PROGRAMMATIC RESTORATION CONCEPTS AND GUIDELINES FOR THE TIJUANA RIVER VALLEY REGIONAL PARK

1.0 INTRODUCTION

The long-term goal of restoration projects inside of watersheds is the establishment of a self-sustainable ecosystem that is in equilibrium with the surrounding landscape. The binational Tijuana River watershed is an example of a system in a state of disequilibrium made apparent by the severe pollution, sedimentation, and stream degradation. Restoration is an effective tool for returning a degraded ecological system close to its pre-disturbed condition. It also serves as a tool for preventing environmental degradation provided that the source of the degradation has been corrected.

This document contains programmatic riparian vegetation restoration concepts and guidelines prepared as a component of the Tijuana River Valley Regional Park (TRVRP) Plan and Environmental Impact Report (EIR). The intent of this document is to describe a baseline approach for coordinated restoration projects in the project area, including the identification of restoration needs and specific restoration areas. While not specifically identifying geographic areas for restoration projects (with the exception of the 60-acre West of Dairy Mart Ponds site), this plan provides restoration guidelines for any riverine and upland system in the Park based on its land use, environmental sensitivity, biological condition, position in the landscape, dominant source of water, and flow and fluctuation of water through the system.

2.0 GOALS AND OBJECTIVES

The process of urbanization often results in a net reduction of natural habitat and a net increase in disturbed habitats which are characterized by non-native and/or ornamental vegetative species. The goal of TRVRP restoration effort is to create a net benefit to biological resources in the Valley by enhancing and restoring native habitats back to their original function and increasing the total area of functioning habitats. This document by itself is not intended to serve as a comprehensive plan for the design of restoration projects in the TRVRP study area. Detailed restoration plans and specifications will be developed based on the guidelines described in this document before restoration implementation can occur.

The specific objectives of TRVRP restoration are to:

- improve water quality in the Tijuana River watershed;
- increase the quality and quantity of riparian habitat throughout the TRVRP study area;
- increase the abundance of woody vegetation in riparian corridors to improve habitat structure along the Tijuana River;
- increase the net area of habitats for native wildlife species, sensitive or not;
- increase the connectivity between natural habitats (both riparian and upland);
- promote revegetation with native species appropriate for the project area
- return decommissioned trails, barren, and compacted areas to fully functioning native habitats;
- reduce the overall opportunities for exotic species invasion in the Valley.

3.0 FUNDAMENTALS OF ECOLOGICAL RESTORATION

Ideally, habitat restoration is intended to restore the habitat value of an area beyond simply "revegetating" or planting vegetation within disturbed areas, but by attempting to create a sustainable and functioning ecosystem. A functioning ecosystem is not restricted to vegetation, but also includes chemical and physical components such as hydrological, soil, wildlife functions, and the interaction of all natural habitat components. Restoration may occur actively or passively. While passive restoration relies exclusively on the forces of nature to enhance and repair disturbed ecosystem functions, active restoration requires anthropogenic actions and physical alterations of the landscape.

Wetland and upland habitats have a wide range of beneficial uses, which should be incorporated into the restoration concept. They protect the existing water supply; serve as habitat and cover for many wildlife species; provide erosion control; enhance nutrient cycling; and provide a valuable potable water source. It is likely that restored habitats will require 15 years or longer to approach the general structure and composition of an established and functioning habitat. However, it should be apparent in 5 years whether restoration efforts will be successful.

Prior to the formulation of a restoration concept, ecological and hydro-geomorphological data, such as topography, hydrology, soils, stream morphology and habitat suitability for certain target species should be gathered and applied to the restoration plan. This facilitates the design of accurate grading

and planting plans and allows for potential soil salvaging, amendment or topsoil replacement decisions. Positioning of different habitat types within the landscape context represents an important step in the planning process, such as the placement of emergent freshwater marsh versus juvenile riparian scrub or mature willow woodland components. Adjacent habitats would also need to be analyzed to evaluate the compatibility of the plant palette with its surrounding environment. Often, a buffer needs to be planted to facilitate the transition between wetland and upland habitats, or between native habitats and recreational uses. In addition, the appropriateness for bio-engineering measures and restoration techniques using non-live materials such as rocks, logs and snags need to be considered, particularly where decommissioned trails start and end, incised channels prevail, or at the outer curves within a stream meander. Any habitat restoration within the TRVRP should include:

