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SALT RIVER
ECOSYSTEM RESTORATION PROJECT
HABITAT MITIGATION AND MONITORING PLAN

Prepared by

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RESPONSIBLE PARTIES

APPLICANT

The Humboldt County Resource Conservation District (HCRCD) is the applicant and responsible party for this project. The contact person at the HCRCD is Ms. Donna Chambers, Executive Director (707.444.9708 x117).

PREPARERS OF THE MITIGATION PLAN

This Habitat Mitigation and Monitoring Plan (HMMP) was prepared by H. T. Harvey & Associates, with substantial technical assistance and input from the HCRCD and Winzler & Kelly. H. T. Harvey & Associates' primary authors were Daniel Stephens, principal-in-charge; and senior wetland ecologists John Bourgeois and Donna Ball.

MONITORING PLAN IMPLEMENTATION REQUIREMENT

The applicant shall monitor the project site in accordance with this approved final HMMP. Any proposed changes to this HMMP shall be reported to the Executive Director of the Coastal Commission. No changes to this HMMP may occur without a Commission amendment to the Project's Coastal Development Permit (CDP No. 1-10-032), unless the Executive Director of the Coastal Commission provides written documentation verifying that no amendment is legally required (CDP No. 1-10-032; Special Condition 2[C]).

MITIGATION MONITORING LINK TO AMP

The purpose of monitoring per the HMMP and the Adaptive Management Plan (AMP) is to assess the progress of the project toward meeting Project goals and objectives, to track regulatory compliance during the required monitoring period, evaluate management actions, and to detect areas displaying potential problems or changes that may require remedial actions. The AMP is provided in Appendix A.

The HMMP serves as a companion document to CEQA and permit support documents and describes the mitigation associated with project impacts under regulatory jurisdiction. The HMMP includes a detailed description of the project impacts and a conceptual plan to mitigate for those impacts, including a description of implementation and planting plans for revegetated areas of the project. The HMMP also includes a description of the project's long-term mitigation site monitoring and maintenance requirements, and provides management recommendations for ongoing maintenance during the mitigation monitoring period.

The HMMP only addresses the three years of mitigation site maintenance during the plant establishment period and the 10 years of mitigation site monitoring required for regulatory compliance. The AMP is a supplement to the HMMP and describes the process of monitoring and management to ensure the long term viability of the project relative to the overall goals and objectives.

PROJECT DESCRIPTION

INTRODUCTION

The Salt River Ecosystem Restoration Project is intended to restore ecologic, geomorphic and hydrologic function within the Salt River Watershed. The project's restoration activities in the Salt River and its tributaries will impact regulated and sensitive habitats. The purpose of this HMMP is to address the mitigation program for those impacts. H. T. Harvey & Associates, under contract to Winzler & Kelly, prepared this HMMP for our team's client, the Humboldt County Resource Conservation District (HCRCD).

Mitigation measures for individual wildlife species are addressed in other documents, including the Biological Assessments and Opinions prepared for listed species, and other technical documents and permits.

There are a number of supplementary documents to this HMMP that provide greater detail in a variety of areas. These are available to reviewing agencies upon request, and include:

- Riverside Ranch Conceptual Restoration Plan (H. T. Harvey & Associates 2008)
- Excavation Materials Management Plan- Salt River Ecosystem Restoration Project (Winzler & Kelly 2010a)
- Salt River/Riverside Ranch Revegetation and Land Use Plan (H. T. Harvey & Associates 2010)
- Salt River 2010 Willow Flycatcher and Western Yellow-billed Cuckoo Surveys (Winzler & Kelly 2010b)
- Salt River Ecosystem Restoration Area Sensitive Plant & Animal Species Survey Near Ferndale, California (Winzler & Kelly 2010c)
- Biological Assessment for the Salt River Ecosystem Restoration Project (Winzler & Kelly 2010d)
- Salt River Ecosystem Restoration Project Adaptive Management Plan (AMP) (H. T. Harvey & Associates 2011a)
- Salt River Ecosystem Restoration Project Rare Plant Mitigation and Monitoring Plan (H. T. Harvey & Associates 2011b)
- 50% Design Plans for the Salt River Corridor Restoration (Winzler & Kelly 2011a) and the 75% Design Plans for Riverside Ranch (Kamman Hydrology & Engineering 2011)
- Take Avoidance Measures for State-Listed Species, Salt River Ecosystem Restoration Project. (H. T. Harvey & Associates 2011c)
- Draft Biological Assessment for the Salt River Ecosystem Restoration Project, Covering the Tidewater Goby. (H. T. Harvey & Associates 2011d).

- Upland Delineation for Riverside Ranch and Salt River Corridor (ACOE, HCRCD, and WK 2011b)
- Geotechnical and Engineering Geologic Report (Draft), Salt River Ecosystem Restoration Project. LACO Associates (April 2011).

LOCATION

The project is located in Humboldt County near the city of Ferndale, California (Figure 1). The project area extends from approximately 1800 linear (ln) ft upstream of the Salt River's confluence with Williams Creek downstream to the Salt River's confluence with Cutoff Slough, a total channel length of approximately 7.7 mi. The project includes the restoration of those mainstem reaches of the Salt River; improving the connectivity of the Salt River with Francis Creek and the Eastside Drainage, and Reas Creek; and the restoration of Riverside Ranch to tidal marsh. The proposed project also includes restoration of 2,900 ft of lower Francis Creek (Figure 2).

SUMMARY OF OVERALL PROJECT GOALS AND OBJECTIVES

The Salt River Ecosystem Restoration Project is a watershed-based, ecosystem-scale project with multiple objectives and benefits.

The purpose of the Salt River Ecosystem Restoration Project (SRERP) is to restore historic processes and functions to the Salt River watershed. These processes and functions are necessary for re-establishing a functioning riverine, riparian, wetland and estuarine ecosystem as part of a land use, flood alleviation, and watershed management program. The chronic aggradation of the Salt River channel and resulting flooding have led to loss of habitat, threats to public infrastructure such as the Ferndale Wastewater Treatment Plant and roads, diminished property value, and declining agricultural productivity.

The SRERP will re-connect the Eel River estuary - via the historic Salt River channel- to a series of five streams draining the Wildcat Mountains. In order to do this, over 7 river/riparian corridor miles (mi) and approximately 300 acres (ac) of tidal wetland will be restored to support a broad suite of special status and native species. The SRERP focuses on re-establishing hydraulic connectivity across the riparian floodplain and will also serve community needs including water quality improvement, flood alleviation, and carbon sequestration. Specific goals of the Salt River Ecosystem Restoration Project include the following:

- Restore the Salt River channel and adjacent riparian floodplain by increasing hydraulic conveyance and constructing habitat features that re-establish ecological processes beneficial to fish and other native species;
- Restore historic estuarine habitat and tidal connectivity within the lower Salt River;
- Improve water quality and drainage efficiency across the floodplain;
- Manage excess sediment loads by maximizing fluvial and tidal channel sediment transport capacity;

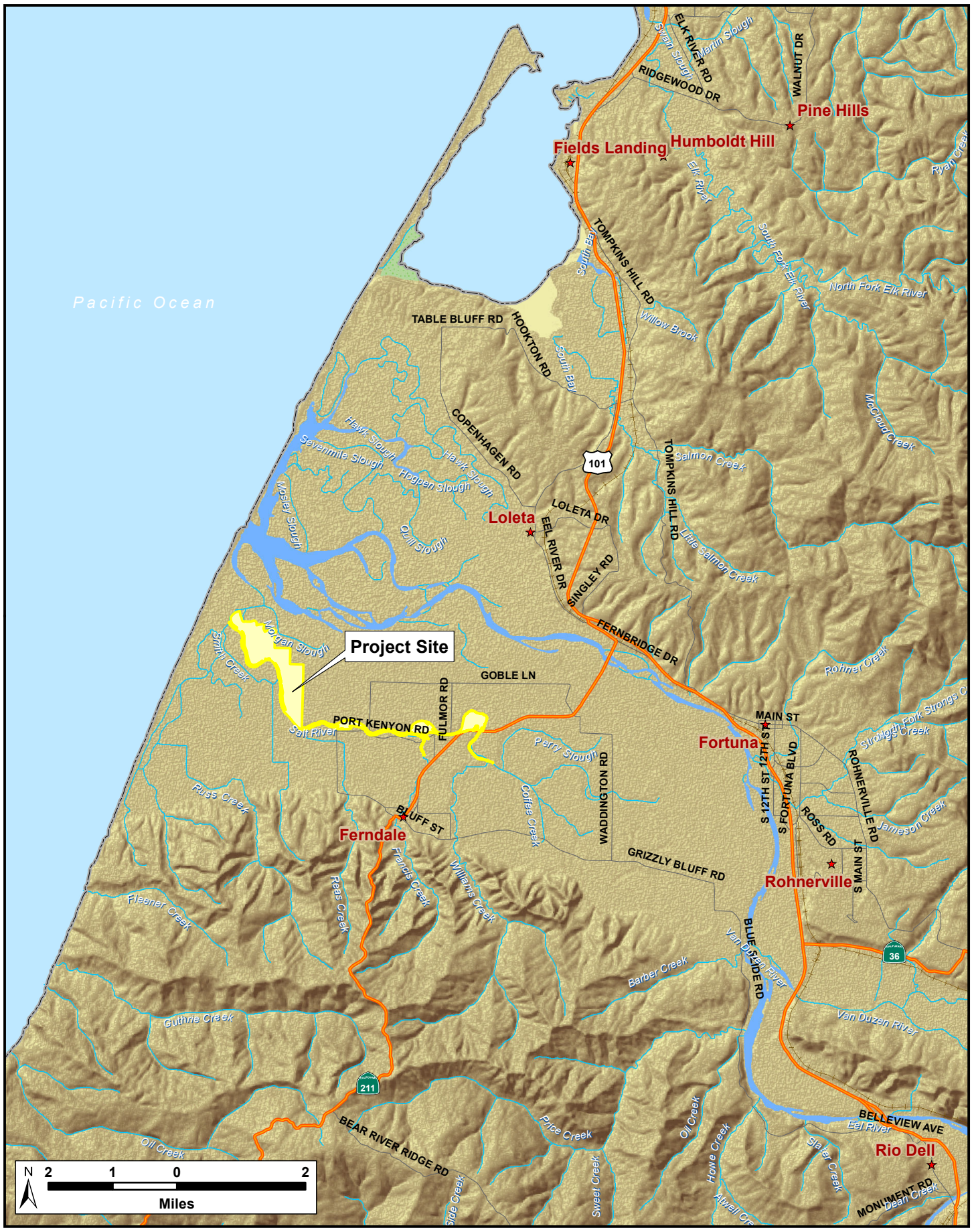

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Figure 1: Salt River and Riverside Ranch Vicinity Map
Salt River Ecosystem Restoration Project
Habitat Mitigation and Monitoring Plan (3117-06)
July 2012

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Figure 2: Site Map
Salt River Ecosystem Restoration Project
Habitat Mitigation and Monitoring Plan (3117-06)
July 2012

- Designing and maintaining active and passive sediment management areas that minimize long-term impacts to land use and ecological function;
- Initiate a long-term corridor adaptive management process that maximizes ecological restoration success in a working landscape by:
    - reducing headwater erosion and sediment delivery to the Salt River floodplain;
    - increasing the volume and efficiency of clear water drainage from the upstream watershed and adjacent agricultural land, and;
    - providing and maintaining sediment management areas that minimize impacts to land use and ecological function.

