CONCEPTUAL WETLANDS MITIGATION PLAN

for the

SAN DIEGO COUNTY WATER AUTHORITY TIJUANA RIVER VALLEY WETLAND MITIGATION BANK PROJECT

Prepared for:

San Diego County Water Authority
4677 Overland Avenue
San Diego, California 92123
Contact: Don Chadwick
(858) 522-6758

Prepared by:

DUDEK
605 Third Street
Encinitas, California 92024
(760) 942-5147

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1.0 INTRODUCTION

The purpose of this conceptual mitigation plan is to outline appropriate measures for creation of a 45-acre wetlands mitigation bank in the Tijuana River Valley. The project is part of an overall mitigation strategy to provide wetlands mitigation credits for upcoming San Diego County Water Authority (SDCWA) capital improvement projects such as the Emergency Storage Project, the proposed Carryover Storage Project, and other SDCWA projects that may require wetlands mitigation.

The goal of this wetlands mitigation project is to provide U.S. Army Corps of Engineers (ACOE) and California Department of Fish and Game (CDFG) wetlands creation credits that are required to offset wetlands impacts created by Water Authority Capital Improvement Projects. ACOE wetlands creation requires the establishment of three environmental parameters that define ACOE jurisdiction under the Clean Water Act: hydric soils, surface hydrology, and hydrophytic vegetation. In addition, the wetlands must possess a significant nexus to navigable and/or permanent waters of the U.S. according to the Joint ACOE/Environmental Protection Agency (EPA) Guidance document in response to Rapanos v. United States and Carabell v. United States (ACOE and EPA, 2007). To achieve this goal, the project site is designed to provide effective flood flow and frequent inundation to the greatest extent practicable to create ACOE jurisdictional wetlands.

The proposed project would create approximately 45 acres of native wetlands vegetation communities and native transitional uplands habitat. The project would establish a permanent surface connection to the Tijuana River, expand the functional floodplain to the south of the river and west of the Smuggler's Gulch Channel, and provide a system of pedestrian/equestrian trails connected to existing trail segments located throughout the Tijuana River Valley Regional Park (TRVRP), Tijuana Slough National Wildlife Refuge, and Border Field State Park as originally described in the *Tijuana River Valley Wetland Mitigation Project, Initial Study, County of San Diego, California* (Dudek 2007b) and County of San Diego Parks and Recreation Department *TRVRP Trails and Habitat Enhancement SEIR* (2006).

The project will include several key features designed specifically to reintegrate the project site with the Tijuana River, restore soil chemistry through surface inputs of freshwater, provide dynamic, self-sustaining native wetlands vegetation communities, and provide protection to adjacent properties from long-term flooding.

The project will also implement TRVRP multi-purpose trails (equestrian and bicycle) that are generally intended to remain open except during unusually high water flow in the valley, and equestrian/pedestrian trails that are subject to seasonal closure. The proposed trails alignment are

designed to be consistent with the County of San Diego's approved trail system. New trails would be constructed at the top of the relocated river berm, providing an all-weather east-west pedestrian/equestrian trail. Top of berm trails would be of a suitable width for small vehicles to travel in order to provide access to the U.S. Border Patrol agents. The existing Cathedral Trail that is aligned through existing river floodplain would have one section relocated by the proposed project. The new river berm trail will connect at the east end of the proposed project site to the proposed trail at Smuggler's Gulch, which runs atop the existing berm. On the west end of the project site, the berm trail would connect with the existing river berm and trail.

Removal of the existing berms located along the northern boundary of the project site is required to re-establish a surface hydrology connection to the Tijuana River. Existing river berms will be relocated to facilitate the proposed flooding of 45 acres of agricultural fields. The relocated berms will be constructed to a top of berm elevation that provides flood protection that is equivalent to the flood protection now provided by the existing berms that will be removed. A hydraulic analysis conducted for this project indicates the current berms provide for 100-year flood protection. Minor grading within the fields will be required to create an appropriate gradient that is necessary to convey floodwater through the site and return the water to the river. An approximately 4-acre area will be graded at the northeast side of the project, where water would flow from the Tijuana River floodplain into the proposed site. This area is situated within the existing Tijuana River floodplain, north of the river berm, and supports mature cottonwood trees and degraded wetlands understory vegetation. Impacts to these existing wetlands are proposed to be offset by creation of new wetlands within the project site.

Other issues related to the construction of the proposed project include the removal of existing on-site abandoned farm buildings, abandoned electricity poles, abandoned groundwater wells, disassembly of non-functional related pump facilities, and relocation of an existing 8-inch potable water line.

Additionally, removal of some surface soils currently laden with trash and debris would be required, as well as creation of a berm segment along the west property boundary, and creation of on-site trail segments that would connect to existing off-site County trails.

The project is designed to balance cut and fill, therefore, no soil export is anticipated. However, concrete rubble within the existing berms may be transported offsite, or be processed onsite and recycled to construction material businesses. Materials processing onsite would require an onsite crushing operation that reduces concrete rubble to the constituent elements such as concrete and aggregates to be trucked off site. The volume of this material and number of truck trips needed to transport the material off site cannot be estimated at this time. Staging of equipment, materials

and supplies would occur on the project site. Construction of the project is anticipated to begin in the fall of 2009.

Creation of wetlands habitat on the project site would include installation of an above ground, temporary irrigation system, installation of container plantings, willow cuttings, and native seed mix application. The project will be monitored and maintained for 5 years per typical mitigation requirements or until the mitigation site reaches performance criteria. Maintenance may include remedial actions such as reseeding, replanting and adjustments to the maintenance regime to promote attainment of the ultimate performance criteria during the 5-year establishment period. Upon the site reaching the ultimate mitigation performance criteria, the site would transition into the long-term management program as defined in an approved Habitat Management Plan (HMP) and managed in perpetuity as open space within the San Diego County TRVRP.

This conceptual plan was prepared to meet applicable regulatory agency guidelines for creation of jurisdictional wetland vegetation communities and land cover types. This plan defines project goals and implementation and monitoring and maintenance information that is designed to attain the intended mitigation result.

1.1 Responsible Parties

This conceptual mitigation plan is being submitted by the San Diego County Water Authority (SDCWA). The representative for SDCWA is Mr. Don Chadwick whose contact information appears on the cover of this plan. SDCWA will be financially responsible for all negotiations and costs associated with the mitigation implementation, monitoring, maintenance and protection of mitigation areas as defined in this document. SDCWA will provide access to the mitigation area for applicable regulatory agency representatives throughout the installation and five-year maintenance and monitoring period. SDCWA is also responsible for completion of mitigation construction drawings and specifications, submittal of as-built drawings, and submittal of annual monitoring reports as discussed below. A Mitigation Banking Agreement (HBA) and Habitat Management Plan (HMP) will be prepared for this project as separate programmatic documents.

1.1.1 Project Biologist/Habitat Restoration Specialist

SDCWA will select a habitat restoration firm to implement the onsite mitigation installation and maintenance plan. SDCWA may choose to hire a maintenance contractor that is separate from the installation contractor. SDCWA will contract with a qualified biological consultant to implement construction monitoring and interim maintenance monitoring of the mitigation site. SDCWA, Restoration Contractor (and any sub-contractors) and Project Biologist will review all aspects of pertinent contract documents including, but not limited to, site protection, submittal,

scheduling of formal site observations, lines of communication, and persons with stop work authority prior to project implementation.

The Project Biologist will oversee and coordinate implementation of this conceptual plan and the construction drawings, interpret said plans, conduct field monitoring of project installation and monitoring during the 120-day maintenance period, and biological monitoring throughout the five-year maintenance and monitoring period. The Project Biologist will possess specific knowledge and project level experience with habitat restoration and enhancement projects. The Project Biologist will possess at least three years of habitat restoration experience in Southern California.

The Project Biologist will inform all project personnel prior to implementation of this conceptual plan of all onsite construction restrictions. The Project Biologist will inform all project personnel of the presence or potential presence of sensitive species and habitats within or adjacent to the project area, as well as any potential dangers onsite (e.g., rattlesnakes, bee-hives, poison oak, etc.). Information about federal, state, and local laws relating to these biological resources will be discussed as part of the personnel education. Native vegetation within and surrounding the exotic vegetation removal areas which is to remain in place will also be flagged by the Project Biologist prior to vegetation removal. Access and staging areas outside of environmentally sensitive areas will be established and flagged.

Construction monitoring will occur throughout the construction period. Monitoring time may increase or decrease as required by field conditions and construction activities. During construction, the Project Biologist, via the SDCWA Construction Manager, will have authority to stop work in situations where biological resources, not authorized to be impacted, are in imminent danger of impacts from adjacent construction activities. Each site visit will be documented in a site observation report that will note construction activities relating to the enhancement plan and any project deficiencies. The project biologist will conduct a minimum of four formal site observations during the 120-day plant establishment period.

The Project Biologist shall conduct onsite maintenance monitoring visits throughout the five-year maintenance monitoring period to document project deficiencies and provide recommendations for remedial measures. Each monitoring visit will include a qualitative assessment of maintenance work and will include remedial recommendations as necessary to help ensure each year's success criteria are met. The five-year biological monitoring of the mitigation program will be performed in accordance with the resource agency requirements and this conceptual plan. Biological monitoring will include collection of qualitative and quantitative data during the five-year monitoring period as described in *Section 6.0*.

1.1.2 Construction Drawings and Specifications

Following approval of this conceptual plan, construction drawings, specifications and project cost estimates will be prepared for construction purposes. Construction drawings and specifications will conform to all aspects of this conceptual plan and guidelines required by the resource agencies. Construction documents and drawings will incorporate the most current site condition information available and will be subject to review and comment by applicable regulatory agencies. Drawings will be at a scale no less than one-inch to 40 feet. The plan package will include a site plan showing proposed work areas and final site facilities, proposed grading, irrigation and planting plans, and construction details.

1.1.3 As-Built Drawing

As-built plans for this mitigation project will only be required if the installation project substantially deviates from this plan and/or the permit conditions. If necessary, as-built plans will reflect changes to the configuration of habitat areas and site elevations that may affect project success.

1.1.4 Annual Monitoring Reports

SDCWA is responsible for maintaining and monitoring the mitigation area for a period of five years following installation (or until the resource agency requirements are met). SDCWA will contract with a qualified biological consulting firm to perform the five-year, interim monitoring for the mitigation site. Monitoring reports containing qualitative and quantitative analysis of the mitigation area will be prepared by the biological consultant on the anniversary date of the project installation annually for five-years. The annual reports will be submitted by SDCWA to the resource agencies. See *Section 6.4* for the specific content of annual monitoring reports.

1.2 Jurisdictional Wetland Vegetation Communities to be Created by Habitat Type

Jurisdictional wetland vegetation community creation at this site will provide mitigation for impacts associated with upcoming SDCWA capital improvement projects such as the Emergency Storage Project the proposed Carryover Storage Project, and other SDCWA projects that may require wetlands mitigation. Approximate wetland composition by vegetation type is shown in *Table 1*.

TABLE 1
Target Vegetation Community Representation

Vegetation Community	Approximate Percent Representation
Southern willow Scrub (SWS)	80
Mulefat scrub (MFS)	10
Freshwater marsh (FWM)	5
Cottonwood Willow woodland (CWWW)	5

*Note: These percentages are a preliminary conceptual approximation. Actual acreage percentage values may differ during design phase or in final project implementation due to unforeseeable environmental conditions that may favor the establishment of one habitat type over another.