- Instream/floodplain restoration: improving water quality and associated stream configuration, creek shading, water temperature reduction, and re-aeration, realigning meander and sinuosity, and adding substrate composition and structural complexity;

- Riparian restoration: preserving and establishing wetlands habitats, enhancing and creating contiguous habitat corridors, creating suitable breeding habitats for riparian wildlife species, and adding structural complexity;

- Upland restoration: establishing upland buffers and wildlife corridors, controlling nonpoint source inputs from the watershed such as hydrological runoff, creating suitable breeding habitats for upland species, and applying urban, agricultural and forestry best management practices.

Finally, plant palettes need to be refined and tailored to the site to include spacing/density information and the amount of plants to be planted within a certain habitat context. Removal of exotic species prior to, during, and after restoration efforts should be addressed in the respective restoration plans and/or specifications. Exotic weed control should also be maintained during post restoration monitoring efforts, often in perpetuity. Sampling methods will be formulated based on performance criteria, statistically analyzed, and reported annually. Reporting at a regular schedule will assure that performance criteria are met and that the restoration site will be successful and sustainable in perpetuity.

4.0 SITE SELECTION CRITERIA

Restoration projects within the confines of the TRVRP include a 60-acre open area west of Dairy Mart Ponds restoration site, selected decommissioned roads and trails, and temporary construction impacts. Trails solely used by the Border Patrol will not be restored. About one third of all

decommissioned and closed roads and trails will be actively restored, while the remainder will be passively returned to native habitats. All trails in the location of cultural resources sites will be passively restored to avoid surface disturbance. In the case of the TRVRP, passive restoration requires minimal actions to avoid weed infestations, such as site clean-up and decompaction (no site disturbance activities can occur if cultural sites are present), scheduled exotic species removal and programmatic monitoring and maintenance. Active restoration includes planting of native vegetation, and potential grading for selected restoration projects. Active and passive restoration guidelines are described below. At this time, no specific passive versus active restoration sites have been identified (with the exception of the West of Dairy Mart Ponds site). The selection of active versus passive restoration sites must adhere to the following criteria:

Active Restoration

Active restoration shall be performed on all decommissioned roads and trails that combine one or more of the following criteria:

- occur within upland vegetation communities (excluding agricultural sites);
- specifically occur within maritime succulent scrub, impacts to which will be mitigated at a 2:1 ratio according to MSCP requirements;
- occur within non-native habitats;
- are heavily infested with exotic species; and
- are heavily compacted;

Passive Restoration

Passive restoration is possible for all decommissioned roads and trails that combine one or more of the following criteria:

- display a 50% recruitment per unit area with appropriate native species upon site analysis;
- occur within native riparian vegetation communities;
- occur within the floodplain;
- occur within agricultural sites;
- occur within non-compacted soils;
- are surrounded by native habitats; and
- occur near archaeological, cultural and historic sites.

Above criteria constitute only information for a baseline analysis. Prior to the selection of passive and active restoration sites, site-specific analysis pursuant to above-described criteria must be performed.

5.0 PROGRAMMATIC RESTORATION GUIDELINES

This section provides programmatic restoration concepts and guidelines for the 60-acre site west of Dairy Marts Ponds, and active and passive restoration measures for selected decommissioned trails and temporary construction impacts. Detailed restoration plans and specifications must be prepared according to these guidelines before restoration can be implemented. Since field surveys were performed for the restoration of the West of Dairy Mart Ponds site during Phase I of the TRVRP, restoration for this site is described in more detail below than for the decommissioned roads and trails restoration concepts.

5.1 Passive Restoration

While passive restoration relies heavily on the forces of nature to restore habitat functions, it can only be successful if suitable conditions are present, specifically in degraded environments. The following minimal steps are necessary in areas that will be restored passively:

- **Identify restoration area**– Identify and select the site(s) and acreage(s) for habitat restoration based on field-collected data (see site selection criteria above). Close all trails subject to passive restoration using physical barriers such as fences, gates, boulders, etc., and post appropriate signs.