PROJECT COMPONENTS

In an effort to achieve the project goals, four project implementation components have been identified, including:

- Restoration of the Salt River channel and riparian floodplain
- Tidal marsh restoration at Riverside Ranch
- Adaptive Management: Riverside Ranch, Channel and Riparian Floodplain, Sediment Maintenance and Management
- Upslope sediment reduction

Each component has a pivotal role in the overall success and long-term benefit of the project. Restoration objectives, outlined below, have been established for each project component in an effort to achieve the overall project goals.

Salt River Channel and Riparian Floodplain Corridor Restoration

One element of the Salt River Ecosystem Restoration Project is the Salt River channel and riparian floodplain corridor restoration. This component will re-establish a defined channel and riparian corridor from above the Salt River confluence with Williams Creek near Perry Slough downstream to the confluence of the Salt River with Cutoff Slough, a total corridor length of approximately 7.7 mi. The corridor design, inclusive of active and passive sediment management areas, is intended to re-establish a functioning channel and floodplain corridor that integrates long-term sediment management and regional drainage needs while restoring significant aquatic and riparian habitat value and ecologic function to the project area.

The following Salt River Channel and Floodplain Corridor Restoration objectives are designed to attain the overall project goals of the Salt River Ecosystem Restoration Project:

- Establish and sustain a dynamic river corridor by optimizing flow and sediment conveyance, integrated with natural floodplain interaction and discrete active and passive sediment management areas.

- Integrate sediment capture and removal (sediment management) actions into the AMP in order to help sustain hydraulic conveyance and ecologic function.
- Minimize the cost, frequency and extent of required sediment management related maintenance activities that disturb the riparian corridor and disrupt ecosystem function.
- Maximize riparian habitat functions and values, extent and complexity by increasing plant species diversity, corridor shading, large wood recruitment, and minimizing invasive species.
- Optimize floodplain habitat complexity.
- Create instream salmonid rearing and refugia habitat within the corridor design, where it is likely to provide sustainable habitat functions.
- Incorporate opportunities to re-connect the corridor to watershed tributaries to improve fish access to spawning and rearing habitats.
- Improve and maintain adjacent land drainage.
- Integrate a Regional Landowner Drainage Management planning process into the AMP that establishes the framework for the development, coordination and funding to enhance the integration of overland drainage with agricultural land practices adjoining the corridor.

Riverside Ranch Tidal Marsh Restoration

The Riverside Ranch restoration will re-establish intertidal wetland habitat to the Eel/Salt River Estuary. The increase in tidal exchange associated with a restored marsh will also help sustain a restored Salt River channel. Restoring tidal prism to the lower Salt River, (i.e., increasing the volume of water exchanged on each tidal cycle) increases channel scour and helps maintain and equilibrate the width and depth of the channel.

The objectives of the Riverside Ranch Tidal Marsh Restoration include the following specific items to help attain the overall project goals of the Salt River Ecosystem Restoration Project.

- Use the increase in tidal prism to help maintain the constructed Salt River channel geomorphology and conveyance.
- Improve drainage and water quality in the lower Salt River and Eel/Salt River estuary.
- Restore tidal connectivity to historic tidal wetlands to allow for the natural evolution of diverse and self-sustaining salt- and brackish water tidal marshes, intertidal mudflat and shallow water habitats.
- Restore the marsh to include and expand the transition zone between tidal wetland and upland.
- Create a template for the natural evolution of a complex tidal drainage network. The network will maximize subtidal and intertidal habitats beneficial to target fish and wildlife species. This includes the enhancement of rearing and migration conditions for estuarine-dependent species including: coho salmon, Chinook salmon, steelhead trout,

coastal cutthroat trout, tidewater goby, and commercially and recreationally valuable species such as redtail perch.

- Retain over 70 ac where agricultural management techniques can be used for short-grass Aleutian cackling goose habitat.
- Provide wintering habitat for migratory waterfowl and shorebirds.
- Provide public access to the extent feasible without compromising the physical and biological project objectives.
- Avoid adverse impacts to the existing drainage of adjacent parcels.
- Design site components that can support natural geomorphic response to sea-level rise.

Restoration of Riverside Ranch is intended to strike a balance between creating significant amounts of new tidal marsh habitat, retaining and enhancing some of the important existing upland features, preserving sufficient acreage for creation of short grass habitat, minimizing long-term site maintenance, and incorporating design features that accommodate sea-level rise. Implementation of the Riverside Ranch restoration will quickly restore habitat functions and values associated with restored tidal connectivity to historical wetland habitats.

Adaptive Management: Riverside Ranch, Channel and Riparian Floodplain, Sediment Maintenance and Management

Ongoing maintenance activities throughout the project area will be vital to ensuring lasting hydraulic and ecological function of the restored system. Maintaining the proposed project components, such as the channel, sediment management areas, drainage ditches, and the berms, will require optimizing overland drainage inflows to the system, and integrating land use with sediment and vegetation maintenance areas. Although minimized, and circumscribed as much as possible, these designated maintenance areas may require vegetation removal, ongoing riparian planting and/or repeated excavation or reworking of deposited sediments.

Most importantly, establishing a formal and predictable structure to adaptive management is fundamental to preserving the long-term social and biological integrity of the project. To this end, an AMP (H. T. Harvey & Associates 2011a) details the organizational structure for the adaptive management process to ensure that project goals and objectives are attained while providing for on-going, long-term input from local property owners and the regulatory community. The following elements are integral to the AMP:

- Specify the structure and responsibilities of the Project Management Team;
- Assign responsibility to identify/obtain funding for monitoring and adaptive management activities;
- Identify monitoring program components for use in evaluating the results of project implementation;
- Identify triggering mechanisms or early stress indicators that will be used to alert the project management team of the need to take action;

- Identify potential adaptive project management options once trigger thresholds have been reached;
- Develop an appropriate conceptual model of adaptive management process, which will:
    - outline a feedback loop between management actions and monitoring,
    - inform managers,
    - select adaptive management actions, and
    - refine the on-going monitoring program.

Four Adaptive Management Summary Tables in the AMP provide descriptions of how the AMP process will be used to evaluate progress toward individual goals and objectives of the project and permitting requirements. Each table is organized in a similar manner, with separate tables provided for the following categories:

- Erosion, Sediment Deposition, and Geomorphic Condition Monitoring and Adaptive Management for the Salt River Corridor
- Erosion, Sediment Deposition, and Geomorphic Condition Monitoring and Adaptive Management for Riverside Ranch
- Water Quality Monitoring and Adaptive Management for Salt River Corridor and Riverside Ranch
- Habitat Development, Vegetation and Invasive Species Monitoring and Adaptive Management for Salt River Corridor and Riverside Ranch

Maintenance activities described under the AMP will be conducted during seasons that avoid impacts to wildlife. These include conducting in-water activities between July and October to avoid water quality impacts that could affect salmonids, and conducting upland activities, including vegetation removal, after mid-August when the breeding season is over to avoid impacts to actively nesting birds, unless the area has been cleared by pre-construction surveys.

Upslope Sediment Reduction Program

The HCRCD has worked with private landowners to implement a variety of erosion control activities over the past several years and proposes to conduct additional sediment control and erosion reduction actions within the upper watersheds of Williams Creek, Francis Creek, and Reas Creek tributaries of the Salt River as part of the proposed project and dependent on landowner participation. The purposes of these actions include improvement of water quality, improvement of anadromous fish habitat in the Salt River watershed, and reduction of erosion and sediment deposition on the Salt River Delta, thereby extending the longevity of the proposed channel excavation.

Activities that will be employed under this project component include: on- and off-channel sediment retention basins; debris basins; stream bank stabilization; and road improvements such as culvert replacement, revegetation of riparian habitat, rock armoring, stabilizing stream banks or small streamside landslides, road rehabilitation, watercourse-crossing improvements, ditch

relief culverts and drainage ditches. These road drainage improvements will reduce sediment loading into the headwater streams. Using the information from an upslope erosion inventory in the Wildcat Mountain tributaries, sediment sources have been identified and prioritized. As opportunities arise and funding allows, Best Management Practices (BMPs) and other site-specific erosion control measures will be implemented to reduce fine sediments from upslope areas. Upslope activities are excluded from this MMP.

SUMMARY OF OVERALL PROJECT IMPACTS

The Salt River Ecosystem Restoration Project is a large-scale project that is anticipated to have significant ecological and agricultural benefits. The existing habitat composition and land use along the Salt River and at Riverside Ranch (Figure 3) will be altered by the hydro-geomorphic changes resulting from the proposed restoration actions. Given the large scale of the Salt River project and the variety of habitats and hydrologic conditions, initial construction related disturbance to the ecosystem is unavoidable and necessary to achieve the project goals. That disturbance includes extensive vegetation clearing, excavation of the historic channel, and construction of a new setback berm to allow for tidal restoration of Riverside Ranch while protecting adjacent properties from saltwater intrusion. Ultimately, however, these actions and the project's restoration, maintenance and adaptive management activities will establish a more extensive, sustainable and diverse ecosystem (Figure 4).