2.0 EXISTING CONDITIONS

The existing conditions of the mitigation site are summarized below. Information on existing biological resources and utilities within the mitigation area was compiled during site visits conducted by Dudek biologists Phil Behrends (PB), Tricia Wotipka (TW), Anita Hayworth (AH), Jeff Priest (JP), Scott Boczkiewicz (SB), and Jennifer Turnbull (JT), who surveyed the project study area between April 2006 and October 2007. Surveys consisted of vegetation mapping, a jurisdictional wetlands delineation, inventory of wildlife and plant species, focused surveys for the federally-listed endangered least Bell's vireo and southwestern willow flycatcher (*Empidonax traillii extimus*), and a focused habitat assessment for the pacific pocket mouse (*Perognathus longimembris pacificus*). During the general and focused surveys, the potential for special status plant and wildlife species to occur onsite was assessed, based on the existing vegetation communities, soils, and overall habitat quality of the site. Additional information on surveys conducted may be found in the *Biological Resources Report for the San Diego County Water Authority Tijuana River Valley Wetlands Mitigation Project* (Dudek 2007a).

2.1 Project Site Location and Description

The Tijuana River Valley Wetlands Mitigation Project site consists of approximately 60 acres located in the City of San Diego, County of San Diego, California. The selected wetlands mitigation bank site is located in the Tijuana River Valley, approximately ¼ mile west of Hollister Street and ¼ mile north of Monument Road. The project site is situated on the U.S. Geological Survey 7.5 minute Imperial Beach quadrangle, Section 4, Township 19 South, Range 2 West (*Figures 1* and *2*). The land is owned by the County of San Diego and is being used by the SDCWA under a cooperative agreement between these agencies. The project area occurs on San Diego Assessors Parcel number 663011200.

Access to the proposed project area is made via Hollister Road and Monument Road. Several unimproved dirt access roads traverse the property from east to west and north to south, making vehicular access to all areas of the property possible. The east side of the site is adjacent to Smugglers Gulch, an approximately 16-foot wide drainage channel that directs drainage from a tributary of the Tijuana River located south of the proposed project site into the river, located immediately north of the site. This channel is approximately 10 to 12 feet deep, and is surrounded by earthen berms that extend up to 6 feet above the surface grade of the adjacent agricultural fields.

The entire northern boundary of the site is composed of a broad, approximately 10-foot high earthen and rubble berm, that prevents flood flows within the Tijuana River from entering the proposed project site. A man-made detention basin is located immediately south of this berm adjacent to Smugglers Gulch on the project site. This basin is passively supplied with river water through a 12-inch culvert located within the earthen berm. This basin has become naturalized with native wetlands vegetation including disturbed southern willow scrub and freshwater marsh, and does not contain a functioning overflow outlet. Several individual arroyo willow (*Salix lasiolepis*) trees are established adjacent to this basin, as well as along the edges of Smugglers Gulch. The remainder of the proposed project site is dominated by relatively flat agricultural fields that are disced on a regular basis (annually), and ruderal habitat dominated by non-native plants. .

The proposed project area topography consists of flat, lowland agricultural fields associated with the Tijuana River Valley that range from approximately 25-feet above mean sea level (AMSL) on the eastern portion of the site to approximately 20-feet AMSL in the southwest portion of the site. Adjacent land uses include agricultural lands and undeveloped land associated with the Tijuana River Valley.

2.2 Existing Uses

Existing land uses include agricultural lands, undeveloped land associated with the Tijuana River Valley and earthen berms. The majority of the proposed project site is dominated by relatively flat agricultural fields that are disced on a regular basis (annually), and ruderal habitat dominated by non-native plants. No crops are currently planted on the site.

Figure 2 Project Area Map

In addition, there are a series of both formal and informal trails throughout the area which are used by equestrians and foot traffic. These trails are connected to the trail network of the parks within the Tijuana River Valley.

2.3 Soil Conditions

According to Bowman (1973), two soil types are mapped on the proposed project site including the saline Chino silt loam on 0 to 2 percent slopes (CkA), and the Tujunga sand on 0 to 5 percent slopes (TuB). The Chino series also consists of moderately well drained, fine sandy loams derived mainly from granitic alluvium. The Chino silt loam is slightly saline and is silt loam to loam throughout. The Tujunga series consists of very deep excessively drained sands derived from granitic alluvium. The Tujunga sand is found on alluvial fans and flood plains.

The proposed project area has been extensively disced for agricultural purposes on an annual basis since the mid 1950s. Due to this long history of intensive land management for agriculture, these distinct soil types may no longer be distinguishable on the project site. Soils observed on the project site during the general field investigations and the wetlands delineation included deep, well-drained, fine-grained sandy loams with slightly saline characteristics (based upon dominant vegetation present). In addition, salt accumulation was noted within portions of soils that have been disced in the recent past. These salt accumulations are likely the result of capillary action from brackish groundwater and surface evaporation. Salt crusts, such as those commonly observed within and associated with hydric soils were not observed on the project site.

2.4 Existing Hydrology

The project site occurs within the lower Tijuana River Valley, approximately 1.75 mile east of the Pacific Ocean. Given the low elevation of the site (approximately 20-feet above sea level) and the occurrence of the site within the lower 1/3 of the Tijuana River watershed, extensive groundwater connection to the project site from the river would be expected. However, the site is dominated by deep, well-drained sands that prevent an accumulation of groundwater near the surface of the project site. Groundwater data indicates that there is moderate to high salinity throughout the site, with test results ranging from 2.39 mmhos/cm to 8.88 mmhos/cm during the test period (McMicheaux, 2001).

The proposed project site occurs immediately south of the main channel of the Tijuana River, but does not currently have an extensive surface connection to the river due to the presence of an earthen berm that borders the entire northern boundary of the site. Smugglers Gulch, a man-

made channel, provides the only minor surface connection to the river. However, the channel is lined throughout the project site by tall earthen and rubble berms that prevent any backflows of river floodwaters from entering the project site. Smugglers Gulch also provides drainage of a tributary of the Tijuana River northward adjacent to the project site, but the berms along the channel again prevent any surface connection of these tributary waters to the project site.

Several freshwater irrigation pipelines are present on the project site. These pipes are generally buried parallel to the east-west unimproved roads onsite and deliver irrigation water to the agricultural fields on the project site as well as to the west and south of the project site. In some areas of the project site, sub-surface leaks from these irrigation water delivery pipes support small, sporadic stands of hydrophytic (water-loving) vegetation including mule fat (*Baccharis salicifolia*), arroyo willow and salt-cedar (*Tamarix* sp.). However, these irrigation water delivery pipes do not provide sufficient long-term water for jurisdictional wetlands habitats to develop on the project site.

2.5 Existing Vegetation Communities and Land Cover Types

Based on species composition and general physiognomy, two native wetland vegetation communities, one disturbed wetlands vegetation community, and three non-native uplands vegetation communities or land covers were identified within the project area. Native wetland vegetation communities include freshwater marsh (FWM) and southern willow scrub (SWS). In addition, disturbed southern willow scrub (dSWS) dominated by non-native plants occurs on the project site. Uplands habitats include disturbed habitat, ruderal land and agricultural lands. No native uplands habitat types were observed on the project site. A list of plant species observed on site is shown in *Appendix A*. During project implementation, some minor impacts to native vegetation on the site are expected. Compulsatory mitigation for these impacts is included in the project. For further discussion on this matter, please refer to the *Biological Resources Report for the San Diego County Water Authority Tijuana River Valley Wetlands Mitigation Project* (Dudek 2007b).

2.5.1 Southern Willow Scrub/Disturbed Southern Willow Scrub

Southern willow scrub is dense riparian vegetation dominated by willows (*Salix* spp.) with other scattered winter-deciduous trees and little understory development. This vegetation occurs on loose, sandy or fine gravelly alluvial soils near stream channels and is dependent on repeated flooding (Holland 1986).

Within the project area, southern willow scrub occurs in distinct, isolated patches composed of individual trees located on the edges of the existing agricultural fields on the property. The habitat is composed of arroyo willow (*Salix lasiolepis*) trees varying from young trees approximately 15 feet in height and 4 to 5 inches in diameter at breast height (dbh) to larger, more mature trees over 30 feet in height and 10 to 12 inches dbh. These trees are likely supported by groundwater that is within the root zone of the trees, as surface flows of fresh water to the trees would be extremely rare due to their position below and outside of the direct hydrologic influence of the Smugglers Gulch channel and the Tijuana River.

Disturbed southern willow scrub also occurs on the project site, along the edges of the berm surrounding the Smugglers Gulch channel and around the freshwater marsh and open water within the detention basin impoundment at the northeast corner of the project site. This habitat is composed of black willow (*Salix goodingii*) and arroyo willow, with small amounts of sparse occurrences of native shrubs and herbs in the understory including mule fat (*Baccharis salicifolia*) and yerba mansa (*Anemopsis californica*) in the habitat under story. However, approximately 50 percent of total plant cover is represented by non-native and invasive plants including salt-cedar (*Tamarisk ramosissima*), giant reed (*Arundo donax*) tree tobacco (*Nicotiana glauca*), castor bean (*Ricinus communis*), cocklebur (*Xanthium strumarium*), fennel (*Foeniculum vulgare*), and non-native grasses including wild oat (*Avena fatua*) and ripgut grass (*Bromus diandrus*). These areas are adjacent to and contiguous with ruderal habitat, dominated by a variety of non-native and invasive species including those listed here.

Disturbed southern willow scrub also occurs, within the areas north of the berms on the project site. These areas also contain many of the non-native and invasive plant species listed above. These areas of disturbed southern willow scrub north of the project site have been designated as 25 percent disturbed or 50 percent disturbed depending upon the area of total plant cover dominated by non-native and/or invasive plant species.

2.5.2 Coastal and Valley Freshwater Marsh and Open Water

Coastal and valley freshwater marsh occurs in drainages, seepages, and other perennially moist low places. This community is characterized by perennial, emergent monocots (e.g., grasses and lilies), two to three meters (6 to 10 feet) tall, such as cattails and bulrushes (*Scirpus* spp.). Understory species typically include curly dock (*Rumex crispus*), marsh fleabane (*Pluchea odorata*), and a variety of hydrophytic grasses and herbs (Holland 1986).

Open water may be defined for the purpose of this plan, as natural or man-made water systems in which open, sparsely vegetated water surface is the dominant land cover feature. This may

include lakes, streams, rivers, ponds, ditches, reservoirs or similar. Water may either be standing or flowing. Some emergent, or floating, vegetation may be present; however this vegetation does not comprise a significant percentage of surface coverage. It generally occurs where the depth of water is too great to support emergent vegetation (BIFFA 2002 and USFWS 1979).

Freshwater marsh occurs within a small impounded detention basin in the northern central portion of the site. The dominant species include slender cattail (*Typha domingensis*) and California bulrush (*Scirpus californicus*). The freshwater marsh has saturated soils, and is contiguous with open water habitat containing no vegetation in the center of the basin. This open water habitat is stagnant and was up to four feet deep at the time of the surveys in the spring of 2007. The basin is impounded on all sides by a berm that extends up to 13 feet above the ordinary high water mark (OHWM). Vegetation along this berm consists of disturbed southern willow scrub and ruderal land. The detention basin is connected to the Tijuana River by a 12-inch inlet which passes through the north side of the berm approximately 2 feet above the OHWM, and is drained by a 12-inch passive outlet that passes from the basin through the south side of the berm. The outlet is located approximately one foot from the top of the berm and appears to be non-functional.