- **Prepare site conditions** – At a minimum, passive restoration for the TRVRP restoration portion must include trash removal and decompaction of all decommissioned roads and trails or construction staging areas. Decompaction is necessary to prepare the site for native plant recruitment. Only areas located in and around cultural sites may not be decompacted based on the recommendations by a cultural expert to avoid soil surface disturbance. Best Management Practices (BMPs) will be installed where necessary to avoid erosion and sedimentation problems, including fiber rolls, silt fences, gravel bag berms, rice-straw bale barriers, stabilized construction entrances and/or check dams. Proposed BMPs will be consistent with regional surface water, storm water and groundwater planning and permitting process that has been established to improve the overall water quality in County watersheds. A Stormwater Management Plan (SWMP) will be prepared by the contractor after the project is awarded. The SWMP will specify and describe the implementation process of all BMPs associated with equipment operation and materials management.

- **Remove exotic species –** Remove all nonnative, invasive species after site decompaction.

All passive restoration areas will be monitored in perpetuity and nonnative, invasive weeds will be removed regularly at least on an annual basis. Exotic species removal is essential for passive restoration efforts to allow for the recruitment of native species.

- **Provide monitoring and maintenance** – Regular monitoring and maintenance, at least annually or more frequently, will occur to identify problems such as exotic species infestations and erosion, and to monitor the success of native species recruitment. Problems must be repaired immediately within 6 weeks of the time that the problem was identified, including the installation of appropriate BMPs. Native plant recruitment and exotic species problems will be recorded quantitatively (percent cover within 1-m quadrats along transects). If native species recruitment remains below a density of 45 percent (compared with an intact site of similar species composition) after three years, active restoration will be necessary to restore proper ecosystem functions.

5.2 Active Restoration

Active restoration in the TRVRP will occur on the 60-acre west of Dairy Mart Ponds site, temporary construction and staging areas, selected riparian sites, and approximately 30 percent of the decommissioned trails. Active restoration must be planned and designed by an experienced restoration ecologist and/or California-licensed landscape architect, implemented by a licensed restoration contractor experienced in habitat restoration, and monitored by a habitat restoration biologist. Decommissioned trails and roads occur in wetland and upland habitats. Most of the decommissioned trails within the TRVRP consist of relatively narrow paths that were historically used by hikers, equestrians, and bicyclists. Most of the trails that occur in upland habitats are compacted, while some of the floodplain trails occur on relatively loose alluvial deposits. Specific locations of active restoration areas will be identified in a phased approach The following general design and implementation steps should be completed for active restoration projects, in addition to those performed for passive restoration projects. A more detailed plan for the 60-acre restoration site is described at the end of this section.

Restoration Planning

- **Determine necessary restoration/revegetation acreage** – Identify and select the site(s) and acreage(s) for habitat restoration based on field-collected data (see site selection criteria above). Consult with the any appropriate agencies (including U.S. Army Corps of

Engineers, ACOE, California Department of Fish and Game, CDFG, and U.S. Fish and Wildlife Service, USFWS) to verify expectations and applicable regulations. Also review and implement any applicable City and County ordinances and planning provisions. In addition, confirm the necessity of invasive species removal.

- **Determine suitability of mitigation sites** – Survey the available restoration area(s) to determine the percentage of uplands versus wetlands available on the site, if applicable or required. This survey will be supported by a wetlands delineation using the ACOE *1987 Wetlands Delineation Manual* to confirm jurisdictional wetlands boundaries. Avoid sensitive sites, including sensitive biological and cultural resources. Noxious and potentially invasive weeds will be removed prior to or as part of restoration.

- **Determine groundwater availability (for wetlands restoration)** – There are at least two ways to determine sustainable water sources for the restoration effort, including well excavation and piezometer installation. Well excavation constitutes excavating pits using a back hoe to determine the presence of or depth to groundwater. Piezometer installation would acquire groundwater contours and a range of general hydrological and soils information. This information is mandatory to ensure that groundwater will be available to permanently sustain the restoration site without artificially adding water to the site. Groundwater contours will provide important baseline information for the creation of grading plans.

- **Determine soil suitability** – Perform soil tests prior and during the installation phase of restoration to determine soil suitability and prescribe appropriate soil amendments, if necessary, to ensure the establishment of adequate growing conditions.