The existing and projected habitats for the Salt River Channel and Riverside Ranch are shown in Table 1. The existing, impacted and projected jurisdictional wetlands are shown in Table 2, and further detail on permanent and temporary impacts to jurisdictional wetlands are outlined in Table 3. The projected habitat conditions represent the anticipated development of the proposed restoration areas 5 to 10 years after construction. A description of the evolution of these habitats is below.

Future or ongoing disturbance from maintenance along the channel corridor will be minimized to the extent possible, and is addressed in the Adaptive Management Plan (H. T. Harvey & Associates 2011a). Ongoing maintenance activities may include vegetation removal, riparian planting, or periodic sediment removal within Sediment Management Areas (SMAs). These areas will be monitored per the AMP, and if any maintenance activities result in the activation of adaptive management triggers, potential remedial measures will be evaluated and implemented. In addition, future channel maintenance activities will be planned to avoid impacts to salmonids and actively nesting birds, unless these areas have been cleared by pre-construction surveys.

Functions and Values of Impacted Habitats

Existing habitats include tidal salt marsh, willow riparian scrub forest, aquatic/mudflat, agricultural grassland, seasonal wetlands, freshwater wetland, ruderal and developed habitats (Figure 3). A discussion of the functions and values of these habitats is discussed within each habitat type.

Tidal Salt/Brackish Marsh

Vegetation. Some tidal influence occurs in the lower reach of the Salt River resulting in brackish to saline conditions. The tidal salt marsh habitat is dominated by non-native dense-flowered cordgrass (*Spartina densiflora*), pickleweed (*Sarcocornia pacifica*), saltgrass (*Distichlis spicata*), slender arrowgrass (*Triglochin concinna*), Lyngbye's sedge (*Carex lyngbyei*), silver weed (*Potentilla anserina*) fat hen (*Atriplex patula*), and sand spurry (*Spergularia macrotheca*).

Wildlife. Vegetated tidal salt marsh provides habitat for a number of avian species, including species found in other habitats in the project area (i.e., the song sparrow [*Melospiza melodia*]) and species that occur primarily in tidal marsh vegetation (i.e., the marsh wren, *Cistothorus palustris*). This habitat supports few mammals in the Humboldt Bay region. These species include the California vole (*Microtus californicus*) and deer mouse (*Peromyscus maniculatus*), both native species, as well as Old World introduced murids (rats and house mouse). Vegetated tidal marsh supports a number of bird species. However, the tidal marsh currently associated with the site is relatively narrow and linear, which reduces the number of birds it can support, especially during the breeding season. For example, herons and rails may forage in these belts of vegetation, but it is not extensive enough to support breeding for most of these larger species. Passerines, such as marsh wrens and song sparrows, may find this habitat extensive enough for nesting. A number of other species would occur as transient foragers or roosters in this habitat. These species include blackbirds, migrant warblers such as yellow and yellow-rumped (*Dendroica coronata*), and nonbreeding sparrows including Lincoln's (*Melospiza lincolnii*), white-crowned (*Zonotrichia leucophrys*) and golden-crowned (*Zonotrichia atricapilla*).

The aquatic habitats associated with the vegetated tidal salt/brackish marsh support estuarine dependent fish communities (described below). Tidal marshes provide refuge habitat during high flows (habitat complexity), and provide/export nutrients and prey items important in the food chain for fish species including juvenile salmonids (*Oncorhynchus* spp.), tidewater goby (*Eucyclogobius newberryi*), and longfin smelt (*Spirinchus thaleichthys*) (Simenstad and Cordell 2000). Tidewater goby are completely estuarine dependent: the habitat currently provided in the lower Salt River and Riverside Ranch may be a sink for gobies, which may only be able to use those habitats during portions of the year.

The tidal salt and brackish marshes of the project site under the current conditions can be considered of moderate value to wildlife species and provide a number of valuable ecological functions relating especially to water quality, sediment retention, nutrient cycling, primary productivity, and wildlife breeding/foraging/refugial habitat. Most of the wildlife associated with tidal marsh comprises avian species. There are few terrestrial animals in salt marsh. The vegetation is not relatively nutritious and most of the animals associated with salt marsh feed on seeds or aquatic animals (Schoenherr 1992).

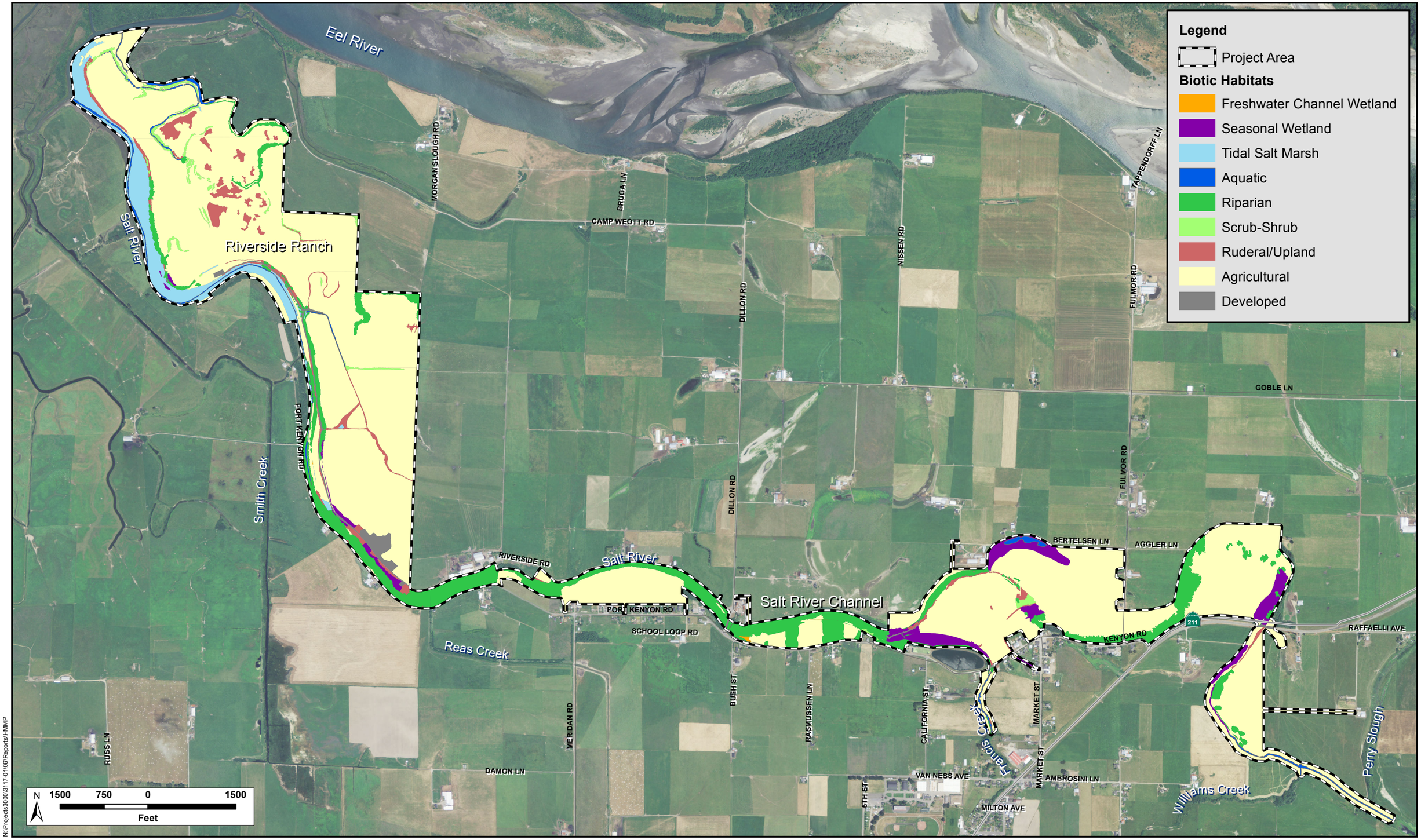

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Figure 3: Existing Habitat Types
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July 2012