2.5.3 Disturbed Habitat

Disturbed habitat occurs as unimproved roads and equestrian and pedestrian trails throughout the project site. These areas are disturbed frequently enough to prevent establishment of vegetation, and are characterized by bare soils with very little organic matter of any kind. Disturbed habitat may include occasional small areas of non-native herbs or grasses.

2.5.4 Ruderal Land

Ruderal land occurs along the edges of the agricultural fields and disturbed habitat areas on the project site. These areas are not disced for agricultural production, but also do not receive repeated physical disturbance from horses, vehicles or pedestrians, but have been altered by previous human disturbance such that native plants are no longer present. Ruderal land is dominated by annual and biennial herbs including tree tobacco, castor bean, fennel, cocklebur, ripgut grass, wild oat, cheeseweed (*Malva parviflora*), Russian thistle *(Salsola tragus),* jimson weed (*Datura stramonium*), crystalline iceplant (*Mesembryanthemum crystallinum*), Carolina geranium (*Geranium carolinianum*) and black mustard (*Brassica nigra*).

2.5.5 Agricultural Land

Agricultural lands occur on the majority of the project site within three large fields that appear to be disced on an annual basis. The majority of plants observed are non-native species commonly associated with agricultural fields including Russian thistle, pigweed (*Chenopodium album*), Australian saltbush (*Atriplex semibaccata*), Bermuda grass (*Cynodon dactylon*), soft chess (*B. hordeaceus*), wild radish (*Raphanus sativus*), London rocket (*Sisymbrium irio*) and dwarf nettle (*Urtica urens*). Some areas dominated by forage plants including alfalfa (*Medicago sativa*) were present at the time of the surveys in the spring of 2007, and occasional sparse dead mule fat seedlings and saline areas dominated by bare soils were also present. Furrows for irrigation were not evident on the project site, and many areas of the agricultural fields contained large amounts of trash and debris within the upper soil surface.

2.6 Wildlife Observed On Site

A total of 68 wildlife species were observed or detected during formal surveys conducted by Dudek biologists in 2006 and 2007. The majority of these species were observed within riparian habitat located immediately adjacent to the site.

2.6.1 Birds

A total of 56 species of birds were observed during the general wildlife observations in 2006 and 2007. The majority of these species were observed within riparian habitat adjacent to the project area. Species observed within the site include song sparrow (*Melospiza melodia*), yellow-rumped warbler (*Dendroica coronata*), Anna's hummingbird (*Calypte anna*), lesser goldfinch (lesser goldfinch), house finch (*Carpodacus mexicanus*), red-shouldered hawk (*Buteo lineatus*), northern flicker (*Colaptes auratus*), California horned lark (*Eremophila alpestris*), mourning dove (*Zenaida macroura*), black phoebe (*Sayornis nigricans*), mallard (*Anas platyrhynchos*), red-tailed hawk (*Buteo jamaicensis*), ruby-crowned kinglet (*Regulus calendula*), northern rough-winged swallow (*Stelgidopteryx serripennis*), dark-eyed junco (*Junco hyemalis*), western meadowlark (*Sturnella neglecta*), northern harrier (*Circus cyaneus*), Lawrence's goldfinch (*Carduelis lawrencei*), and least Bell's vireo.

Three least Bell's vireos were observed adjacent to the site during focused surveys conducted in 2006. During two of the least Bell's vireo surveys, a vireo was observed on the project site in disturbed southern willow scrub (Dudek, 2007a).

2.6.2 Reptiles and Amphibians

The only amphibian species observed within the survey area was bull frog (*Rana catesbeiana*), a non-native species which was observed in freshwater marsh habitat within the impounded pond onsite. Two reptile species including side-blotched lizard *(Uta stansburiana*), and southern alligator lizard (*Gerrhonotus multicarinatus*) were observed within the project area. Other reptile species observed within the adjacent riparian habitat include common kingsnake (*Lampropeltis getulus*) and western fence lizard (*Sceloporus occidentalis*) (Dudek, 2007a).

2.6.3 Mammals

A total of six common mammal species were observed within or adjacent to the project area. On site observations included ground squirrel (*Spermophilus beecheyi*) and common raccoon (*Procyon lotor*) (Dudek, 2007a).

3.0 MITIGATION PROGRAM

3.1 Local, State, and Federal Project Goals and Objectives

The purpose of this mitigation site is to create a wetland mitigation bank to be use by SDCWA for impacts to jurisdictional wetlands. This will be accomplished by the establishment of native wetland vegetation communities which will be under joint jurisdiction of ACOE, CDFG, and Regional Water Quality Control Board (RWQCB).

In order to meet criteria acceptable to the applicable regulatory agencies as jurisdictional, the project will undergo five years of biological monitoring to ensure that appropriate wetland hydrology is created and the vegetation communities meet their intended structure, complexity and biological function.

3.2 Proposed Site Uses

The native vegetation communities of the mitigation site will be generally off limits to use by the public, as to minimize disturbance to the developing vegetation communities and wildlife species which have colonized the site. There will be a pedestrian/ equestrian trail network open to the public, which will connect to existing equestrian and hiking trails within the Tijuana River Valley, as shown in *Figure 3*. Historical use of an adjacent wetland mitigation site for equestrian trail use has not resulted in deterioration of the adjacent restored wetland vegetation communities through which the trail is located.

Figure 3 Conceptual Mitigation Design Map

3.3 Wetland Functions and Values

The mitigation plan focuses on creating the biological resources on the existing project site by expanding the riparian corridor of the adjacent Tijuana River and its active floodplain footprint. Initial assessment indicates that the proposed plan will create wetland functions currently absent on the site, since the site is dominated by unvegetated, agricultural land with no wetland hydrology. Based on the proposed design, the addition of surface hydraulic inlet connections from the main Tijuana River stream channel to the site, as well as hydraulic outlets from the wetland back into the existing riparian corridor will accommodate a localized increase of floodwater storage. Hydrologic functions including long-term surface water storage and energy dissipation are projected to improve from the addition of micro- and macro-topographic complexity (variable plant materials, added flow channels, hummocks), as well as the addition of shrub and tree density and basal area to the site (cottonwood, sycamore, willow, and other woody plants). Dynamic surface water storage, which is currently a depressed function throughout the Tijuana River Valley due to river channelization for agricultural purposes, is projected to improve due to the addition of these elements. Sub-surface water storage functions are projected to have a slight increase in subsurface storage due expected to additional hydraulic outlets that may accelerate water table drawdown.

Biogeochemical functions including nutrient cycling, removal of imported elements/compounds, and retention of particulates are all projected to improve due to an increased density of woody plant materials, improved onsite micro-topographic complexity, and accelerated primary productivity resulting from installation trees, shrubs, and herbaceous vegetation, as well as expansion of the freshwater marsh vegetation component. The retention of particulates function, resulting from substantial increases (over time) of surface vegetation roughness, which tends to slow high-flow velocities and promote sediment deposition, will provide opportunity for an increased amount of nutrient uptake within the project area. Although the retained sediments indicator for this function is expected to decrease initially due to increased area of surface flows, the increasing density of woody vegetation is projected to offset the initial reduction of the retained sediments indicator. The organic carbon export function is also projected to improve slightly due to increased amounts of available organic matter in the wetland and the addition of surface hydraulic connections with the main stream channel, which improves drainage during the descending limb of the hydrograph.

Based on water quality sampling data, the Tijuana River is nutrient rich. Associated with these nutrients are high levels of bacteria and microorganisms which are known to be harmful to coastal water quality when discharged untreated into the ocean. The mitigation site will provide additional potential for biofiltration of these nutrients and associated constituents onsite.

Vegetative functions including maintenance of community type and detrital biomass, both of which are currently absent wetland functions onsite, will be created as species composition increases, as trees and shrubs dominate more of the total vegetative cover (currently less than 1 percent total cover), and as natural regeneration of woody plants improves (over time, with seed from plantings and upstream propagules). Maintenance of spatial structure, currently a depressed wildlife habitat function onsite, is also projected to improve as the above indices are altered through vegetation establishment. Maintenance of interspersion and connectivity is projected to improve with the addition of surface hydraulic connection to the main stream channel, which promotes formation and maintenance of a high heterogeneity of wildlife habitats and potentially complex trophic interactions among wildlife species. Maintenance of distribution and abundance of invertebrates and vertebrates are both projected to increase; additional habitat will be created onsite for aquatic invertebrates, and additional plant species and resulting leaf-litter biomass will provide enhanced habitats for terrestrial invertebrates. It is also projected that the trophic interactions of vertebrate guilds and species onsite will increase with the additional inputs of biomass, seasonal variation of plant materials, improved vertical stratification of vegetation onsite, and increased habitat for invertebrates.

3.4 Target Hydrologic Regime

The project is based on establishing appropriate site hydrology by directing seasonally high over-bank stream flows from the Tijuana River throughout the site (to be accomplished by removing berms and regrading to appropriate contours), as well as by utilizing naturally occurring high groundwater levels throughout the site. To support the reestablishment of wetland vegetation communities, a new hydraulic surface inlet, and new surface hydraulic outlet will be created to provide opportunity for the over-bank flow onto the site. Grading at the inlet area will lower elevation to facilitate the flow of a 2-year storm event onto the mitigation site. Vegetation baffles will be installed at the project inlet to increase the friction coefficient for flow entering the site, thus allowing only a portion of the 2-year storm event to enter the mitigation site. This design feature is included to avoid diversion of the entire 2-year flood event into the mitigation site and any adverse effects that total diversion of flow may have had on habitat associated with the southern branch of the Tijuana River.

Excavation within the site is expected to ensure that the entire mitigation site will have sub-surface groundwater present within the root zone of the plants in all community types. While the majority of year-round stream flow is currently contained within the low-flow channel of the Tijuana River emergency channel, the project will be designed so that a 2-year storm event will result in temporary flooding of the majority of the mitigation site of an approximate depth of two feet (Chang 2007). The outlet location was selected based on adjacent existing elevations within the City of San Diego Tijuana River Emergency Channel wetlands mitigation project that creates a flow gradient from inlet to outlet that is consistent with the existing Tijuana River Floodplain. Establishment of this hydraulic gradient across the mitigation site will eliminate the potential for standing or persistent ponded water.

3.5 Rationale for Expecting Successful Mitigation

The riparian corridor of the Tijuana River and the City of San Diego Tijuana River Emergency Channel Wetland Mitigation Project are located directly adjacent to the project site. These areas currently are supporting a mixture of native and non-native wetland species. The presence of these species indicates that appropriate hydrology is present to sustain native wetlands vegetation communities. The hydrology of the river valley floodplain in which the project is located, appears to be relatively constant and of sufficient flow volume to support the intended native wetlands vegetation (Chang 2007). The project site will be graded down, providing suitable topography and groundwater soil moisture optimal for establishment and persistence of native wetland vegetation communities.

The natural tendency of native wetland vegetation to recruit into open areas with sufficient soil moisture, combined with container plant installation and a native seed mix application, is expected to result in a significant expansion of native wetland vegetation within the project site.

Weed control measures will be implemented for five years after the initial installation, or until final success criteria has been achieved and may include remedial actions that will be implemented, as needed, to promote project success. The suppression of weed growth and reproduction over the extended maintenance period will allow establishing native vegetation to become dominant over non-native plant species throughout the project site. The newly established vegetation will have a positive effect on many aspects of biological and hydrological functions and values including sediment entrainment, moderation of flow velocities, carbon storage, shade that will suppress non-native seedling recruitment and moderate water runoff temperatures, and enhance wildlife resources. Trash removal will occur as part of the maintenance regime during the maintenance and monitoring period.