- **Determine planting details** – Plant species composition and density will be derived from nearby intact sites similar to the restoration site. A control site will be similar in habitat type, species composition and density. Using sampling methods such as transects and/or quadrats, identify the plant species composition and density at this site and transfer this information into appropriate seed and container plant specifications. Plant selection and information should conform to native plant nursery and seed collector standards. Size selection should result in a structurally and age-diverse restoration planting.

- **Prepare detailed planning documents** – Prepare detailed restoration plans and specifications, including: grading contours; topsoil salvage, testing and storage; invasive species removal, if appropriate; soil preparation requirements; planting specifications, such

as plant palettes, growing requirements (e.g., seed distributions or plantings of cuttings and container stock, inoculation requirements); irrigation needs; plant-establishment monitoring; remedial measures; performance standards and long-term monitoring and maintenance. Formulate restoration specifications to detail contractor responsibilities based on, but more detailed than, the restoration concept plan. In addition, develop landscape plans (signed by a California-licensed landscape architect), including grading plans, irrigation plans and planting plans. Planting plans will include the species composition detailed in this report; however, information such as spacing must be added. Grading plans will be developed according to adjacent topography and/or the groundwater contours that were established during hydrological studies. Irrigation should only considered for wetlands restoration plans; uplands can mostly be restored through dry-seeding. If needed, irrigation should be designed to be temporary and removable following two to four years of plant establishment. If available and permissible by law, reclaimed water constitutes an appropriate irrigation source for the establishment of a riparian wetlands system.

- **Formulate long-term monitoring and maintenance program** – Devise performance standards in accordance with standards acceptable to the agencies. Formulate a monitoring and maintenance program to consist of tasks such as irrigation control, removal and replacement of dead vegetation, fencing to avoid trespassing, weed and erosion control and monitoring successful ecosystem establishment according to above performance standards. The goal of monitoring and maintenance is to achieve self-sustainable ecosystems that function similar to natural systems. Therefore, natural scour and deadwood should not be remedied since these phenomena are typical of the dynamic nature any ecosystem and function as microhabitats for wildlife. Monitoring will follow a set schedule, which involves frequent site visits (monthly) between installation and the end of the establishment, and during the first monitoring year. Quarterly monitoring visits will be conducted thereafter and will continue until the end of the monitoring period. Annual monitoring should be conducted thereafter in perpetuity. Monitoring typically consists of qualitative and quantitative data collection, such as field checks by the monitoring biologist to assess plant success (percent cover, density, frequency, and size of individual plants), hydrology, soils, and wildlife use. Quantitative data will be assessed using statistically valid sampling methods along permanent vegetation sampling stations. Statistical data on restoration success are only valuable if compared with data gathered from natural controls of similar function and near-by location using the same sampling methods.

Restoration Implementation

- **Select project biologist** – Retain a project biologist overseeing the restoration. The project biologist will be accountable for the successful implementation of the restoration project. The project biologist must be able to provide records of past successful native upland and wetland restoration experience.

- **Initiate contract growing of plant material** – It takes time to establish appropriate plant material for restoration projects, particularly if a structurally diverse canopy cover is desired. Native plant nurseries typically do not hold a stock of appropriate plant materials large enough to satisfy the creation of even the smallest wetland. Therefore, advanced notice must be given to the nurseries to prepare plant materials at least six months prior to the desired planting date. If large plant stock is required (e.g., 5-gallon containers and larger), a nursery will often request advanced notice in excess of six months. In addition, it is important to verify that the contract grower is experienced in native plants for restoration purposes and is knowledgeable in mycorrhizal fungi inoculation methods. In addition, plant acquisition may occur though collection of plant material by an experienced collector. Plant material such as seeds and cuttings should be collected within the immediate vicinity of the restoration area and within the appropriate plant communities. The project biologist should confirm the growing success of plant materials at least once prior to plant delivery to ensure that the plant material conforms to specifications. If unsatisfactory plant material is delivered to the site, the project biologist retains the right to refuse the delivery and acquire appropriate plants at the contracting nursery's expense.

- **Retain landscape contractor** – A licensed landscape contractor should be knowledgeable and experienced in native habitat restoration.