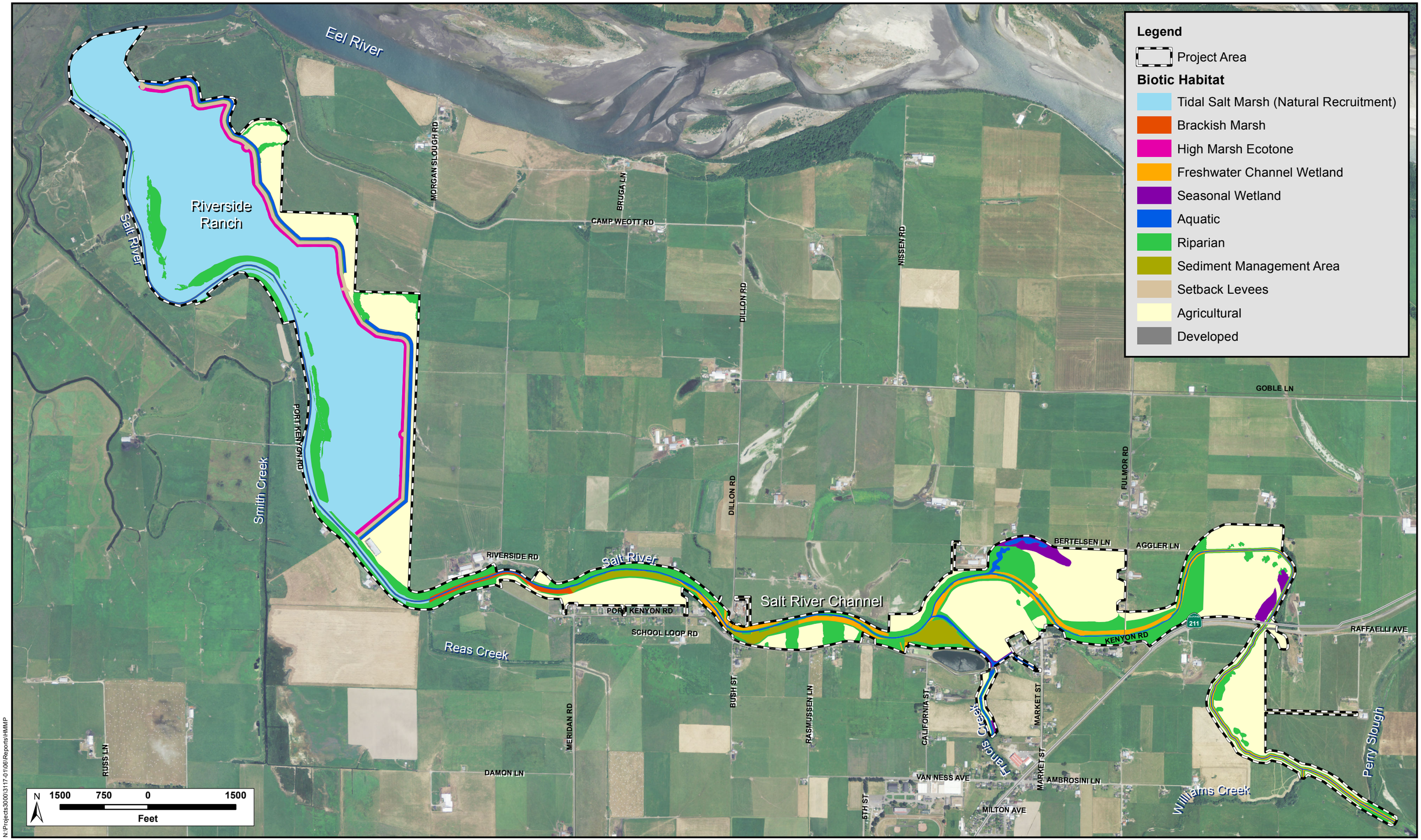

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Figure 4: Projected Habitat Types
Salt River Ecosystem Restoration Project
Habitat Mitigation and Monitoring Plan (3117-06)
July 2012

Table 1. Land Use and Habitat Projections (all units in acres)[1]

HABITAT TYPE	RIVERSIDE RANCH[2]				SALT RIVER[2]				OVERALL PROJECT			
	Existing	Removed	Replanted or Created	Projected or Created	Existing	Removed	Replanted or Created	Projected or Created	Total Existing	Total Projected	Projected Change	Creation Ratio[7]
Tidal Salt & Brackish Marsh	36	14	300	322	-	-	4	4	36	326	+290	9:1
High Marsh Ecotone	-	-	12	12	-	-	-	-	0	12	+12	12:1
Aquatic / Mudflat[5]	8	4	17	21	3	-	-	14	11	35	+24	3:1
Riparian Forest/Scrub	31	10	22	43	66	32	51	85	97	128[8]	+31	1.3:1
Freshwater Wetland Habitats:												
a) Freshwater Channel Wetlands	<1	-	-	<1	1	<1	22	22	1	22	+22	22:1
b) Seasonal Wetlands	3	3	-	<1	21	11	-	10	24	10	-14	-
Agricultural/ Grassland/ Levees	358	303[9]	18[4]	73	240	52	-	188	598	262	-337	-
Scrub-Shrub	8	8	-	-	1	1	-	-	9	0	-9	-
Ruderal	20	20	-	-	3	3	-	-	23	0	-23	-
Developed	8	8	-	<1	1	<1	-	<1	9	<1	-8	-
Sediment Management Areas [6]	-	-	-	-	-	-	-	13[3]	0	13	+13	13:1
Permanent Access Road or Improved Bridge Crossing	-	-	-	-	-	-	-	<1	0	<1	+<1	-
Approximate Total	**472**			**472**	**336**			**336**	**808**	**808**		

[1] Totals are approximate due to rounding of individual acreage amounts.

[2] The confluence of Reas Creek divides the restoration areas of Riverside Ranch (Phase 1) and Salt River (Phase 2).

[3] 13 ac have been depicted on the projected vegetation maps. However, an additional 7 ac are tentatively proposed within the project area on existing agricultural grasslands.

[4] New berm will be seeded with native and erosion control grass species, above 9 ft (NAVD 88) on tidal marsh side and entire side slope on opposing side.

[5] Existing habitat type includes impacted areas to existing Eel grass beds (1.2 ac). Projected habitat area includes an estimated 8.7 ac of Eel grass beds created. Reference: Salt River Ecosystem Restoration Project Rare Plant Mitigation and Monitoring Plan (H. T. Harvey & Associates and Winzler & Kelly, January 27, 2011).

[6] The location of proposed Sediment Management Areas currently comprise approximately 85% Agricultural Grasslands and 15% Riparian Forest and have been accounted for in the respective Removed columns.

[7] Creation Ratio defined as total acres **Projected** (Created) to total acres **Existing**.

[8] Area does not include anticipated future natural recruitment of riparian habitat on the active bench. 20+ ac of projected freshwater and seasonal wetland habitats on the active bench could convert to riparian forest per Adaptive Management Plan.

[9] Area includes grassland habitat on existing levees some of which are not currently used for agricultural production.

Table 2. ACOE and CA Coastal Commission Jurisdictional Wetlands[1] Permanently Impacted and/or Created (all units in acres)

RIVERSIDE RANCH[2]				SALT RIVER[3]				OVERALL PROJECT		
Existing	**Filled**	**Created**	**Projected**	**Existing**	**Filled**	**Created**	**Projected**	**Total Existing**	**Total Projected**	**Projected Change**
462.9	13.7[4]	13.7[5]	462.9	293	0.3[6]	1.6[7]	294.3	755.9	757.2	+1.3

[1] Upland Delineation for the Salt River Restoration Project Mapping and Report, Prepared by the ACOE, HCRCD and Winzler &Kelly, December 2010. Amended April 2011

[2] Total Riverside Ranch Tidal Marsh Restoration (Phase I) Area: 472 AC

[3] Total Salt River Channel and Riparian Corridor Restoration (Phase II) Area: 336 AC

[4] Native fill from the channel excavation will be placed on approximately 81.2 AC of wetlands of which **13.7 ac will be permanently convert from wetlands to uplands**. The permanently impacted area is associated with the new berm and calculated as the area above 9.0 ft (NAVD 88) on the tidal side of the berm and above the existing ground elevation on the opposing side of berm and per the Riverside Ranch Wetland Conversion Assessment Report (Winzler & Kelly, H. T. Harvey & Associates and Kamman Hydrology & Engineering, August 2011). The remaining 67.5 AC of fill will be placed in the tidal marsh below 9.0 ft (NAVD 88) to diversify marsh plain elevations and create high marsh ecotone wetlands.

[5] **Creation of 13.7 ac of wetlands through lowering of site levees and mapped uplands**.

[6] Accounts for replaced Port Kenyon Road bridge crossing over Francis Creek, replaced agricultural bridge crossing over Francis Creek approximately 500-ft upstream from Port Kenyon Rd., new culvert crossing over Eastside Drainage, roughened rock channels to connect Reas and Williams Creeks, and permanent corridor access roads for Francis Creek SMA and SMA immediately upstream from Dillon Road bridge.

[7] Current upland areas that will be excavated and converted to freshwater channel wetland.

Table 3. Type of Permanent and Temporary Impacts to ACOE and CA Coastal Commission Jurisdictional Wetlands or Waters of the U.S./State[3]

PERMANENT[1] FILL AND/OR DREDGE				TEMPORARY[2] FILL AND/OR DREDGE		
Description	**Cubic Yards (CY)**	**Acres (AC)**	**Linear Feet**	**Cubic Yards (CY)**	**Acres (AC)**	**Linear Feet**
Riverside Ranch Tidal Marsh Restoration (Phase 1)						
Salt River Channel (Dredge Native)	183,4000	22.2	12,900	Approximate 1,600 CY of gravel/rock/sheet-pile/soil[8,9]	<1	ND[5]
Internal Sloughs (Dredge Native)	47,000	8.7	19,700			
Lower Marsh Plain (Dredge Native)	60,600	50 (approx.)	NA			
Raise Marsh Plain (Fill Native)	121,300	35 (approx.)	NA			
Berm Outboard Ditch (Dredge Native)	31,400	13	10,500			
Berm (Fill Native)	185,000	13.7	11,360			
Fill Existing Ag Ditches (Fill Native)	30,250	3 (approx.)	5,000			
Lower Existing Levees (Dredge Native)	14,150	5 (approx.)	7,000			
Salt River Channel and Riparian Corridor Restoration (Phase 2)						
Salt River Channel (Dredge Native)	387,700	70 [7]	27,750	Approximate 1,500 CY gravel[4,10]	<1	ND[5]
Francis Creek Channel (Dredge Native)	36,000	3	2,900			
Eastside Drainage (Dredge Native)	1,000	0.3	1,000			
Francis Creek Channel (Fill – Bridge Replacement)	50 (Concrete Footing)	0.3[6]	NA			
Sediment Management Area Access Road (Fill)	350 (Gravel)					
Boulder Weirs at Reas, Francis and Williams Creek Confluence (Fill)	500 (Rock)					

[1] Permanent impact areas are defined as areas that will experience permanent dredge/fill.

[2] Temporary impact areas are areas where temporary construction disturbance could occur and are within the project area. These areas will be utilized for haul roads, staging areas and stockpiling areas and will be restored back to pre-construction conditions. These areas exclude soil amendment areas on agriculture lands.

[3] Upland Delineation for the Salt River Restoration Project Mapping and Report, Prepared by the ACOE, HCRCD and Winzler & Kelly, December 2010. Amended April 2011.

[4] Assumed 50CY of temporarily placed gravel base for each proposed construction entrance and temporary placement of coffer dams.

[5] Not Definable due to variable haul routes and coffer dam placement determined by the contractor and construction manager within the project limits of disturbance.

[6] Accounts for replaced Port Kenyon Road bridge crossing over Francis Creek, replaced agricultural bridge crossing over Francis Creek approximately 500-ft upstream from Port Kenyon Rd., new culvert crossing over Eastside Drainage, roughened rock channels to connect Reas and Williams Creeks, and permanent corridor access roads for Francis Creek SMA and SMA immediately upstream from Dillon Road bridge.

[7] Channel excavation area within the Salt River Channel and Riparian Corridor Restoration, Phase II area (336 AC) that is currently mapped as Jurisdictional Wetlands/Waters.