An HMP will be prepared and implemented as an element of the HBA. The HMP will provide an adaptive management framework that will direct appropriate management actions over the life of the mitigation bank. Such management actions may include weed control, trash abatement, public access and other issues that are identified during negotiation of the HBA.

3.6 Time Lapse

It is likely that the planted wetland vegetation communities will require the majority of the five year maintenance and monitoring period to approach the typical height, structural complexity, and cover values of maturing, wetland vegetation communities. Based on previous restoration experience on the adjacent City of San Diego Wetlands Mitigation Site, it is reasonable to expect the mitigation project to reach 80 percent of the mature height and form within the five-year monitoring period. Within five years the intended native plant compositions will be established enough to survive under natural conditions and will have adequate cover to resist the invasion of exotic species from adjacent portions of the watershed if performance criteria are achieved.

It is likely that the freshwater marsh along the stream channel will be the first to colonize, with propagules from obligate plants (e.g., cattails, bulrushes, rushes, sedges) seeding in from upstream sources and augmenting the planted species. This will help expedite the establishment of a dense fresh water marsh component along wetland channels graded throughout the site. The southern willow scrub and mulefat scrub are expected to colonize the mitigation site relatively quickly as well, with some woody species such as cottonwood requiring longer to achieve a mature height and canopy spread.

Although each vegetation community will differ in growth rate and percent cover, it should be apparent whether the project has been successful by the end of the five-year maintenance and monitoring period.

3.7 Preliminary Project Schedule

This preliminary project schedule is contingent upon the approval of the resource permitting agencies and local jurisdictions. Upon appropriate approvals, implementation of this conceptual wetland mitigation plan could begin as early as Fall 2008, as shown below in *Table 2*.

TABLE 2
Preliminary Phase 1 Mitigation Project Schedule

Task	Date
Prepare Final Mitigation Construction Documents (Plans, Specifications and Cost Estimate); Establish Contract Grow Arrangement with Nursery	Fall 2008
Award Installation Contract	Spring 2009
Site Grading and Preparation	Summer 2009
Install Irrigation System	Fall 2009
Install Plant Container Stock, Wattle/live stakes, Apply Hydroseed	Fall/ Winter 2009
120-day Plant Establishment Period	Spring 2010
Conduct Five-year Maintenance, Monitoring, and Reporting	Summer 2010 – Summer 2015
Final Release of Permit Obligations	Summer 2015

4.0 MITIGATION IMPLEMENTATION PLAN

Project implementation will include the removal of exotic vegetation, site grading to remove and reestablish flow gradients and appropriate surface elevations relative to groundwater depths, create topographical features that will facilitate an appropriate hydrologic function throughout the site, installation of live wattles and stakes for vegetation establishment and sediment control, installation of a temporary irrigations system, container plant installation, and the application of native seed mixes. A description of these activities is provided below.

4.1 Required Activities During Implementation

The following activities are required during implementation of the mitigation project, including but not limited to project installation and interim maintenance. All site features including fence, signage and erosion control features shall be maintained by the Restoration Contractor in proper condition through the end of the project maintenance and monitoring period.

4.1.1 Construction Fence

Protection of all installed plant materials in wetland creation areas will be provided by temporary orange construction fencing installed along the edges of the access road to protect all environmentally sensitive areas. Fence locations will be approved by the Project Biologist prior to installation, and shall be installed at the edge of sensitive wildlife habitat areas prior to the beginning of vegetation clearing and grading.

4.1.2 On-site Construction Activity Restrictions

During mitigation site construction and throughout implementation of this conceptual plan, the following guidelines should be followed:

- Operation of machinery adjacent to Tijuana River and associated waterways and wetland vegetation communities adjacent or onsite will be minimized to avoid damage to existing biological resources except as shown on construction drawings. Machinery refueling and or servicing must take place at designated staging areas.
- No dumping of debris or stockpiling of soil will occur in or near the Tijuana River floodplain except in areas designated on the construction drawings and as shown in *Figure 3*.
- Construction access to the site will be limited to existing paved and approved roads/ routes.
- No smoking will be permitted within or adjacent to the mitigation site.
- Native habitat areas adjacent to the mitigation site will be avoided with machinery at all times.
- Fire abatement equipment must be present onsite when machinery is being operated.
- All staging areas shall be accessible to SDCWA, the project biologist, and appropriate regulatory agencies, subject to applicable safety protocol.
- Environmentally sensitive areas and plant species to be protected in place will be flagged by the Project Biologist prior to project initiation.

4.1.3 Construction Monitoring by Project Biologist

The Project Biologist will make regular site observations during project implementation. The Project Biologist will review activities for conformance to this plan, environmental permit conditions, and the requirements of contract plans and specifications. Each site observation visit will be documented in an observation report. Photo-documentation of site conditions will be conducted, as needed.

4.2 Exotic Plant Removal

In addition to grading of primarily unvegetated agricultural lands, stands of non-native vegetation will be removed. Non-native and invasive plants found onsite to be removed prior to grading include; salt-cedar (*Tamarisk ramosissima*), giant reed (*Arundo donax*) tree tobacco (*Nicotiana glauca*), castor bean (*Ricinus communis*), cocklebur (*Xanthium strumarium*), fennel

(*Foeniculum vulgare*), and non-native grasses including wild oat (*Avena fatua*) and ripgut grass (*Bromus diandrus*). All vegetation within the grading limits will be removed with bulldozers except for selected isolated native trees to be protected in place.

4.3 Site Grading

Site grading will remove berms that restrict flow from the project site, establish inlet and outlet elevations and appropriate flow gradients across the site, and reestablish new berms to protect adjacent land against flooding during the 25-year flood event consistent with the *Two Alternatives Report, Tijuana River Valley – Flood Control and Infrastructure Study* (BSI 1994).

The project site will be graded down per the project plans and specifications to access groundwater for planted vegetation, as well as create the target hydrologic regime. The site will be graded to allow capacity for an average 2 foot inundation level covering the site during a 2 year precipitation event.

No import soil is anticipated to be necessary for implementation of the mitigation plan. Most of the soil removed to create jurisdictional wetlands will be used onsite for berm construction or stockpiled at the designated onsite disposal area (*Figure 3*). Debris removal during berm demolition will be exported from the site and recycled or disposed of at a legal disposal location. Grading will be accomplished to create the optimum conditions for wetland hydrology and wetlands vegetation community development.

The Project Biologist will observe rough and final grades to assess whether the grading complies with the project design and are adequate to support the target vegetation for the area. The Project Biologist will periodically monitor the site preparation and grading procedures to verify that they stay within the established limits, minimize impacts to existing wetlands and native vegetation, and comply with any applicable resource agency permit conditions.

4.4 Erosion Control and Best Management Practices

Applicable erosion control measures in the form of Best Management Practices (BMPs) will be utilized as necessary during project implementation. Erosion control measures in the form of BMPs will be utilized during exotic vegetation removal and grading activities to minimize impacts to water quality as site conditions necessitate. BMPs will be maintained throughout construction and during the five-year maintenance period or until new native vegetation is sufficiently established to provide replacement stabilization.

BMPs should be implemented throughout work areas where substantial vegetation removal is required. The project biologist will monitor periodically during the project to help ensure BMP compliance.

BMPs include:

- Installation (as necessary) of silt fencing, fiber rolls, and gravel bags at key locations where the potential for erosion and soil transport exists.
- Installation (as necessary) of erosion control features (e.g., geotextile fabric) during and following vegetation removal and grading.
- Hydroseeding (including an appropriate binding agent) of project site.
- Installation of willow cuttings and wattles which will root and provide soil stability

4.5 Project Access Routes

Access to the proposed project area is made via Hollister Road, Monument Road, and the Saturn Boulevard Right of Way. Several unimproved dirt access roads traverse the property from east to west and north to south, making vehicular access to all areas of the property possible. Dirt roads both cross, as well as utilize existing berms.

4.6 Wetlands Planting Design

A planting plan will be prepared in accordance with *Section 1.1*.2 that defines the habitat areas to be established on the project site per *Table 1*. In general, southern willow scrub will be located in areas that are expected to have appropriate and frequent inundation without year round saturated soils. Mule fat scrub will be located at the outer fringe of the mitigation site where drier conditions are expected to occur. Freshwater marsh vegetation is expected to establish through passive revegetation along low flow channels that provide year round soil moisture that is necessary to support this vegetation community. Cottonwood-Willow Woodlands will be created through the addition of community-specific species such as cottonwood in association with willow plantings.

Documentation during field survey work indicates that a significant amount of anthropogenic trash is present in the surrounding waterways brought into the area via Smugglers Gulch. Removal of trash may be a significant maintenance task for this project site. To alleviate trash deposition onsite, a series of three vegetation baffles have been designed for installation at and near the surface water inlet as depicted in *Figures 3* and *4*. The vegetation baffles will have two effects on flow: 1) the baffles will create a higher friction coefficient to water flow, thus reducing

Figure 4 Vegetation Baffle

high velocity flow that can transport trash debris into the mitigation site, and 2) the baffles will create a physical barrier to the passage of trash debris. The vegetation baffles will consist of dense plantings of arrow weed (*Pluchea sericea*) and/or sandbar willow (*Salix exigua*). These species are effective filters because each species 1) spreads by underground runners sending up multiple vertical shoots and forming monotypic thickets over time and 2) tend to have vertical stems without branching. Plant material from stakes and wattles will be planted in multiple rows near the surface water inlet to the project (*Figure 3*). As the vegetation grows and establishes, trash will be diverted from the project area because high velocity flow will continue to move northward caught up in racking, thereby reducing the amount of trash flowing onto the rest of the site.

4.6.1 Recommended Plant Palettes

After removal of exotic plants and grading of the site, the planting areas will be prepared and revegetated with native species. Planting palettes are shown in *Tables 3* through *7*. All container plants, live stakes, wattled material, and seed shall originate from coastal San Diego County within 25 miles of the coast.

TABLE 3
Southern Willow Scrub Plant Palette (36 acres)

Botanical Name	Common Name	Total Estimated Number of plants	Container Size	Average Spacing (Feet on Center)
Container Plants				
Baccharis salicifolia	mulefat	2450	1 gallon	8
Carex spissa	San Diego sedge	4900	1 gallon	4
Iva hayesiana	San Diego marsh elder	4900	1 gallon	4
Muhlenbergia rigens	deergrass	4900	1 gallon	4
Juncus acutus	spiny rush	4900	1 gallon	4
Rosa californica	California wild rose	1225	1 gallon	8
Rubus ursinus	California blackberry	1225	1 gallon	8
Salix exigua	sandbar willow	4900	1 gallon	8
Salix lasiolepis	arroyo willow	7350	1 gallon	8
Salix goodingii	black willow	7350	1 gallon	8
Hydroseed Mix		% Purity/ % Germination		Lbs. Per Acre
Ambrosia psilostachya	western ragweed	2/30		2
Anemopsis californica	yerba mansa	45/60		4
Artemisia douglasiana	mugwort	10/50		6
Artemisia palmeri	San Diego sagewort	15/50		4
Leymus triticoides	beardless wild rye	90/80		3
Oenothera elata	evening primrose	98/75		1
Pluchea odorata	marsh fleabane	35/60		2
Total Ls. Per Acre				22

*Note: A yet unspecified number of stakes and wattles from willow species will be incorporated into the planting for this vegetation community. The quantities and willow species shall be determined by the Project Biologist, based on abundance of donor plant material onsite. All hydroseed mixes shall include seed mix indicated in Lbs. per acre, virgin wood cellulose fiber mulch at 2,500 Lbs. per acre, and binder at 150 Lbs. per acre.