- **Initial site visit** – Schedule a field visit with all responsible parities, including installation contractor(s), project biologist, representatives of the jurisdiction, and, potentially, resources agencies. This field visit is intended to describe the project, project responsibilities, reporting procedures, educate the contractor regarding the presence of potentially sensitive resources, and discuss potential foreseeable problems.

- **Initiate site preparation** – Site preparation, according to the restoration planning documents, typically include such measures as site fencing and flagging, clearing and grubbing, exotic weed removal, topsoil salvage and storage, soil testing, grading, decompaction and/or imprinting, and, for wetlands restoration only, installation of a temporary irrigation system. Decompaction is specifically important for the active restoration of decommissioned trails and construction staging areas. Decompaction will only

be necessary in areas where decommissioned trails in riparian habitats are compacted on the surface or in deeper soil layers. In loose alluvial, decompaction may not be necessary. In addition, decompaction by ripping and/or discing will be necessary in most cases where decommissioned trails occur on compacted upland soils.

- **Prepare for planting** – Planting preparation includes such measures as inspection and lay-out of plant material by the project biologist. For most trails in riparian areas, riparian and wetlands vegetation will be restored by collecting on-site willow, cottonwood, and mulefat cuttings that are augered into the water table and backfilled; plant spacing is typically 6-12 feet for mulefat, and 12-15 feet for willows and cottonwoods. Although planting cuttings is an efficient and effective restoration method in riparian habitats, container stock (including sleeves) may be used in selected areas and where appropriate, and an understory of annual and herbaceous plants may be hydro-seeded. In addition, the project biologist will also supervise the application of soil amendments, if specified or deemed appropriate, as well as the planting or seeding of plant materials by the installation contractor. Planting may be limited to seed application through either imprinting, dry-seeding, or hydro-seeding; imprinting is recommended for the active restoration of decommissioned trails.

  For trails in uplands areas, plant palettes will be derived from quantitative field data collected at reference sites in the TRVRP study area. In selected areas or under specific conditions as determined by the restoration biologist, container stock, dry-seeding or hydroseeding may be implemented. However, the most effective and efficient restoration method uses imprinting techniques, which allow seeds and water to accumulate and form beneficial growing conditions, preventing soil substrate and seeds to be washed out. Land imprinting is the formation by mechanical means of smooth-walled V-shaped furrows in the soil surface. Imprinting is an inexpensive way to prepare soil, apply seed, and inject beneficial mycorrhizal fungi beneath the soil surface.

- **Monitor plant establishment** – During the plant establishment period (typically 120 days), the project biologist will monitor the site and complete remediation measures, such as replacing dead plant material, fixing the irrigation system, removing weeds and trash, and repairing erosion damage, as necessary. Reporting procedures to the applicable jurisdiction and agencies will be adhered to as established in previous documents (e.g., permits, restoration plans).

- **Initiate long-term monitoring, maintenance and reporting procedures** – According to the restoration concept and monitoring program, retain a monitoring biologist (if different from the project biologist) and maintenance contractor to perform long-term monitoring of

the wetland creation project. Both the monitoring biologist and the maintenance contractor need to be knowledgeable in the identification of native plants versus exotic weeds and need to demonstrate past experience in native vegetation monitoring. Following the restoration implementation period, the site would ideally be monitored and maintained for three to five years (or longer) at a schedule determined in the monitoring program. The monitoring or project biologist would brief the applicable jurisdiction and resource agency on the site's success by biannual or annual monitoring reports. A final monitoring report and subsequent site visit with the agencies would conclude the project, provided the agencies find that the site fulfills required performance standards to their satisfaction. Subject to a Section 404 permit, the ACOE often requests a final wetlands delineation to confirm that the restored area conforms to the ACOE's definition of wetland by at least showing the successful establishment of hydrophytic vegetation and hydrology (hydric soils, the third parameter the ACOE requires as wetland parameter, often need more time to establish themselves than the monitoring period allows).