[8] Does not include area bound by Salt River channel and proposed berm (approximately 320 AC) that will be temporarily disturbed for construction access and material hauling. This area will be de-compacted and restored back to pre-construction conditions.

[9] Temporary fill for construction access and coffer dam placement in Salt River Channel.

[10] Does not include area within project limits and outside of permanent disturbance area (approximately 135 AC) that will be temporarily disturbed for construction access and material hauling. This area will be de-compacted and restored back to pre-construction conditions.

Riparian Forest/ Scrub-Shrub

The riparian zone is a 50-200 ft corridor along the Salt River and adjacent levees that comprises willows, alders, forbs and grasses (Alice Berg & Associates 2005; H. T. Harvey & Associates 2010; Grassetti Environmental Consulting 2011; Winzler & Kelly 2010e). Scrub-shrub habitat is also located along several smaller historic drainages within the agricultural fields, as well as along man-made ditches and fencelines. These habitat types are described in concert due to their frequent affiliation within the Project Area.

Vegetation. Dominant willow species include arroyo willow (*Salix lasiolepis*), sandbar willow (*Salix exigua*), Pacific willow (*Salix lasiandra*), and Sitka willow (*Salix sitchensis*). In addition to willows, riparian species include red alder (*Alnus rubra*) and sparse, isolated stands of black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) (Ericsson et al. 2008). Large remnant willow riparian stands are also present along drainage features on the northeast site boundary. Scrub-shrub habitat forms distinct row cover along drainage areas and fence lines within the project area and in areas along the Salt River channel. Scrub-shrub habitat typically consists of California rose (*Rosa californica*) Himalayan and California blackberry (*Rubus discolor* and *R. ursinus*), coyote brush (*Baccharis pilularis*), and poison oak (*Toxicodendron diversilobium*).

Wildlife. The willow riparian scrub/forest habitat on this site is relatively extensive and well developed. As such, it provides the necessary vegetation attributes associated with a functional riparian system at a coastal location. This habitat supports relatively high avian species diversity throughout the year (although species composition changes seasonally). Of conservation interest is the importance of riparian habitat to Neotropical migrants, including some that likely breed on the site (e.g., Bullock's oriole, *Icterus bullockii*), some that would occur primarily during migration (MacGillivray's warbler, *Oporonis tolmiei*), and some that occur during the winter months (golden-crowned sparrow). Finally, other species are resident in willow riparian in this area and breed in this habitat (e.g., black-capped chickadee, *Parus atricapillus*). During a visit in May 2008, a number of birds characteristic of willow habitat were singing in the willow riparian habitat on the site. These species included Swainson's thrush (*Catharus ustulatus*), Wilson's warbler (*Wilsonia pusilla*), yellow warbler (*Dendroica petechia*), and Bullock's oriole. Other bird species that that can be found in this habitat type include the wrentit (*Chamaea fasciata*), orange-crowned warbler (*Vermivora celata*), Wilson's warbler, song (*Melospiza melodia*) and white-crowned (*Zonotrichia leucophrys*) sparrows, house finch (*Carpodacus mexicanus*), and American goldfinch (*Carduelis tristis*).

This habitat type could be appropriate breeding habitat for willow flycatchers (*Empidonax traillii*), a species listed by the state of California as endangered (the federally listed *E. t. extimus* does not occur in northwestern California). This species is a rare and very local breeder in northwestern California. Willow flycatchers have been detected in the project area, most likely as relatively scarce migrants. There are no documented breeding records for the species at the project site or in the Salt River drainage (Alice Berg and Associates 2005, Hunter et al. 2005, Winzler & Kelly 2010b). However, during protocol-level surveys

for willow flycatchers in suitable habitat in the Project area in 2010, a single male willow flycatcher singing on territory was observed (Winzler & Kelly 2010b).

In addition to birds, riparian areas provide important habitat for other wildlife taxa. A limited number of reptiles and amphibians occur in riparian habitat in the region including northern alligator lizard (*Elgaria coerulea*), western terrestrial garter snake (*Thamnophis elegans*), common garter snake (*Thamnophis sirtalis*), northern red-legged frog (*Rana aurora*), pacific chorus frog (*Pseudacris regilla*) and California slender salamander (*Batrachoseps attenuatus*) A number of mammals and other species are found in these habitats as well, including black-tailed deer (*Odocoileus hemionus*).

The density and diversity of species in riparian communities are greater than any other community in California (Schoenherr 1993). Riparian communities are highly productive and provide an abundance of food resources, vegetation structural complexity, and represent an ecotone between aquatic and upland habitats, which further enhances diversity. Overall, riparian habitats such as this provide valuable ecological functions, particularly relating to wildlife breeding and foraging.

Aquatic/Mudflat

The Salt River and its tributaries support aquatic/mudflat habitats. At low tides, a small amount of mudflat habitat is exposed along the river adjacent to the project site, especially in areas closer to the confluence with the Eel River, where the Salt River is wider. At high tides, these mudflat areas convert to shallow open water or aquatic habitat. Additional areas of aquatic habitat occur as small drainage channels, primarily located behind water control structures or in constructed drainage ditches.

However, freshwater inputs (and therefore a true open-water aquatic channel) to the mainstem of the Salt River have become dramatically impaired due to excess sedimentation. The result is a diversion of flows and ensuing flooding, including Williams Creek that no longer flows into the Salt River and therefore is not available to salmonids (Downie and Lucey 2005).

Vegetation. Aquatic/mudflat vegetation consists of eelgrass (*Zostera marina*) which occurs in low density from the confluence of Cut-Off Slough to the confluence of Smith Creek, algae (*Gracilaria* sp. and *Ulva* sp.), and widgeon grass (*Ruppia maritima*).

Wildlife. Birds forage in aquatic/mudflat habitat, especially during retreating and low tides when water is relatively shallow. Such conditions facilitate detection and capture of fish and invertebrates (herons etc.), and mudflat is exposed enabling shorebirds to probe the moist substrate for invertebrates. Other species, for example waterfowl and kingfishers, are more likely to use this habitat during incoming or high tides. Example birds observed and expected in this habitat include: great blue (*Ardea herodias*) and black-crowned night (*Nycticorax nycticorax*) herons, great (*Camerodius albus*) and snowy (*Egretta thula*) egrets, green-winged teal (*Anas crecca*), mallard (*Anas platyrhynchos*) lesser scaup (*Aythya affnis*), northern harrier (*Circus cyaneus*), greater (*Tringa melanoleuca*) and lesser (*T. flavipes*), yellowlegs and black-bellied plover (*Pluvialis squatarola*).

The estuarine aquatic habitat of the Salt River currently provides marginal habitat for estuarine dependent species (e.g., tidewater goby), potentially important but constrained migration/rearing habitat for species such as salmonids, and spawning/nursery habitat for many species that utilize the ocean as adults. Many of these species will forage at high tides over the mudflats. Tidal channels provide small fish a refuge from larger fish and avian predators. In the estuarine portion of the Salt River, juvenile federally threatened Chinook salmon (*O. tshawytscha*) as well as coho salmon, steelhead, cutthroat trout, Sacramento pikeminnow (*Ptychocheilus grandis*) and threespine stickleback are known to occur. As is the case in similar settings, juvenile salmonids will likely rear in freshwater tidal portions of the estuary before migrating out to sea as smolts, and likely use the brackish portions to transition physiologically from freshwater to marine habitats. Other estuarine fish species that are likely to occur include longfin smelt, Pacific herring (*Clupea harengus*), Pacific sardine (*Sardinops sagax*), surf smelt (*Hypomesus pretiosus*), topsmelt (*Atherinops affinis*), bay pipefish (*Sygnathus leptorhynchus*), redtail surfperch (*Amphistichus rhodoterus*), shiner surfperch (*Cymatogaster aggregata*), prickly scuplin (*Cottus asper*), coastrange sculpin (*Cottus aleuticus*), Pacific staghorn sculpin (*Leptocottus armatus*), English sole (*Parophrys vetulis*), starry flounder (*Platichthys stellatus*), and anchovy (*Engraulis mordax*) (Downey and Lucey 2005). Special-status fish are discussed later in this document under *Summary of Threatened/Endangered Species Impacts*.

Estuarine systems function on both plankton-based and detrital-based food webs. Vegetation composition varies with salinity and depth, which in turn influences the distribution of animal species throughout the system. Many of these species forage in these habitats in an opportunistic fashion, taking advantage of temporary fluctuations in food availability created by the tidal cycle. The aquatic and mudflat habitats of the project area are valuable habitats for the species described above, and provide foraging habitat for most fish species when inundated by tides, and provide spawning habitat for species such as Pacific herring.

Agricultural Grassland

The dominant land cover type in the Salt River Delta is agricultural grassland. This is a regionally abundant habitat type that provides low-to-moderate ecological value to the species described below.

Vegetation. Vegetation in the low-lying agricultural pastureland of the Salt River Delta is dominated by grassland species such as Kentucky bluegrass (*Poa pratensis*), perennial ryegrass (*Lolium perenne*), saltgrass, common velvet grass (*Holcus lanatus*), creeping bentgrass (*Agrostis stonolifera*), reed canarygrass (*Phalaris arundinacea*), and common oat (*Avena sativa*). Ruderal species within the pastureland include poison hemlock (*Conium maculatum*), bull thistle (*Cirsium vulgare*), filaree (*Erodium cicutarium*), dandelion (*Taraxacum officinale*), common vetch (*Vicia sativa*), bindweed (*Convolvulus arvensis*), fennel (*Foeniculum vulgare*), wild radish (*Raphanus sativus*), dock (*Rumex* spp.), common ragwort (*Senecio vulgaris*), soft chess (*Bromus hordaceous*), creeping buttercup (*Ranunculus repens*), white clover (*Trifolium repens*), red clover (*Trifolium pratense*), bird's-foot trefoil (*Lotus corniculatus*) and English plantain (*Plantago lanceolata*) (Francis 2005) (Ericsson et al. 2008; H. T. Harvey & Associates 2008).