TABLE 4
Mulefat Scrub Plant Palette (4.5 acres)

Botanical Name	Common Name	Total Estimated Number of plants	Container Size	Average Spacing (Feet on Center)
Container Plants				
Baccharis salicifolia	mulefat	1838	1 gallon	8
Iva hayesiana	San Diego marsh elder	2450	1 gallon	4
Leymus condensatus	giant wild rye	544	1 gallon	6
Muhlenbergia rigens	deergrass	613	1 gallon	4
Rubus ursinus	California blackberry	153	1 gallon	8
Hydroseed Mix		% Purity/ % Germination		Lbs. Per Acre
Ambrosia psilostachya	western ragweed	2/30		2
Artemisia douglasiana	mugwort	10/50		5
Artemisia palmeri	San Diego sagewort	15/50		4
Oenothera hookeri	Hooker's evening primrose	98/75		1
Pluchea odorata	marsh fleabane	35/60		2
Total Ls. Per Acre				14

NOTE: All hydroseed mixes shall include seed mix indicated in Lbs. per acre, virgin wood cellulose fiber mulch at 2,500 Lbs. per acre, and binder at 150 Lbs. per acre.

TABLE 5
Freshwater Marsh Plant Palette (2.25 acres)

Botanical Name	Common Name	Total Estimated Number of plants	Container Size	Average Spacing (Feet on Center)
Container Plants				
Anemopsis californica	yerba mansa	1000	1 gallon	2
Carex spissa	San Diego sedge	613	1 gallon	4
Eleocharis montevidensis	sand spikerush	196	1 gallon	5
Juncus acutus	spiny rush	272	1 gallon	6
Juncus xiphioides	iris-leaved rush	272	1 gallon	3
Scirpus robustus	prairie bulrush	800	1 gallon	4

TABLE 6
Cottonwood-Willow Woodland Plant Palette (2.25 acres)

Botanical Name	Common Name	Total Estimated Number of plants	Container size	Average Spacing (Feet On Center)
Container Plants				
Baccharis salicifolia	mule fat	77	1 gallon	8
Carex spissa	San Diego sedge	306	1 gallon	4
Iva hayesiana	San Diego marsh elder	306	1 gallon	4
Juncus acutus	spiny rush	136	1 gallon	6
Platanus racemosa	Sycamore	12	1 gallon	20
Populus fremontii	Fremont's cottonwood	31	1 gallon	25
Salix exigua	sandbar willow	230	1 gallon	8
Salix lasiolepis	arroyo willow	283	1 gallon	8
Salix goodingii	black willow	230	1 gallon	8

TABLE 6
Cottonwood-Willow Woodland Plant Palette (2.25 acres)

Botanical Name	Common Name	Total Estimated Number of plants	Container size	Average Spacing (Feet On Center)
Hydroseed Mix		% Purity/ % Germination		Lbs. Per Acre
Ambrosia psilostachya	western ragweed	2/30		2
Anemopsis californica	yerba mansa	45/60		4
Artemisia douglasiana	Mugwort	10/50		6
Artemisia palmeri	San Diego sagewort	15/50		4
Juncus acutus	Spiny rush	90/40		1
Leymus triticoides	Beardless wild rye	90/80		3
Muhlenbergia rigens	Deerweed	80/70		3
Onethera elata	Hooker's evening primrose	98/75		0.5
Pluchea odorata	Marsh fleabane	35/60		2
Total lbs. Per Acre				25.5

NOTE: All hydroseed mixes shall include seed mix indicated in Lbs. per acre, virgin wood cellulose fiber mulch at 2,500 Lbs. per acre, and binder at 150 Lbs. per acre. A yet unspecified number of stakes and wattles from willow species will be incorporated into the planting for this vegetation community. The quantities and willow species shall be determined by the Project Biologist, based on abundance of donor plant material onsite. All hydroseed mixes shall include seed mix indicated in Lbs. per acre, virgin wood cellulose fiber mulch at 2,500 Lbs. per acre, and binder at 150 Lbs. per acre.

TABLE 7
Transitional Upland Plant Palette (8.37 acres)

Botanical Name	Common Name	Total Estimated Number of plants	Container size	Average Spacing (Feet On Center)
Container Plants				
Leymus condensatus	Giant wild rye	2910	1 gallon	5
Malosma laurina	Laurel-leafed sumac	1137	1 gallon	8
Quercus agrifolia	Coast live oak	182	1 gallon	20
Rhus integrifolia	Lemonadeberry	727	1 gallon	10
Sambucus mexicana	Mexican elderberry	727	1 gallon	10
Hydroseed Mix		% Purity/ % Germination		Lbs. Per Acre
Artemisia californica	California Sagebrush	15/50		6
Eriogonum fasciculatum	Flat-topped buckwheat	10/65		4
Hemizonia fasciculatum	Fascicled tarweed	10/25		2
Leymus triticoides	Beardless wild rye	90/80		3
Lupinus succulentus	Arroyo lupine	98/83		6
Melica imperfecta	Coast melic grass	90/60		4
Muhlenbergia rigens	Deerweed	80/70		3
Viguiera laciniata	San Diego Sunflower	40/50		4
Total lbs. Per Acre				32

NOTE: All hydroseed mixes shall include seed mix indicated in Lbs. per acre, virgin wood cellulose fiber mulch at 2,500 Lbs. per acre, and binder at 150 Lbs. per acre.

4.7 Revegetation Methods

Seeding, container plant, and willow stake/ wattle installation will be performed by a qualified landscape contractor and monitored by the Project Biologist.

4.7.1 Plant Material Installation

Implementation of this plan must be coordinated with the Restoration Contractor, SDCWA, and the Project Biologist. Plant materials for the planting plan will include container stock, live willow cuttings (stakes and wattles), and native hydroseed mixes as indicated in the plant palettes provided in *Tables 3* through *7*. All container plants will be checked for viability and general health upon arrival at the mitigation site. Plant materials shall be native species from San Diego County, within 10 miles from the coast. Plant species and quantities will be confirmed by the project Biologist.

Standard planting procedures will be employed for installing container plants. Holes approximately twice the size of the rootball of the plant will be dug using a post hole digger or power auger. Holes will be filled with water and allowed to drain immediately prior to planting. Backfill soil containing amendments (such as a fertilizer tab, or equivalent), as directed by the Project Biologist, will be placed in every planting hole following soaking, and container plants installed so that the top of the root ball is at grade.

After container plants have been installed, hydroseed mixtures will be applied to all planting areas. Labels for each hydroseed mixture shall be inspected and approved by the Project Biologist prior to mixing and application. All hydroseed mixes are to include the specified seed mix at the prescribed rate per acre, virgin wood cellulose fiber mulch at 2000 pounds per acre, commercial fertilizer at the specified rate as directed by the Project Biologist during finish grading, and a commercial binder (“Az-Tac or equivalent) at 150 pounds per acre.

4.7.2 Live Willow Wattles

Wattles of willows may be used throughout the project site, along the graded low flow channels, as natural erosion control, or to create vegetative baffle features. Live cuttings, approximately 0.75 to 2 inches in diameter and approximately 4 feet long, will be cut from live trees, stripped of leaves, and packaged approximately 5-10 stakes per bundle. The bundles will be wrapped three times with twine, at each end, and once in the middle. Cuttings will be arranged with half of the upward growing buds facing one end, and the other half facing the other end to promote a varied growth pattern upon sprouting. Once the wattles have been assembled, they will be submerged

in water and soaked for 3 to 7 days. This allows the cuttings to imbibe water, stimulates root and latent leaf buds to prepare for sprouting. Holes will be dug as necessitated by the individual application, and after the soaking period, the wattles will be placed in the holes, staked to the ground using live stakes, "watered-in" and covered up. It is imperative to keep the soil surrounding the wattles saturated, but not inundated. Placement of the wattles will be designated by the Project Biologist.

All cuttings shall be collected from within the Tijuana River riparian corridor, from healthy trees where the cutting of vegetation would not be detrimental to their survival. No more than 15 percent plant mass shall be removed form any one plant. No branches greater than 2 inches in diameter shall be cut.

4.7.3 Live Willow Stakes

Live stakes may also be used for bank stabilization along graded low flow channels, or on other areas as determined by the project biologist. Willow stakes shall be approximately 0.75 to 2 inches in diameter, and approximately 18 to 14 inches in length. The bottom end shall be cut at a 45 degree angle, both for ease of installation, and for easy directional identification. Stakes shall be soaked for 1-3 days, and be installed before root and shoot buds begin to erupt. It is imperative that the stakes be driven into the ground before significant root development occurs, as it would be sheered from the stake upon installation if it is too long. Following soaking, a pilot hole may be made using a piece of rebar, or similar, and the stakes then driven in to the soil half their length. In areas of sufficiently soft soils, a pilot hole may not be necessary. All cuttings shall be collected from within the Tijuana River riparian corridor, from healthy trees where the cutting of vegetation would not be detrimental to their survival. No more than 15 percent plant mass shall be removed form any one plant. No branches greater than 2 inches in diameter shall be cut.

4.8 Irrigation System Installation

The primary functional goal of this mitigation plan is to establish native vegetation communities capable of maintaining and supporting themselves in perpetuity. However, native container plants and seed will require irrigation for establishment on the mitigation site, especially during summer months, having been grown in nursery containers and then transplanted onto the site. A temporary above-ground spray irrigation system will be installed to support the container stock plantings and hydroseed mixtures until they can survive on their own based on observed and predicted seasonal rainfall, overland flow, and effective plant rooting depth.

All irrigation will be installed by the Restoration Contractor per the final plans and specifications. The irrigation system will be designed with above ground components to facilitate removal once the system is decommissioned.

The water source for irrigation is located at a municipal point-of-connection along Hollister Road, and the existing mainline running along the berm adjacent to the Tijuana River. All irrigation will only be used during plant establishment, as the goal of the mitigation project is to create native, self-sustaining plant communities. Irrigation use will be discontinued at least 2 years before the end of the five–year maintenance period to demonstrate the habitat's ability to survive without supplemental water.

The irrigation system will utilize battery-operated controllers that operate independent irrigation circuits, minimizing irrigation maintenance requirements for the site. All irrigation onsite will consist of PVC pipe staked at grade, with 100 percent coverage from spray heads. All areas in the transitional/upland zones along the trail system, maintenance access roads, and along the margins of the site, shall be irrigated.

Consultation with the Project Biologist will be necessary to determine the timing for the cessation of irrigation. Irrigation should stop at the earliest possible date without risking significant loss of plantings. It is expected that the irrigation system will be abandoned no earlier than the end of year two. Irrigation must be discontinued no later than the end of year three of the five-year monitoring and maintenance period based on permit requirements. Irrigation components, such as valves and sprinkler heads, may be salvaged for re-use elsewhere at the end of the establishment period.

5.0 FIVE-YEAR INTERIM MAINTENANCE PLAN

All areas of the mitigation site will be subject to the requirements specified in this maintenance and monitoring plan. SDCWA will be responsible for insuring the maintenance and monitoring of the mitigation site until the project is accepted as complete by applicable regulatory agencies.