Restoration of Habitat West of Dairy Mart Ponds

The proposed restoration site west of Dairy Mart Ponds encompasses approximately 60 acres (Figure 1). The site is divided into two sections, A and B, to allow for separate implementation timelines due to funding restraints; Section A is 37 acres and Section B is 23 acres. The site is north of the Tijuana River, west of the north-south portion of Dairy Mart Road, and south of a housing development that runs along I-5. The site was historically used for agricultural and cropping purposes; however, it has remained fallow for at least ten years.

The restoration concept for the west of Dairy Mart Ponds site are based on field survey data from sites throughout the Tijuana River Valley and prior restoration projects in the Valley, such as the Mitigation Project for the South Bay Water Reclamation Plan south-east of this site. A survey of sites throughout the Valley was used to account for the variability in vegetation and water levels throughout the area.

Existing Vegetation

The restoration site currently consists of disturbed habitat dominated by exotic species, specifically *Chrysanthemum coronarium* (crown daisy), and exotic trees such as tamarisk species (*Tamarix ramosissima, T. parviflora)*, *Eucalyptus* sp., *Nicotiana glauca* (tree tobacco), and *Schinus molle* (Peru peppertree). Other exotic species found at the site were *Xanthium strumarium* (cocklebur), *Melilotus albus* (white sweet clover), *Mesembryanthemum crystallinum* (ice plant), *Salsola tragus* (tumbleweed), *Conyza canadensis* (horseweed), and *Arundo donax* (giant reed).

Native species present at the site include *Salix exigua* (sandbar willow), *Salix gooddingii* (Gooding's black willow), *Populus fremontii* (Fremont cottonwood), *Baccharis salicifolia* (mulefat), *Ambrosia psilostachya* (western ragweed), *Isocoma menziesii* (goldenbush), *Heliotropium curassavicum* (heliotrope), *Helianthus annuus* (common sunflower), and *Frankenia grandifolia* (alkali heath).

Soils and Hydrology

The topography of the site is generally flat, surrounded on all sides by a flood berm. The dominant soil type consists of Chino silt loam, which is a slightly saline soil found on slopes of a zero to two percent grade. Although Chino silt loam is described as silt loam to loam, sandy loam was also observed in soil pits during hydrological surveys performed for this site.

Estimates of water table elevation vary within the site. Hydrological surveys indicated that two locations had clay loam soils with moisture appearing at six inches below surface for one location, and twelve inches for the other. Four other locations had sandy soil with moisture at a depth of 2.5 to 3.0 feet.

Restoration Methods

Unless otherwise negotiated with the United States Fish and Wildlife Service, all installation will be done between September 15 and March 15 due to endangered species concerns. This would avoid impacts during the breeding season.

Seed Collection

Seed for the containerized plants and seeding should be collected from within 5 miles of the restoration site. If seed is not available due to seasonality or a poor seeding year, seed collected from Southern San Diego County may be purchased from selected seed companies.

Soil and Water Testing

Nutrient and inorganic metals should be tested in both the soil and water prior to the completion of a final restoration plan. An initial broad sampling should be completed for all properties listed in Table 1. Soil samples on the restoration site should be taken from three to four feet below the surface to reach soil levels for planting after grading. In addition, ten samples should be taken in surrounding, relatively undisturbed riparian areas. One soil sample should be collected and analyzed per every five acres. After analysis of the initial samples, a more detailed sampling of problem areas may be required. The San Diego County Water Authority has conducted baseline sampling for the future mitigation banking/restoration site. These water and soil sampling results should be provided

to understand potential problem areas and to identify sampling constituents.

Table 1. Recommended soil and water tests

Soil (These tests can usually be purchased as a package)	
pH	Aluminum
Lime	Boron
Salts (electrical conductivity)	Sulfur
Cation exchange capacity	Zinc
Total organic matter content	Copper
Nitrogen	Magnesium
Bicarbonate phosphorus	Manganese
Potassium	Iron
Calcium	
Water	
Arsenic	Lead
Barium	Mercury
Cadmium	Nickel
Chromium	Selenium
	Sodium

Site Preparation

Grading

If surface alterations and grading are required, a detailed grading plan should be prepared by a registered engineer prior to the development of restoration plans. A utility check via "one-call" and an archaeological survey should be completed before grading begins. Initial studies on the hydrology of the site yielded the following recommendations for planning and cost estimates: approximately 80 percent of Section A will be graded between two and four feet and approximately 40 percent of Section B depending upon groundwater levels.