Wildlife. Agricultural pastureland provides habitat for a suite of wildlife species that include the species identified as occurring in ruderal grasslands on the site. Black-tailed deer are common here. Mammals that typically use such fields, perhaps more frequently than is the case with ruderal grassland, include the California vole, Pacific shrew (*Sorex pacificus*), and coast mole (*Scapanus orarius*). A number of swallows were observed foraging for aerial insects over the pastureland during a site visit in May 2008. These species included tree (*Tachycineta bicolor*), cliff (*Petrochelidon pyrrhonota*) and barn swallows (*Hirundo rustica*). Other species observed in this habitat on the site included Eurasian collared-dove (*Streptopelia decaocto*), Savannah sparrow (*Passerculus sandwichensis*), and red-winged (*Agelaius phoeniceus*) and Brewer's blackbirds (*Euphagus cyanocephalus*). Shorebirds that occur in pasturelands in coastal Humboldt County include the long-billed curlew (*Numenius americanus*), and killdeer (*Charadrius vociferous*). These fields also provide foraging habitat for a number of raptor species including the northern harrier, peregrine falcon (*Falco peregrinus*), red-tailed hawk (*Buteo jamaciensis*), barn owl (*Tyto alba*), and the turkey vulture (*Cathartes aura*).

Seasonal Wetlands

Seasonal wetlands occur primarily in low-lying areas outside the Salt River riparian corridor within agricultural pasturelands. These pasturelands are generally subject to seasonal disturbance by grazing, which reduces the vegetation complexity and associated ecological functions and values of these areas, although they support some valuable amphibian breeding niches. Seasonal wetlands are predominantly freshwater, but include some brackish areas in the lower reaches of the Salt River channel, particularly within the Riverside Ranch segment of the project. These wetlands are also often subjected to substantial periods of inundation during the rainy season due to poor drainage, and are relatively dry during the summer and fall.

Vegetation. Seasonal wetlands are vegetated by spikerush (*Eleocharis macrostachya*), small field bulrush (*Scirpus microcarpus*), common rush (*Juncus effusus*), spreading rush, (*Juncus patens*), field horsetail (*Equisetum arvense*), Pacific silverweed (*Potentilla anserina*), blackberry, creeping buttercup, white clover, red clover, bird's-foot trefoil, and brass buttons (*Cotula coronopifolia*).

Wildlife. Seasonal wetlands provide habitat for a variety of wildlife. The composition of species using seasonal wetlands varies considerably depending on the extent of the wetlands, the duration and period of inundation as well as the extent and species composition of vegetation associated with the wetlands. More species will be associated with the seasonal wetlands than with the flooded pasture on this site. A major factor responsible for the higher diversity of wildlife using the seasonal wetlands is the wetland vegetation associated with those wetlands relative to the grasses in the pasture. Many of the species that use flooded pasture also use seasonal wetlands when they hold water. However a number of additional species use the vegetation associated with the seasonal wetlands that are absent from the flooded pasture. Amphibians such as Pacific treefrogs (*Pseudacris regilla*) use these ponded areas and will breed in them if the duration of ponding is sufficient and various species of garter snakes (*Thamnophis* spp.) may visit seasonal wetlands on the site. Northern red-

legged frogs (*Rana aurora*) occur on the site and breed in some of these wetlands. Small mammals such as rodents and insectivores inhabit vegetated portions of the seasonal wetlands and these species, in turn, provide prey for predatory birds and mammals. Examples of birds found in this habitat that are not likely to use flooded pasture include the green heron (*Butorides virescens*), common yellowthroat (*Geothlypis trichas*), and marsh wren. A seasonal (summer/fall) herd of deer also utilizes this area. Seasonally connected wetland habitats (connected by channels that allow for fish to pass to the estuary/river during high flows or high tides) in Riverside Ranch may also provide rearing habitat for fish species including salmonids and tidewater goby.

Freshwater Channel Wetlands

Freshwater channel wetland habitat occurs on less than one acre of the project area, primarily along edges of streams and sloughs. Water levels in the project area recede in the summer, exposing mud and creating habitat for wetland species. This is a valuable habitat type for the species described below, especially salmonids.

Vegetation. Freshwater channel wetlands in the project area is characterized by emergent vegetation include sturdy bulrush (*Schoenoplectus robustus*, also known as *Scirpus robustus*), creeping spike rush, and common rush.

Wildlife. Freshwater channel wetlands attract many bird species including the American bittern (*Botaurus lentiginosus*), red-winged blackbird, marsh wren, pied-billed grebe (*Podilymbus podiceps*), American coot (*Fulica americana*), great-blue heron, great egret, snowy egret and cinnamon teal (*Anas cyanoptera*). Various mammals, such as river otters (*Lutra canadensis*) and reptiles and amphibians, including red-legged frogs and garter snakes also use this habitat in the region. Freshwater channels provide rearing habitat for juvenile salmonids, and also provides habitat for introduced predatory Sacramento pikeminnow. Tidally influenced freshwater wetland habitat provides a particularly important rearing habitat for juvenile coho salmon; growth and survival of juveniles is often greater in these habitats than in stream habitats farther upstream (Koski 2009, Wallace and Allen 2009).

Existing conditions in the Salt River provide some juvenile rearing habitat for salmonids but the quality and quantity of tidal freshwater habitat critical for rearing of juvenile coho salmon and other salmonids is limited. Currently, connectivity of freshwater habitat in the Salt River is poor; adult access to spawning habitat is limited in some years in Francis Creek and most years in other tributaries.

Ruderal

Ruderal habitat occurs primarily along and near developed areas, levees (both natural and man-made) and drainages around and within the Salt River Delta. Generally this habitat type is of relatively low ecological value.

Vegetation. Ruderal habitat is dominated by mostly invasive non-native species such as wild radish, velvet grass, bull thistle, poison hemlock, bird's foot trefoil, and English plantain.

Wildlife. As is typical of ruderal areas, this habitat on site supports primarily widespread, common wildlife species tolerant of disturbed habitats. Examples of mammals that are found in this habitat in the Humboldt Bay region include house mice (*Mus musculus*), black rats (*Rattus rattus*), deer mice (*Peromyscus maniculatus*), striped skunks (*Mephitis mephitis*), raccoons (*Procyon lotor*), opossums (*Didelphis virginiana*), and feral cats (*Felis catus*). Avian species characteristic of ruderal grasslands in this region include the house finch, American goldfinch, red-winged (*Agelaius phoeniceus*) and Brewer's blackbirds (*Euphagus cyanocephalus*) and various sparrows, including savannah sparrows (*Passerculus sandwichensis*) that likely breed in portions of this habitat (as well as agricultural grassland habitat) that support relatively dense stands of grass. Reptiles and amphibians are relatively sparse in ruderal habitats in the region, but Pacific tree frogs, garter snakes, and western fence lizards (*Sceloporus occidentalis*) forage in these areas. Other wildlife that may utilize this ruderal habitat includes blacktailed deer (*Odocoileus* sp.) and porcupine (*Erethizon dorsatum*).

Developed

Developed areas include areas such as barns and houses, roads, and other agricultural infrastructure, such as holding pens. Developed areas do not include substantial areas of vegetation cover.

Wildlife. Several species of birds and mammals likely use these structures for shelter and foraging, as well as possibly for nesting. Such species include barn owls, barn and cliff swallows, Norway rats (*Rattus norvegicus*), house mice, and feral cats (*Felis catus*). Structures also provide foraging perches for raptors, such as red-tailed hawks (*Buteo jamaicensis*) and American kestrels (*Falco sparverius*).

Summary of Threatened/Endangered Species Impacts

Prior to 2010 sensitive species surveys, information concerning the known distribution of threatened, endangered, or other special-status and significant plant and animal species that may occur in the area was collected from several sources and reviewed by H. T. Harvey & Associates biologists. The sources included the CDFG's Natural Diversity Data Base (CNDDB 2008), and miscellaneous information available through the U.S. Fish and Wildlife Service (USFWS), CDFG, and technical publications. Contacts with local biologists were also made (e.g., Andrea Pickart [Humboldt Bay National Wildlife Refuge] and Annie Eicher [UC Sea Grant Extension]). A comprehensive discussion of the special-status species can be found in the project's Environmental Impact Report (Grassetti Environmental Consulting 2011).

During site surveys in 2010 two listed plant species were found in the project area and could be impacted by project construction; Humboldt Bay owl's clover (*Castilleja ambigua* ssp. *humboldtiensis*) and Lyngbyes' sedge (*Carex lyngbyei*). The restoration planning for these 2 species has been developed in the Rare Plant Mitigation and Monitoring plan (H. T. Harvey & Associates 2011b). In addition, USFWS conducted a field survey in May 2010 of several locations selected based on aerial photography of the Riverside Ranch property to evaluate presence of tidewater goby (*Eucyclogobius newberryi*). Tidewater goby occurred at six of ten

locations surveyed and a juvenile coho salmon was found at one location where tidewater goby were also found (USFWS 2010). However, surveys were repeated by CDFG at the same sites, in September 2010, and by USFWS, in October 2010, and no tidewater gobies were detected during either surveys. These survey results suggest that tidewater gobies may only occur seasonally or infrequently in the project area. Coho salmon, steelhead and cutthroat have been found in Francis Creek above Centerville/Grizzly Bluff Road by CDFG (Downie and Lucey 2005), indicating that at least in some years anadromous fish can migrate up the Salt River to upstream spawning habitat. In addition, during protocol-level surveys for willow flycatchers and western yellow-billed cuckoos in suitable habitat in the Project area in 2010, a single male willow flycatcher singing on territory was observed but no western yellow-billed cuckoos were detected (Winzler & Kelly 2010b; H. T. Harvey & Associates 2010). The state fully protected white-tailed kite is also commonly observed in the project area.

Several of these species may occur on the site, and one (the short-eared owl, *Asio flammeus*) may benefit from increased tidal marsh habitat associated with the restoration of Riverside Ranch. Other species of special concern (i.e., long-eared owl, *A. otus* and tricolored blackbird, *Agelaius tricolor*) are likely to occur only very rarely, if at all on the site and thus, are not likely to be affected by the project. In addition, since the Draft Biological Assessment (Winzler & Kelly 2010d) was prepared, critical habitat was designated for steelhead and Chinook salmon (NMFS 2005), as well as for tidewater goby. Tidewater goby was federally listed as endangered in 1994 (59 FR 5494). Critical habitat was designated in 2000 (65 FR 69693), and this designation was revised in 2008 (73 FR 5920). The Salt River, including the action area, is not within tidewater goby critical habitat; however, critical habitat occurs in the adjacent Eel river estuary less than 4 km form the action area. Finally, the essential fish habitat (EFH) assessment addressed salmonids but not other EFH fish species (see below).