Because the goal of the maintenance and monitoring plan is to establish a mosaic of native wetland vegetation communities that can support themselves with little or no maintenance, the primary effort of the maintenance plan is concentrated in the first few seasons of plant growth following project installation, when weeds can easily out-compete native plants. The intensity of the maintenance activity is expected to subside each year as the native plant materials become more established and local competition from non-native plants for resources in the mitigation areas is minimized through ongoing control of non-native plants.

5.1 Maintenance Activities

Maintenance activities will be conducted concurrent with the installation of the container plant and hydroseed materials, and will continue throughout the initial 120-day establishment period, through the interim maintenance and monitoring period, and concluding once success criteria have been met. Contractor maintenance activities on the site shall be conducted monthly during the 120-day establishment period and years one and two of the project, every other month for year three, and quarterly for years four and five. The Project Biologist will conduct inspections on a quarterly basis during years one through five. Recommendations for maintenance efforts will be based upon site observations and will include assessment of and recommendations to improve or repair project items including those listed below.

5.1.1 Non-Native Plant Species Control

Ongoing weed control activities will occur throughout the five-year interim maintenance period. Weed control will consist of the complete removal of selected non-native vegetation (i.e., seed heads, stems, roots), and all debris and slash generated from weed removal activities will be disposed of offsite in a legally acceptable manner. Root removal may not apply to trees.

Weed control measures may include direct physical or mechanical removal (e.g., cutting with weed whip machines, mowing) and herbicide application. Weeding will be performed as recommended by the Project Biologist to keep any weeds establishing on the mitigation site at manageable levels. The weed species presented in *Table 8* shall be controlled before seed-set (other species that appear may be added to this list if deemed necessary by the Project Biologist).

TABLE 8
Selected Weed Species to be Controlled Within the Mitigation Site

Group 1 Non-Native Weed Species to be Controlled through Physical Removal		Group 2 Invasive Exotics to be Controlled through Physical Removal and/or Direct Herbicide Application	
Scientific Name	Common Name	Scientific Name	Common Name
Brassica spp., *Hirschfeldia* sp.	mustard	*Cortaderia selloana*	pampas grass
Avena spp., *Bromus* spp., *Dactylis* sp., *Digitaria* sp., *Hordeum* sp.	Non-native annual grasses	*Nicotiana glauca*	tree tobacco
Cirsium spp., *Centaurea* sp.	thistles	*Ricinus communis*	castor-bean
Erodium botrys, E. cicutarium	filaree	*Schinus terebinthifolius*	Brazilian pepper
Lolium multiflorum	Italian ryegrass	*Arundo donax*	giant reed
Malva parviflora	cheeseweed	*Foeniculum vulgare*	sweet fennel
Melilotus spp.	yellow, white clover	*Eucalyptus* spp.	eucalyptus
Picris echioides	bristly ox-tongue	*Cynodon dactylon*	Bermuda grass
Russian thistle	Salsola tragus	*Tamarix* spp.	salt-cedar

TABLE 8
Selected Weed Species to be Controlled Within the Mitigation Site

Group 1 Non-Native Weed Species to be Controlled through Physical Removal		Group 2 Invasive Exotics to be Controlled through Physical Removal and/or Direct Herbicide Application	
Scientific Name	Common Name	Scientific Name	Common Name
Sonchus oleraceus	common sow-thistle	*Schinus molle*	California pepper
Xanthium strumarium	cocklebur	*Lepidium latifolium*	perennial pepperweed

The weed species listed in Group 1 should be removed by direct physical methods before seed-set (other species that appear may be added to this list if deemed necessary by the Project Biologist) if possible. All non-native grasses shall be controlled within the project boundaries during the interim monitoring period, but complete eradication may not be possible due to the ubiquitous nature of their distribution. Presence of non-native grasses shall not be used as a criteria for project success. *Group 2* species require chemical application to successfully control the species within the site. Herbicidal control will be used for persistent Group 2 plant species, as well as any additional perennial species that are low growing and are difficult to control by other methods (as directed by the Project Biologist via SDCWA). The maintenance contractor should coordinate with the Project Biologist and SDCWA to identify specific sites where chemical herbicide may be used. Any herbicide treatment must be specified by a licensed pest control advisor and applied by a licensed pest control applicator.

5.1.2 Hand Removal

Hand removal/physical extraction of exotics/weeds will be used around desirable native species or clusters to be preserved, where other control methods are impractical, or would cause damage to the native species. Special care will be taken not to trample adjacent native vegetation while hand removing target exotic species. The labor crew's ability to identify target exotics and existing sensitive vegetation is required to limit impacts on adjacent native habitat. Crews will be assisted by the Project Biologist in plant species identification.

Physical removal of non-plants, including the roots, is the best method for species whose rootball can readily be pulled-out with the above-ground portions of the plant. These species will be physically removed before seed-set. If hand removal is possible only after seed-set, then seed heads will be cut-off, bagged, and removed from the site prior to the weed removal. Species that will be removed and controlled though hand removal methods are shown in *Table 8*.

5.1.3 Mechanical Removal

Trees and large shrubs will be removed using mechanical methods, primarily using chain saws. Cut vegetation will be moved via foot from the area to adjacent access paths where truck transport is possible.

Exotic trees may also be killed and left in place to minimized impacts to surrounding native vegetation, and to provide roosting habitat if appropriate.

Chainsaws may also be used, as many of the exotics within the riparian zone are tree-like, and once felled, may be limbed and cut into smaller, more manageable sections for removal via foot. Species that will be removed and controlled though mechanical methods are shown in *Table 8*.

5.1.4 Chemical Treatment

Herbicide control will be used for the highly invasive exotics and weeds, which have root systems that are impractical to remove. The Project Biologist will coordinate with the contractor/pesticide applicator to identify specific locations where herbicides may be used. Chemical treatment may follow hand and mechanical removal activities that are conducted to increase the effectiveness of subsequent chemical treatment.

All herbicide treatments must be specified by a Licensed Pest Control Advisor and applied by a Licensed Pest Control Applicator. Any chemical use should be conducted using methods, such as brush application or spot spraying as directed by the Licensed Pest Control Advisor that minimize effects to adjacent/desirable native species. Only water safe herbicides shall be used in riparian areas as approved by applicable regulatory agencies.

Follow-up applications may be necessary for the highly aggressive species which can not be killed with one herbicide application. Follow-up herbicide treatment should be done at the biologically appropriate time when the recovering plants are still relatively small and before they have time to regain strength and vigor. This may require treatment during the bird breeding season. Legally registered herbicides may pose a threat to avian species; refer to the herbicide label for information on proper timing and application rates.

Pesticide label directions change with some frequency, and occasionally new products are introduced or old ones are withdrawn. Currently registered herbicides that may be utilized for weed control in the project area as this Plan was being prepared include, but are not limited to, glyph sate (trade names Aqua master, Roundup Pro, Roundup Pro Dry, Roundup Pro

Concentrate, etc.), trilogy (trade names Gallon 3A, Gallon 4, Pathfinder II), piquet (trade name Reward), fluazifop-p (trade name Fusilade II), sethoxydim (trade name Poast), and pelargonic acid (trade name Scythe). All, some, or none of these materials may be used to control weeds in the project area, depending on circumstances at the time control is accomplished. Species that will be removed and controlled by chemical methods are shown in *Table 8*.

5.1.5 Irrigation Maintenance

The mitigation site will be irrigated to promote plant survival during the drier parts of the year, primarily the summer months. Irrigation may be used in winter months to simulate a normal or above normal rain season if natural precipitation is lacking. Irrigation shall last for a maximum of three years, excepting conditions for implementation of adaptive management activities. Irrigation volume will be gradually reduced over time to acclimate plants to a non-irrigated condition prior to complete cessation of irrigation. Irrigation from June to November shall be minimized to allow plants to experience normal drought cycles and to promote appropriate root growth. The Restoration Contractor shall maintain the irrigation system at the optimum level of operation.

5.1.6 Trash Removal

Trash will be removed from the site by hand during maintenance visits. Trash consists of all man-made materials, equipment, or debris dumped, thrown, washed, blown, and left within the mitigation areas. Trash and inorganic debris washed or blown onto the mitigation site will be removed regularly. Deadwood and leaf litter of native trees and shrubs will not be removed. Downed logs and leaf litter provide valuable micro-habitats for invertebrates, reptiles, small mammals, and birds. In addition, the decomposition of deadwood and leaf litter is essential for the replenishment of soil nutrients and minerals.

Trash removal from the vegetation baffles will be conducted as part of 5-year maintenance period. The amount of trash that is collected in these baffles is expected to decline over the 5-year maintenance period as the vegetation becomes dense and mature.

5.1.7 Remedial Planting/Seeding

During monitoring visits, all plants shall be checked for viability by the Project Biologist. Dead plant material will be removed and replaced with the same size material as was planted originally (except where mortality is judged to be the result of inappropriate soil or water conditions, in which case a more suitable species would be substituted as determined by the Project Biologist)

during the 120-day period and at the end of year one. Replacement planting will be implemented to expedite native plant establishment in the enhancement areas. Remedial container planting, cuttings and wattles, and/or supplemental seeding may be necessary following each monitoring stage, as directed by the Project Biologist. All dead container plant materials above the allowable tolerance levels shall be replaced with the same species and in the same size containers as originally specified in *Tables 3* and *7*. The Project Biologist will recommend species substitutions as appropriate. In addition, any remedial seeding deemed necessary by the Project Biologist to ensure conformance with the project performance standards shall be completed with native seed of the same species and percent purity/germination as specified.

6.0 MONITORING PLAN

6.1 Performance Standards

At the end of the 120-day period after installation, all native container plantings will achieve 100 percent survival. Wattle and stake material shall have a minimum survival rate of 70 percent because even wattles that do not survive provide benefits to the project site such as soil stabilization. At the end of year one, the survival rate will be 100 percent and at least 80 percent thereafter. Native cover performance goals are included in the FHA criteria (*Section 6.2*). By the end of year five, annual weeds will make up no more than 5 percent of the entire cover onsite, no more than 5 percent of the site will consist of bare ground, and the site will be free of invasive exotic perennial plant species such as giant reed (*Arundo donax*) and salt cedar (*Tamarix* sp.)

6.2 Functional Hybrid Assessment (FHA) Criteria

In order to more effectively evaluate natural wetland functions of the vegetation communities onsite, two sets of evaluation criteria have been established; one for southern willow scrub, cottonwood willow woodland, and mulefat scrub, and one for freshwater marsh. The evaluation criteria with associated scores for each of the functional categories are described below. The FHA assessment is part of the qualitative monitoring, and is in addition to quantitative transect data collection.

Criteria for Southern Willow Scrub, Cottonwood Willow Riparian Woodland and Mulefat Scrub

Habitat – Structural Diversity

Score	Evaluation Criteria
0	Site permanently converted to human land use such as housing, agricultural, or concrete channel which will not be able to support native riparian vegetation.
0.2	No existing native riparian vegetation (e.g., covered with annual grasses and scrub, bare ground). However, site has the potential for revegetation without extensive structural modification.
0.4	Vegetated areas of the site contain sparse, scattered, patchy or remnant native riparian vegetation which is immature and/or lacks structural (vertical) diversity.
0.6	The patches of native riparian vegetation on the site contain native riparian trees and saplings (i.e., perennial dicots), but contain no, or poorly developed native shrub understory
0.8	The patches of riparian vegetation on the site contain native riparian trees and saplings (for willow scrub), plus a well-developed native shrub understory.
1.0	The patches on the site are structurally diverse. They contain riparian trees and saplings (for southern willow scrub and cottonwood willow woodland), and native seedlings, as well as developed native shrub understory and native herbaceous wetland plant species.