Irrigation

A temporary, above-ground sprinkler irrigation system will be designed by a California-licensed landscape architect with the assistance of the restoration biologist. The irrigation system will be designed to use the City of San Diego's recycled water, if possible. The recycled water will be tested prior to use to ensure that levels of chlorine and other contaminants are within tolerable levels. The sprinkler heads should be positioned to avoid spray onto adjacent trails and access roads. The irrigation system will be designed to be easily removed after the site achieves the success criteria.

Planting

Container Planting

A total of 73,890 containerized seedlings should be planted on the entire site (Table 2). The planting list was created based upon the species composition and density of a reference site, other restoration sites within the Tijuana River Valley, and the existing native plant species on-site. The planting list does not contain mulefat as dense patches of this species already exist on the restoration site. The spacing on the planting is approximately 5 ft. in areas with little or no mulefat. In the dense mulefat areas, planting will occur on an approximate 15 ft spacing to provide greater diversity.

Table 2. Proposed containerized seedling species, numbers, and container type.

Scientific Name	Common Name	Container	Number	
			A	B
Juncus acutus	spiny rush	10T	46	37
Platanus racemosa	western sycamore	40D	391	481
Populus fremontii	Fremont cottonwood	40D	805	999
Salix exigua	sandbar willow	10T	8,740	12,210
Salix gooddingii	Gooding's black willow	10T	9,085	12,950
Salix lasiolepis	arroyo willow	10T	12,075	15,725
Sambucus mexicana	Mexican elderberry	40D	161	185
Total			31,303	42,587

Seeding

Hydroseeding is recommended in all areas not densely (40-70 percent) covered with mulefat. It is estimated that approximately 60 percent of Section A and 40 percent of Section B should be hydroseeded (Table 3). Hydroseeding should be done between November and February to take full advantage of winter rains for establishment.

Table 3. Proposed seed mixture for both restoration sites.

Scientific Name	Common Name	Pounds per acre	Total pounds	
			A	B
Ambrosia psilostachya	western ragweed	2	44.4	18.4
Anemopsis californica	yerba mansa	3	66.6	27.6
Artemisia douglasiana	California mugwort	4	88.8	36.8
Artemisia dracunculus	dragon sagewort	4	88.8	36.8
Oenothera elata	evening primrose	4	88.8	36.8
Leymus triticoides	beardless wild ryegrass	2	44.4	18.4
Total		19	421.8	174.8

Fencing and signage

(This will include access issues during and after implementation). Both sites should be fenced during an establishment phase of at least two years. The fencing will allow for access through the eight foot wide trails during the establishment period. At the end of one year, the need for the fencing can be revaluated.

Maintenance

Weeding

Weeding throughout the entire site for both sections should be conducted once per month during the first year, once every three months during the second year and quarterly during the following years until success criteria is met. Weeding should be done by a crew experienced in local riparian vegetation and supervised by a Restoration Specialist with at least two years experience in local flora. Weeding may be done using a foliar herbicide such as Aquamaster™ in areas not hydroseeded. Weeding in hydroseeded area should be done by hand, except in areas with large patches of exotic vegetation. In the latter areas, foliar spraying with Aquamaster™ may be done if supervised by a qualified biologist.

Irrigation

If supplemental irrigation is required, the irrigation plan should include a watering frequency based upon the irrigation design. Watering twice a month during the dry months of the first year and once a month for the following two years is recommended. The watering should allow for soil moisture to percolate at least four inches into the soil each time. In addition, the watering should be monitored and adjusted as needed to prevent rotting of plant roots and run off.

Success Criteria and Monitoring

Success Criteria

Suggested success criteria for the restoration project are outlined in Table 4. Because this project is not mitigation but long-term habitat improvement as part of the project, the habitat will be allowed to develop and mature over a period of time more ecologically feasible and successful than the standard five year period for mitigation purposes. Success criteria for the project should be measured in vegetation percent cover and diversity.

Table 4. Suggested performance standards for West of Dairy Mart Ponds restoration.

