onsite tarping, coverboards, gullies formed at North Finger, sediment basin construction and progress photos.

Image file naming convention is starts with month and year, followed by N for North Finger or S for South Finger, followed by photosite, sometimes followed by a period and a photosite replicate number. For example, 2/11_N_2.1.jpg is a photo taken during February 2011 of the North Finger Photosite station Dol 2, replicate 1. Miscellaneous photos are also named with month and year, usually with N or S (although sometimes WQ for water quality station, and then a descriptor of the photo, such as "Gully." For example, 2/11_N_runoffgully.jpg is a photo taken during February 2011 of the runoff gully in North Finger.

In addition to all the site photos, a "Photosites" folder contains an Excel spreadsheet of the geographic coordinates for all photomonitoring sites in both Latitude/Longitude and UTM coordinate systems as well as a physical description of the site from which the photos were taken (Photosite locations.xls). The folder also contains a site map with all photosite locations marked (Photosite locations.jpg).

There are 46 folders of site photos, ranging from November 2005 to November 2015. The following table shows the months and years represented in the photo DVD.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2005									x		x	
2006	x	x		x				x			x	
2007				x							x	
2008	x							x			x	
2009		x			x			x		x	x	x
2010	x			x	x			x			x	
2011		x	x				x			x	x	
2012	x	x	x		x			x			x	x
2013								x			x	
2014	x		x	x				x		x		x
2015	x				x						x	

The TLS survey final report and GIS data are included in a separate folder on the DVD.