Habitat – Coverage and Spatial Diversity

Score	Evaluation Criteria
0	Site permanently converted to land use which will not be able to support native riparian vegetation, such as housing, agricultural, or concrete channel.
0.2	No existing native riparian vegetation (e.g., covered with annual grasses and scrub, bare ground). However, site has the potential for revegetation without extensive structural modification.
0.4	Patches of monotypic native riparian vegetation covering up to 50 percent of the site, interspersed among grasses or bare ground.
0.6	Patches of diverse, native riparian vegetation covering up to 30 percent of the site, interspersed among grasses, exotic plants, or bare ground; AND/OR greater than 50 percent of the site covered with monotypic patches of native riparian vegetation, interspersed among grasses or bare ground.

Score	Evaluation Criteria
0.8	Diverse, native riparian vegetation covering between 30 percent and 70 percent of the site, e.g., strips or islands of native riparian vegetation interspersed in open space.
1.0	Diverse, native riparian vegetation (e.g., at least three different genera of riparian vegetation present) covering between 70 percent and 100 percent of the site, interspersed in open space.

Percent Exotic, Invasive Vegetation

Score	Evaluation Criteria
0	Site is covered with pure stands of exotic vegetation or lacks any native riparian vegetation.
0.2	Site is covered by 70 to 99 percent exotic vegetation.
0.4	Site is covered by 40 to 69 percent exotic vegetation.
0.6	Site is covered by 10 to 39 percent exotic vegetation.
0.8	Site is covered by 5 to 9 percent exotic vegetation.
1.0	Site is covered by less than 5 percent exotic vegetation.

Hydrologic Regime

Score	Evaluation Criteria
0	No regular supply of water to the site. Site not associated with any water source, surface drainage, impoundment, or groundwater availability.
0.2	Water supply to the site is solely from artificial irrigation (e.g., sprinklers, drip irrigation). No natural surface drainage, natural impoundment, groundwater availability or other natural hydrologic regime.
0.5	Site is sustained by natural source of water, but is not associated with a stream, river or other concentrated flow conduit. For example, the site is sustained by groundwater, or urban runoff. There is no evidence of riparian processes, such as overbank flow or scour and deposition.
0.7	Site is within or adjacent to an impoundment on a natural water course which is subject to fluctuations in flow or hydroperiod.
1.0	Site is within or adjacent to a stream, river or other concentrated flow conduit, which provides the primary source of water to the site. This site contains some evidence of riparian processes such as an overbank flow, scour or deposition.

Micro- and Macro-Topographic Complexity

Score	Evaluation Criteria
0	Channel is contained in a concrete-line channel, culvert, etc.
0.2	Floodprone area is characterized by a homogenous, flat earthen surface with little to no micro- and macro-topographic features.
0.5	Floodprone area contains micro- and/or macro-topographic features such as meanders, bars, braiding, secondary channels, backwaters, terraces, pits, ponds, hummocks, but is predominantly homogenous or flat surfaces.
0.8	Floodplain is not predominantly homogenous but is characterized by micro-topographic features such as pits, ponds, hummocks, bars. However, there are no macro-topographic features such as braiding, secondary channels or backwaters.
1.0	Floodprone area is characterized by micro- and macro-topographic complexity such as meanders, bars, braiding, secondary channels, backwaters, terraces, pits, ponds, hummocks, etc.

Biogeochemical Processes – Vegetation Roughness and Organic Carbon

Score	Evaluation Criteria
0	Channel is contained in a concrete-line channel, culvert, etc., with little to no vegetation or detritus.
0.2	Site can support native grasses, forbs, or other herbaceous vegetation and there is woody debris, leaf litter, or detritus present in the channel.
0.4	Channel supports at least 25 percent relative cover of native grasses, forbs, herbaceous, or riparian vegetation and there is at least 10 percent relative cover of woody debris, leaf litter, or detritus in the channel.
0.6	Site contains between 25 percent and 50 percent relative cover of any strata of native riparian vegetation and between 10 percent and 40 percent relative cover with woody debris, leaf litter, or detritus.
0.8	Site contains between 50 percent and 75 percent relative cover of any strata of native riparian vegetation and between 40 percent and 60 percent relative cover with woody debris, leaf litter, or detritus.
1.0	Site contains greater than 75 percent relative cover of any strata of native riparian vegetation and greater than 60 percent relative cover with woody debris, leaf litter, or detritus.

Criteria for Freshwater Marsh

Diversity of Hydrophytic Vegetation

Score	Evaluation Criteria
0	Site permanently converted to land use, such as housing or agricultural, which is not able to support native hydrophytic vegetation.
0.2	Vegetation on the site consists of a monoculture of native hydrophytic vegetation.
0.4	Vegetation on the site is dominated by two species of native hydrophytic vegetation.
0.6	Site is dominated by more than two species of native hydrophytic vegetation, with one species comprising more than 50 percent of the total plant population.
0.8	Site is dominated by more than two species of native hydrophytic vegetation, with no one species comprising more than 50 percent of the total plant population.
1.0	Diverse native herbaceous vegetation (e.g., greater than three species, representing at least two different genera), with no one species comprising more than 50 percent of the total plant population.

Habitat – Coverage and Spatial Diversity

Score	Evaluation Criteria
0	Site permanently converted to land use which will not be able to support native wetland vegetation, such as housing, agricultural, or concrete channel.
0.2	No existing native wetland vegetation (e.g., covered with non-native plant species, bare ground). However, site has the potential for revegetation without extensive structural modification.
0.4	Patches of monotypic native wetland vegetation covering up to 50 percent of the site interspersed among non-native plants or bare ground.
0.6	Patches of diverse, native wetland vegetation covering up to 30 percent of the site, interspersed among exotic plants, or bare ground; AND/OR greater than 50 percent of the site covered with monotypic patches of native wetland vegetation, interspersed among non-native plants or bare ground.
0.8	Diverse, native wetland vegetation covering between 30 percent and 70 percent of the site, e.g., strips or islands of native wetland vegetation interspersed in open space.
1.0	Diverse, native wetland vegetation (e.g., at least three different genera of wetland vegetation present) covering between 70 percent and 100 percent of the site, interspersed in open space.

Percent Exotic, Invasive Vegetation

Score	Evaluation Criteria
0	Site is covered with pure stands of exotic vegetation or lacks any riparian vegetation.
0.2	Site is covered by 70 to 99 percent exotic vegetation.
0.4	Site is covered by 40 to 69 percent exotic vegetation.
0.6	Site is covered by 10 to 39 percent exotic vegetation.
0.8	Site is covered by 5 to 9 percent exotic vegetation.
1.0	Site is covered by less than 5 percent exotic vegetation.

Hydrologic Support

Score	Evaluation Criteria
0	No regular supply of water to the site. Site not associated with any water source, surface drainage, impoundment, or groundwater discharge.
0.2	Water supply to the site is solely from artificial irrigation (e.g., sprinklers, drip irrigation). No natural surface drainage, natural impoundment, groundwater discharge or other natural hydrologic regime.
0.8	Site is sustained by natural or consistent source of water (e.g., rainfall, urban runoff), but is dry for some portion of the year during an average rainfall year.
1.0	Site is sustained by natural or consistent source of water (e.g., groundwater, rainfall, urban runoff), year-round. Site may dry out during drought conditions.

Micro- and Macro-Topographic Complexity

Score	Evaluation Criteria
0	Channel is contained in a concrete-line channel, culvert, etc.
0.2	Floodprone area is characterized by a homogenous, flat earthen surface with little to no micro- and macro-topographic features.
0.5	Floodprone area contains micro- and/or macro-topographic features such as meanders, bars, braiding, secondary channels, backwaters, terraces, pits, ponds, hummocks, but is predominantly homogenous or flat surfaces.
0.8	Floodplain is not predominantly homogenous but is characterized by micro-topographic features such as pits, ponds, hummocks, bars. However, there are no macro-topographic features such as braiding, secondary channels, backwaters.
1.0	Floodprone area is characterized by micro- and macro-topographic complexity such as meanders, bars, braiding, secondary channels, backwaters, terraces, pits, ponds, hummocks, etc.

6.2.1 Functional Hybrid Assessment (FHA) Success Criteria

During data collection each year, FHA scores will be assigned to each vegetation community within the mitigation area, using the evaluation criteria outlined above. The interim and ultimate target scores are listed in *Table 9*. Interim and ultimate success will be determined as follows:

- Interim success of southern willow scrub, cottonwood willow woodland and mulefat scrub = attainment of interim target score for Hydrologic Regime criterion AND attainment of interim target scores for four of the remaining five criteria.

- Ultimate success of southern willow scrub, cottonwood willow woodland and mulefat scrub = attainment of ultimate target score for Hydrologic Regime criterion AND attainment of ultimate target scores for four of the remaining five criteria.

- Interim success of freshwater marsh = attainment of four of the five interim target scores.

- Ultimate success of freshwater marsh = attainment of four of the five ultimate target scores.

TABLE 9
FHA Goals for Success of Vegetation Communities

Evaluation Criteria	Interim Target Score (Years 1 – 3)	Ultimate Target Score (Years 4 & 5)
Southern Willow Scrub, Cottonwood Willow Woodland and Mulefat Scrub		
Structural Diversity	0.4	0.5
Coverage and Spatial Diversity	0.6	1.0
Exotic Vegetation	0.6	0.8
Hydrologic Regime	1.0	1.0
Topographic Complexity	0.5	0.8
Biogeochemistry	0.6	0.8
Freshwater Marsh		
Diversity of Hydrophytic Vegetation	0.4	0.6
Coverage and Spatial Diversity	0.6	1.0
Exotic Vegetation	0.6	0.8
Hydrologic Support	0.8	0.8
Topographic Complexity	0.5	0.5

6.3 Monitoring Methods/Schedule

Upon completion of project installation and verification by the Project Biologist, the long-term monitoring period will be initiated. During the first 120 days after installation, the plants will be monitored monthly by the Project Biologist to ensure 100 percent survival of container plants by the end of that time period. Plants which die within this period will be replaced by the landscape contractor as recommended by the Project Biologist. Upon successful completion of the 120-day period, the Project Biologist will perform monitoring visits quarterly for years and one through five.

After each visit a site observation report will be provided to the SDCWA, and to the landscape maintenance contractor. The site observation report will include description of the project status, site conditions, and any maintenance recommendations or remedial actions.

These performance criteria will be utilized to assess the annual progress of the mitigation area, and are regarded as interim project objectives designed to achieve the final goals. Fulfillment of these criteria will indicate that the mitigation areas are progressing toward the vegetation communities that constitute the long-term goals of the plan. If mitigation efforts fail to meet the performance standards listed below in any one year, the Project Biologist will recommend remedial actions to be implemented (e.g., supplemental planting, seeding, transplanting) that will enhance the vegetation communities to a level in conformance with these standards.

6.4 Mitigation Site Monitoring

Monitoring of the mitigation site will be performed by the Project Biologist during the 120-day establishment period, and regularly throughout the duration of the monitoring period. Both horticultural (qualitative) monitoring and biological (quantitative) monitoring will be conducted within the project site.