It is our opinion that the Salt River Ecosystem Restoration Project could affect the federally threatened Southern Oregon/Northern California Coasts (SONCC) coho salmon (*Oncorhynchus kisutch*), California Coastal Chinook salmon (*O. tshawytscha*), and northern California steelhead (*O. mykiss*). Coho salmon is also listed as threatened by the State of California. In addition, the project area provides critical habitat for coho salmon, Chinook salmon and steelhead. The project is likely to affect the federally endangered tidewater goby in the short term, but provide long term benefits. The Project could also affect the State-threatened longfin smelt (*Spirinchus thaleichthys*), and the State-endangered western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) and willow flycatcher (*Empidonax traillii*).

Essential Fish Habitat (EFH)

All subtidal and intertidal habitats within the Salt and Eel Rivers are designated as EFH for a number of species federally managed under three fishery management plans (FMPs for groundfish, coastal pelagic species, and Pacific salmon). FMPs are developed by Regional Fishery Management Councils and implemented by NMFS. No FMP species are known to occur inside Riverside Ranch at this time, although some species may enter the ranch through water control structures. Pacific sardine, starry flounder, and English sole have been collected from the Salt River Estuary (Downie and Lucey 2005). These species are likely to use tidal channels, mudflats, and marsh edge habitats of the lowermost reaches of the Salt and Eel Rivers as nursery and foraging habitat, occurring mostly in marine and brackish water habitats. Juvenile and adult

salmonids (coho and Chinook salmon, steelhead, and cutthroat) likely use the lower portion of the Salt River and Eel River estuaries during their transition from marine and freshwater habitats. Juvenile salmonids will use creeks and freshwater tidal marsh edges and protected tidal channels for foraging and growth; recent information from Humboldt Bay indicates that growth rates of juvenile coho salmon in freshwater tidal habitats can far exceed growth of juveniles in upstream creeks and may be important overwintering habitats (Wallace 2009). Brackish water habitats are less likely to be used for rearing, but are important transitional habitats for juvenile salmonids undergoing smoltification as they move into marine habitats. In addition, eelgrass and estuaries are two types of Habitat Areas of Particular Concern (HAPCs) recognized under the Magnuson-Stevens Fishery Conservation and Management Act; HAPCs are a subset of EFH used to focus management and restoration efforts, and are recognized for their ecological functions and sensitivity to human impacts.

RESTORATION DESIGN

LOCATION

All of the project's restoration areas are located within the project construction footprint and immediately adjacent lands of willing landowners.

OWNERSHIP STATUS

Land ownership in the Project area is primarily private property and includes Riverside Ranch, the Salt River channel, and some adjacent pasturelands. Riverside Ranch, which was private land primarily in agricultural uses, was acquired in 2007 by the Western Rivers Conservancy, and it is expected that ownership will be transferred to the California Department of Fish & Game. Along the periphery of the Salt River channel land uses are primarily agricultural and contain a few residences, agricultural outbuildings and the wastewater treatment plant for the City of Ferndale (Grassetti Environmental Consulting 2011).

HISTORIC AND CURRENT USES

The Project area was historically a tidal slough before construction of levees, tide gates, dikes, berms, and water diversions in the late 1800s allowed conversion of much of the tidal slough to pasture (Grassetti Environmental Consulting 2011). Since then, the Project area has been used primarily for seasonal livestock grazing (dairy cows), and crops (corn and hay), with the exception of historically forested upland areas (Grassetti Environmental Consulting 2011).

BASIS FOR DESIGN

The project's goals and objectives are described previously under Summary of Overall Project Goals and Objectives. Those goals and objectives, most of which directly address the restoration of functional native habitats, form the strategic basis for the design. The habitat restoration design addresses those goals and objectives and is integrated closely with the physical design for the site.

The Salt River Channel and Riparian Corridor and Tidal Marsh restoration designs (Kamman Hydrology & Engineering 2011, Winzler & Kelly 2011a) are driven primarily by the site's hydrologic setting and goals, and the resulting dynamic landform defines the basis for the restoration design. The proposed mosaic of restored habitats has been developed to match plant species' tolerances and/or affinity for post-construction salinity, soil, hydrologic, and sedimentary conditions (e.g., static, aggrading or scouring sediments). Plant species have been selected and placed to assist hydrologic functionality (streambank stabilization, focusing flows to induce sediment transport, etc.), compete with undesirable invasive plant species (primarily via shading), provide shading of the active channel to improve fish habitat, and restore historic plant associations. A diversity of plant species is also proposed to maximize the potential for restoration success and to establish habitats that support a broad suite of wildlife species. The design team has also minimized impacts to sensitive and regulated habitats, and maximized the restoration acreage of high priority sensitive habitats such as wetlands and riparian habitats, and habitats for sensitive wildlife species. Riparian and wetland habitats comprise two of the most

valuable habitat types for birds and other wildlife in North America, and riparian habitats have been identified as the most important habitats to landbird species in California (RHJV 2004.).

Due to the large scale alteration of site hydrology and elevations necessary to achieve the project goals, and the inherently limited land available for ecosystem restoration within the project footprint, it is infeasible to avoid conversion of some habitat types or to replace all impacted habitats using standard mitigation ratios. Thus, there are complex tradeoffs to be considered, but there is also an overall net ecosystem benefit. Some of the tangible benefits are:

1) *Restoration of historic habitats* including tidal marsh, tidal slough, freshwater channel, Sitka spruce riparian forest, and rare plant habitat
2) Proposed restoration will significantly *increase the habitat diversity*, and support a wider assemblage of wildlife species than the current condition
3) *Significant increase in tidal marsh*, one of the richest ecosystems present on the coast, including the establishment of substantial new high marsh ecotone
4) The project design is being developed to *minimize/avoid the need for future intrusive channel maintenance* that would impact the aquatic/riparian ecosystem
5) Provide improved *fish passage and significant levels of restored and currently unavailable instream habitat*
6) Project will *control invasive plants* such as non-native *Spartina* and reed canarygrass

HABITAT RESTORATION CONCEPTUAL DESIGN

Salt River Fluvial Reach

The fluvial reach of the Salt River channel between Perry Slough and Reas Creek has been designed to connect a proposed river channel corridor to passive and active sediment management areas as well as the floodplain. The proposed channel capacity ranges between the 1- and 1.5-year return period flow, with capacity depending on topographic relief of the adjoining floodplain. Within the channel, there are two principal geomorphic features: the active channel and the active bench.

Figures 5, 7, 9, and 12 show the proposed channel alignment and restoration areas in plan view and Figures 6, 8, 10, 11, and 13 show cross-sections of the channel, existing habitats and proposed habitats. Plant species palettes for the different habitats are shown on each cross-section.

Geomorphic Elements of Restoration Areas

Active Channel

The active channel is intended to function as a higher energy channel that will transport sediment and water over a wide range of flows. The active channel will be confined by woody vegetation (both planted and naturally recruited on the adjoining banks) to provide