	Year 1	Year 2	Year 3	Year 4	Year 5
Percent Vegetation cover	20	35	45	65	80
Perennial Species Density (# plants/acre)	1000	1100	1200	1200	1200
Percent Container Plan Survival	80	90	100	100	100

Methods

A modified version of the California Native Plant Society (CNPS) method is recommended to determine estimates of mature plant cover, ground cover, and species diversity. The CNPS method utilizes the point-intercept method to determine species percent cover per each canopy strata (e.g., canopy, mid or shrub level, and understory). One hundred points would be sampled along a randomly placed 50 meter (m) tape at 0.5 m intervals. A one-meter long, ¼-inch round rod would be placed vertically at each sampling point. All live species that come in contact with the bar, or its upward extension, would be counted. Trees would be considered greater than 2.5 meters, shrubs less than 0.4 meters and greater than 2.5 meters and herbs less than 0.4 meters in height. If no vegetation is intercepted at a sampling, the point would be recorded as “bare”. Total coverage would then be

determined by the number of points covered by vegetation along the transect. Percent cover for individual species would be calculated by dividing the number of points covered by that species by the total number of sample points (100). Relative cover would be calculated for each species by dividing percent cover for each species by the sum of the percent covers for all species. One transect per three acres is recommended for monitoring.

In addition, photopoints should be established to evaluate the development of habitat layers. A quarterly qualitative monitoring of the site should be conducted to view any potential problems that may need corrective actions. All data should be compiled in an annual report.

Additional information on wildlife use of the site would also be beneficial. The restoration site would provide the opportunity for studies and research projects for graduate students at the local universities, while also providing valuable data for future projects.

An list of permits and responsible parties will be outlined during the detailed restoration planning phase. Responsible parties shall include the City and County of San Diego, the USFWS, ACOE, and CDFG.

6.0 EXOTIC SPECIES MANAGEMENT

Exotic plant species are those plants that arrived in an area through human actions. Once introduced, exotic plants are considered "invasive weeds" when they colonize natural areas and dominate or displace natural communities.

Prior to initiating species- and site-specific weed control activities, a broader, watershed-level strategy toward exotic species control should be considered to eradicate weeds more efficiently. Activities proposed as a component of reducing current weed infestations should be evaluated for potential impacts on other exotic plant infestations and on currently uninfested areas. Invasive species control should commence in the upstream portion of the watershed working downstream to avoid distributing weed seeds into already cleared and treated areas. Watershed-level planning must address the on-going dispersal and recruitment of weeds into infested areas through natural and human-induced events that open up new ground to potential infestation, such as landslides, tree falls, trail establishment, streambank stabilization, and recreational use.

The following factors need to be considered in the assessment of each project's effect on exotic plants:

- areas to be disturbed by the weed removal effort, existing desirable or sensitive vegetation, and known weed occurrences (identifying all noxious weeds potentially impacted by the project and their method of invasion);

- access provisions (access permits; accessibility without disturbing sensitive vegetation or wetlands) and staging area needs (size and location of area needed for vehicles, equipment and chemical mixing activities);

- type of ground disturbance associated with project actions (e.g., depth, type, and means of ground disturbance such as overland travel by vehicles on soil surface, trenching by hand-digging to three feet deep, or discing top several inches with a tractor);

- potential removal of existing vegetation; and

- method and time frame for remediating the ground disturbance (e.g., revegetation, mulching, or swamp mat installation). After assessing the project's potential effect on weeds, means of mitigating these effects must be designed. These may include defining Best Management Practices or other project- and site-specific mitigation measures suitable for the particular activity (such as restoration or revegetation using desirable, native vegetation).

7.0 REPORTING

Final installation and monitoring reports will be issued to the City of San Diego and the County of San Diego, as described above. If regulatory compliance is required for the restoration effort, reports will be submitted to the respective regulatory agencies, including the ACOE, CDFG, and USFWS. Reporting will follow regulatory guidelines, as applicable. For example, a final jurisdictional wetlands delineation will be required if restoration goals include the creation of jurisdictional wetlands. In addition, as-built construction plans will also be submitted to the regulatory agencies, the City and the County, to illustrate restoration and exotic species removal efforts. The as-built drawings and reports form the baseline for the monitoring efforts as monitoring success will be quantified against the "existing conditions" reported in the as-built documentation.