Data of native vegetation coverage, weed presence, and site progress will be collected during monitoring visits to be used in the annual monitoring report. Qualitative monitoring will be conducted to assess native container plant vigor and development, seedling recruitment from native hydroseed and natural sources, soil moisture content, presence/absence of plant pests or diseases, erosion and/or drainage conditions onsite, presence/absence of non-native or invasive plant species, trash or debris accumulation, wildlife presence/absence, and project fencing. All qualitative monitoring visits to the mitigation site will be documented with a monitoring report, which will be forwarded to SDCWA. Any project deficiencies will be noted in the monitoring report, with accompanying recommendations for maintenance or remedial actions.

Quantitative monitoring will be conducted to determine container plant survivorship/mortality, total native species cover and composition, total non-native species cover and composition, vertical stratification of native herb, shrub, and tree species onsite, and target species heights. Quantitative monitoring will be conducted by establishing permanent vegetation transects within the mitigation site at random locations in the late summer/early fall of year one. These transects will be utilized to determine achievement of the yearly performance standards and assignment an FHA rating value for "coverage and spatial diversity". A permanent photo-documentation station will be established along each transect to record the progress of the mitigation site and graphically record plant establishment over the five-year period. A total of 20 50-meter transects will be used to collect vegetative data for analysis and comparison against performance criteria.

Transects will be sampled using the point-intercept method (Canfield 1941, adapted by California Native Plant Society (CNPS) 2001). A transect tape will be run between two posts 25 meters apart, and vegetative intercept line will be visually projected above and below the tape at every half-meter mark. Each herb, shrub, or tree that intercepts the projected line will be recorded by species. In addition, all plant species present within the five-meter wide "species richness" portion on either side of the transect will be recorded by species. All data will be utilized to determine total percent plant cover, percent native cover, percent non-native cover, overall species richness and diversity, and target species growth. Quantitative monitoring will be conducted once annually in the summer or fall beginning in year two and extending through year five of the mitigation project.

6.5 Annual Reports

Annual monitoring reports will be submitted to ACOE, CDFG, and U.S. Fish and Wildlife Service (FWS) during the five-year maintenance and monitoring period of the project. Annual reports outlining the results of the habitat monitoring will be submitted in January of each year. The monitoring reports will describe the existing conditions of the project areas derived from qualitative field observations and quantitative vegetation data collection. The reports will provide a comparison of annual success criteria with field conditions, identify all shortcomings of the mitigation project, project implementation, etc, and recommend remedial measures necessary for the successful completion of the project. Each yearly report will provide a summary of the accumulated data. Annual reports also will include the following:

- A list of names, titles, and companies of all persons who prepared the content of the annual report and participated in monitoring activities
- Prints of biological monitoring photographs

- Maps identifying monitoring areas, planting zones, and weed removal areas as appropriate
- Quantitative data from transect measurements in years one through five of the mitigation project

7.0 CONTINGENCY MEASURES

7.1 Initiating Procedures for Contingency Measures

If performance criteria are not met for all or any portion of the mitigation project or if the final success criteria are not met, the project Biologist and SDCWA shall prepare an analysis of the cause(s) of failure within the appropriate annual report and, if determined necessary by ACOE, CDFG, or FWS, propose remedial action for agency approval. If the mitigation site has not met the performance criteria by the end of the five-year, long-term maintenance and monitoring period, SDCWA's maintenance and monitoring obligations will continue until contingency measures are negotiated and implemented to bring the mitigation site into compliance with the established standards or until applicable regulatory agencies grant final mitigation project acceptance as completed.

7.2 Adaptive Management Plan

Adaptive management will be implemented in the event of unforeseen or probable but unpredictable circumstances. Adaptive management is defined, for the purposes of this mitigation project, as a flexible, iterative approach to the long-term management of biological resources that is directed over time by the results of ongoing monitoring activities and direct observation of environmental stressors that are producing adverse results within the mitigation site. Adaptive management will include the utilization of regular qualitative assessments and rapid qualitative assessment data gathered in the field prior to and during the mitigation project to assess the health and vigor of habitat within the mitigation site. Following an event that causes damage to all or part of the mitigation site, these data will be used in part to drive management considerations for repair of the damaged areas. Achieving the key goals of mitigation completion and establishment of self-sustaining native habitats will be the focus of all adaptive management decisions. Individual environmental stressors are discussed below along with an anticipated range of management responses to correct any damage that may occur to the mitigation site.

7.2.1 Herbivory

Some grazing and browsing by native mammals is expected to occur within the mitigation area. The plant palettes for each vegetation community have been designed to tolerate a moderate level of plant browsing. If browse levels should become elevated (i.e., if significant plant mortality and cover reduction occurs) as indicated by qualitative or quantitative monitoring of the mitigation site, remedial measures will have to be implemented. Browse guards (plastic fencing) may be installed around the base of tree and young shrub container plants in affected areas to reduce plant mortality. In addition, remedial planting or seeding may be necessary depending upon the stage of the project. If irrigation has not been ceased, then remedial plating with container plants may be possible to restore cover. If irrigation has been ceased, then remedial seeding utilizing hand tools may be possible within affected areas to help restore cover. Each of these options would require the use of contingency funds to restore affected areas.

7.2.2 Flooding

Flooding is anticipated to occur annually within the project site. Flooding may periodically reduce overall plant cover within the site, but is not anticipated to reduce cover below a level in conformance with the project performance standards. If quarterly monitoring of the project's wetland areas indicates that cover is being reduced below tolerable levels, remedial planting (if irrigation is operational) or seeding may be required. Additional willow wattles and/or stakes may be placed in strategic areas to address changed flow characteristics of the stream channel.

7.2.3 Drought

Seasonal drought is a normal annual cycle in San Diego County and all plant palettes have been designed with drought tolerant plant species that are capable of withstanding seasonal fluctuations in available moisture. However, an extended drought could potentially occur including low seasonal rainfall and prolonged high temperatures that may negatively affect the mitigation site (e.g., lower native cover, higher plant mortality, increased potential for pest infestations onsite, *etc*.). Irrigation will be installed onsite to reduce or eliminate the effects of drought on container plants and seedlings during the first three years of the mitigation project. Any remedial options that may be necessary after two years from the installation date will likely require an additional period of site irrigation to relive plants from drought stress and/or provide for new seed growth. All irrigation components will be left in place after year two in case remedial seeding and/or container planting is required at a later project date. If the irrigation system is required at a later date, it should be used only as necessary (i.e., periodic watering versus regular daily watering).

7.3 Funding Mechanisms

The same funding source available for the intended mitigation project, as established by SDCWA, will be available for any additional planning, implementation and monitoring of any contingency procedures that may be required to achieve the mitigation goals. Adequate contingent funds will be established to provide remedial measures as necessary.

8.0 COMPLETION OF MITIGATION

8.1 Notification of Completion

SDCWA shall notify the applicable regulatory agencies upon submitting the annual report for the final year in which the final success criteria have been met at the end of the five-year monitoring period, and request confirmation that of the project has met performance goals. Early release may be possible if performance standards are met early and the resource agencies agree with the level of establishment. Removal of the irrigation system, temporary fencing, and signage would occur prior to final sign-off.

8.2 Regulatory Agency Confirmation

Following receipt of the notification of completion, the ACOE, FWS and CDFG may visit the site to confirm the completion of the mitigation effort and will issue formal letters of success prior to acceptance.

8.3 Post-Monitoring Period Site Management Turnover

The project will be monitored and maintained for five years or until success criteria has been met and then turned over to be managed in perpetuity as part of the TRVRP by the County of San Diego Parks Department consistent with the approved HMP.

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APPENDIX A

Vascular Plant Species Observed On Site

APPENDIX A
Vascular Plant Species Observed On Site

ANGIOSPERMS (DICOTS)

AIZOACEAE - FIG-MARIGOLD FAMILY

* *Carpobrotus chilensis* - sea fig

* *Mesembryanthemum crystallinum* - crystalline iceplant

AMARANTHACEAE - AMARANTH FAMILY

Amaranthus blitoides - prostrate amaranth

APIACEAE - CARROT FAMILY

* *Foeniculum vulgare* - fennel

ASTERACEAE - SUNFLOWER FAMILY

Ambrosia chamissonis - beach-bur

Ambrosia psilostachya - western ragweed

Baccharis salicifolia - mule fat, seep-willow, water-wally

Baccharis sarothroides - broom baccharis

* *Chrysanthemum coronarium* - garland or crown daisy

Encelia californica - California encelia

Ericameria sp. - goldenbush

* *Xanthium strumarium* - cocklebur

BATACEAE - SALTWORT FAMILY

Batis maritima - saltwort, beachwort

BORAGINACEAE - BORAGE FAMILY

Heliotropium curassavicum - salt heliotrope

BRASSICACEAE - MUSTARD FAMILY

* *Brassica nigra* - black mustard

* *Lobularia maritima* - sweet alyssum

* *Raphanus sativus* – radish

* *Sisymbrium irio* - London rocket

CHENOPODIACEAE - GOOSEFOOT FAMILY

* *Atriplex semibaccata* - Australian saltbush

* *Chenopodium album* - pigweed, lamb's-quarters

* *Chenopodium ambrosioides* - Mexican tea
* *Salsola tragus* - Russian thistle, tumbleweed

EUPHORBIACEAE - SPURGE FAMILY
* *Ricinus communis* - castor bean

FABACEAE - PEA FAMILY
* *Medicago sativa* – alfalfa
* *Spartium junceum* - Spanish broom

GERANIACEAE - GERANIUM FAMILY
* *Geranium carolinianum* - Carolina geranium

HYDROPHYLLACEAE - WATERLEAF FAMILY
Phacelia sp. - phacelia

MALVACEAE - MALLOW FAMILY
* *Malva parviflora* - cheeseweed, little mallow

MYOPORACEAE - MYOPORUM FAMILY
* *Myoporum laetum* - ngaio, myoporum

POLYGONACEAE - BUCKWHEAT FAMILY
* *Polygonum arenastrum* - common knotweed, doorweed
* *Rumex crispus* - curly dock

SALICACEAE - WILLOW FAMILY
Salix gooddingii - Goodding's black willow
Salix lasiolepis - arroyo willow

SAURURACEAE - LIZARD'S-TAIL FAMILY
Anemopsis californica - yerba mansa

SOLANACEAE - NIGHTSHADE FAMILY
* *Datura stramonium* - jimson weed
* *Nicotiana glauca* - tree tobacco

APPENDIX A
Vascular Plant Species Observed On Site

TAMARICACEAE - TAMARISK FAMILY

* *Tamarix ramosissima* - salt-cedar, Mediterranean tamarisk

URTICACEEAE - NETTLE FAMILY

* *Urtica urens* - dwarf nettle

ANGIOSPERMAE (MONOCOTYLEDONES)

ARECACEAE - PALM FAMILY

* *Washingtonia robusta* - Mexican fan palm

CYPERACEAE - SEDGE FAMILY

Scirpus californicus – California bulrush

POACEAE - GRASS FAMILY

* *Arundo donax* - giant reed
* *Avena fatua* - wild oat
* *Bromus diandrus* - ripgut grass
* *Bromus hordeaceus* - soft chess
* *Cortaderia selloana* - pampas grass
* *Cynodon dactylon* - Bermuda grass
* *Digitaria sanguinalis* - large crabgrass
* *Polypogon monspeliensis* - annual beard grass

TYPHACEAE - CATTAIL FAMILY

Typha domingensis - slender cattail

*signifies introduced (non-native) species