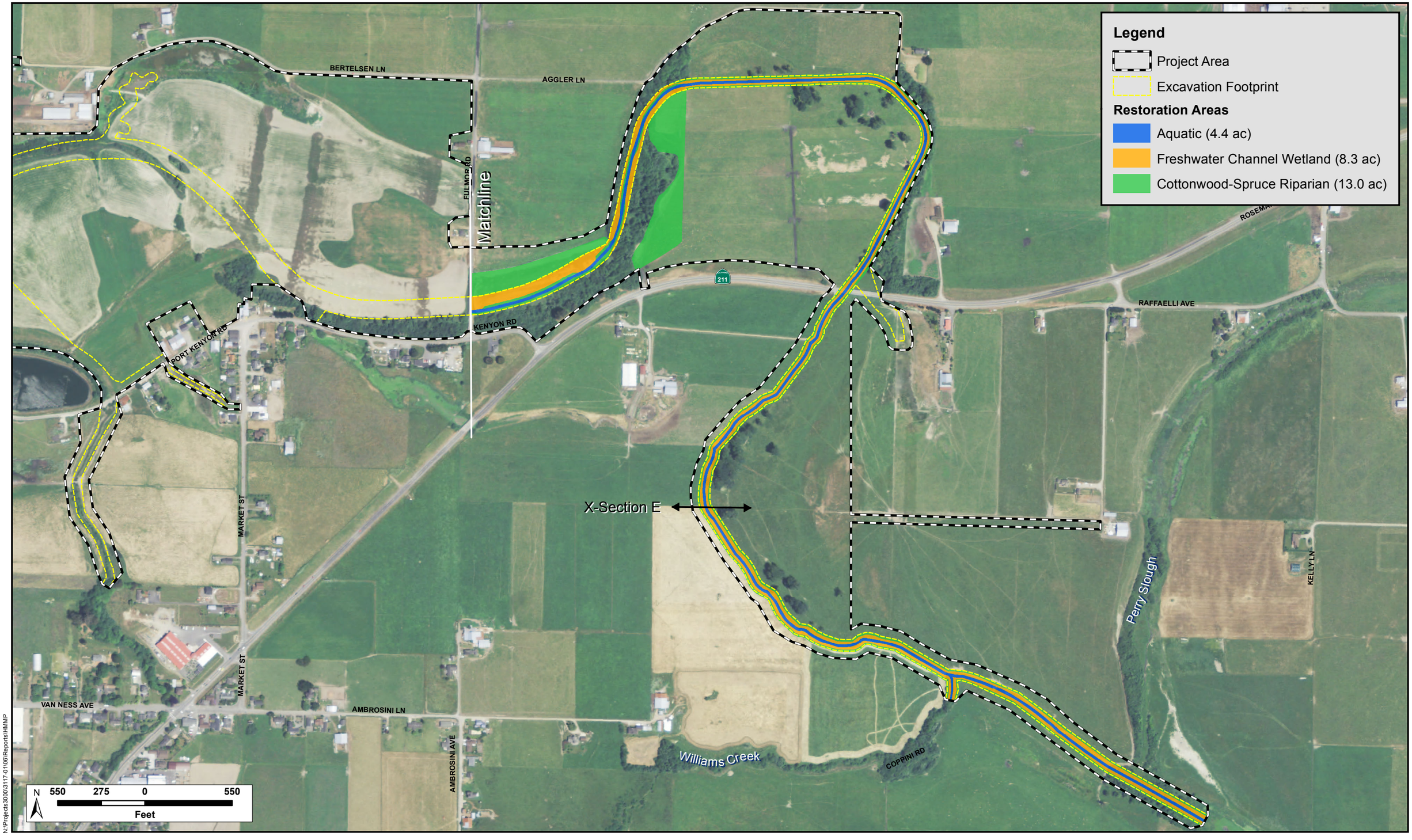

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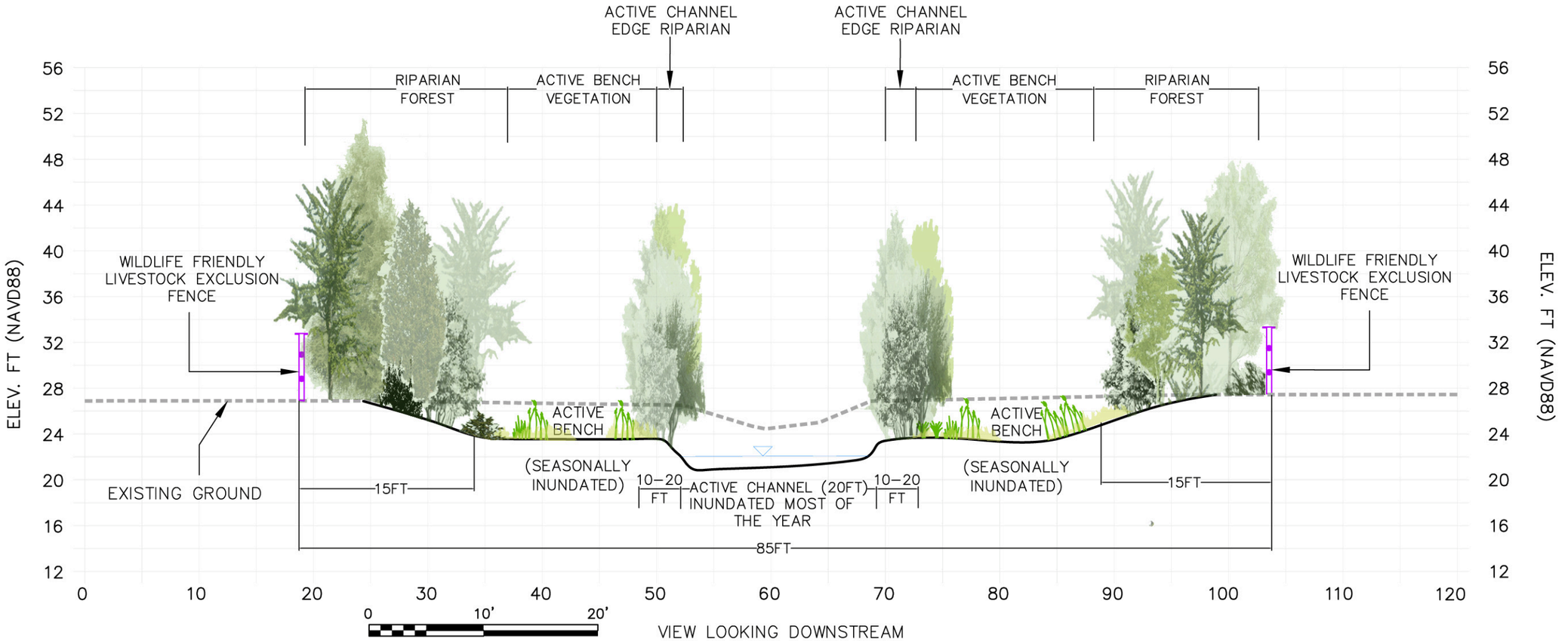
Figure 5: Salt River and Riverside Ranch Restoration Areas: Cottonwood/Spruce Riparian Forest with Freshwater Channel Wetland

Salt River Ecosystem Restoration Project
Habitat Mitigation and Monitoring Plan (3117-06)
July 2012

Cross-Section E

Cottonwood/ Spruce Riparian Forest with Freshwater Channel Wetland



Riparian Forest Trees

Black cottonwood *(Populus balsamifera* ssp. *trichocarpa)* (40%)
Sitka spruce *(Picea sitchensis)* (40%)
Grand fir *(Abies grandis)* (8%)
Red alder *(Alnus rubra)* (5%)
Bigleaf maple *(Acer macrophyllum)* (7%)

Riparian Forest Shrubs/ Ferns

Twinberry *(Lonicera involucrata)* (25%)
Cascara buckthorn *(Rhamnus purshiana)* (15%)
California wax myrtle *(Myrica californica)* (10%)
Thimbleberry *(Rubus parviflorus)* (15%)
Salmonberry *(Rubus spectabilis)* (15%)
Red elderberry *(Sambucus racemosa)* (10%)
Giant chain fern *(Woodwardia fimbriata)* (2%)
Sword fern *(Polystichum munitum)* (4%)
Spreading wood fern *(Dryopteris expansa)* (2%)

Active Channel Edge Riparian Trees*

Pacific willow *(Salix lasiandra)* (15%)
Arroyo willow *(Salix lasiolepis)* (15%)
Sitka willow *(Salix sitchensis)* (15%)
Hooker's willow *(Salix hookeriana)* (15%)
Black cottonwood *(Populus balsamifera* ssp. *trichocarpa)* (10%)
Sitka spruce *(Picea sitchensis)* (10%)
Red alder *(Alnus rubra)* (20%)

*Active channel edge riparian tree species will vary through the reach based on bioengineering approach for higher and lower shear zones.

Active Bench Vegetation** (Freshwater Channel Wetland)

Slough sedge *(Carex obnupta)* (30%)
Common spike rush *(Eleocharis macrostachya)* (30%)
Salvaged plugs *(*native plants only*)* (40%)

**Species planted in isolated areas compatible with active bench habitat elements, such as side channels, alcoves, and backwater areas

Base cross- section is provided by
WINZLER & KELLY

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H. T. HARVEY & ASSOCIATES
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Figure 6
Salt River Ecosystem Restoration Project (3117-06)
July 2012

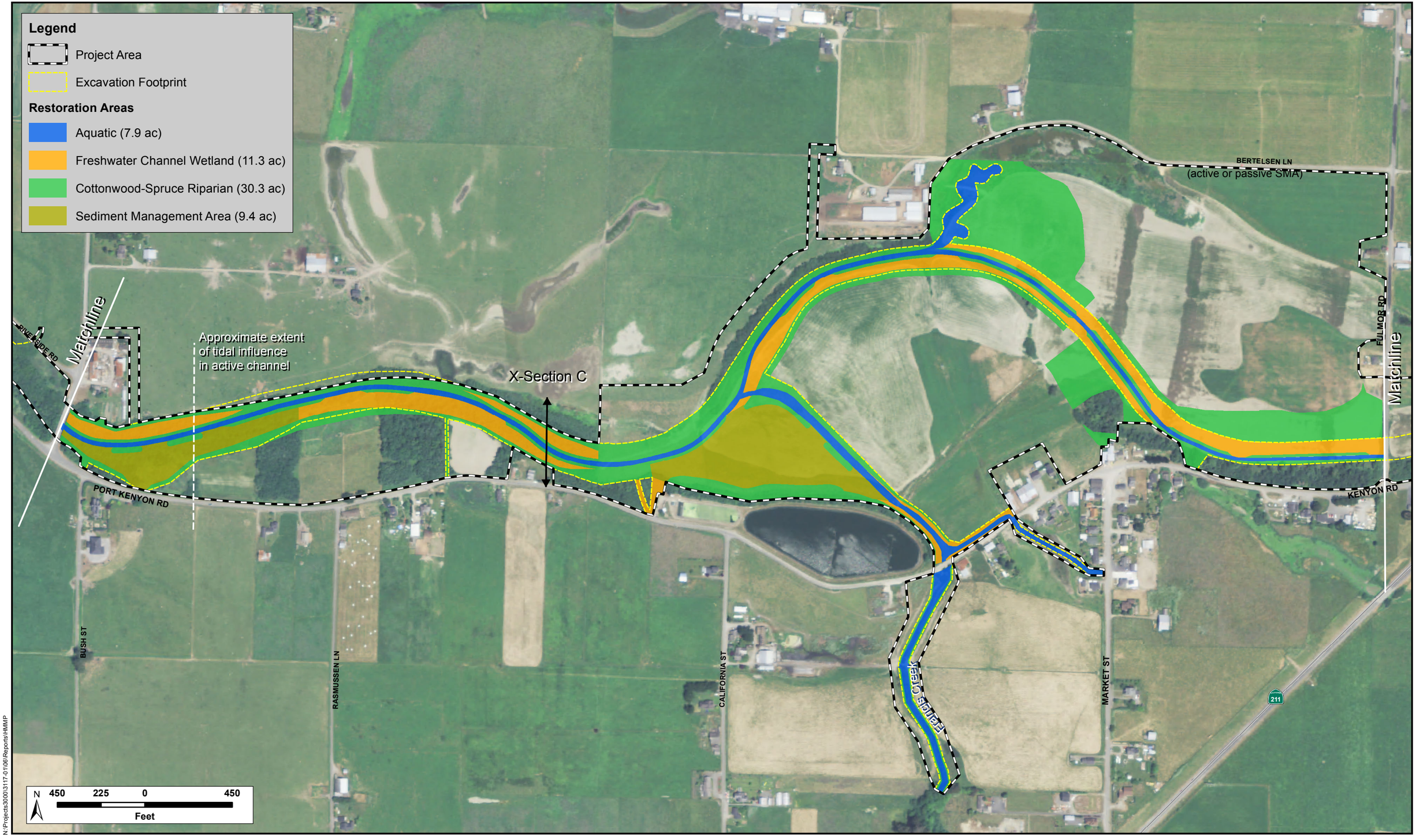

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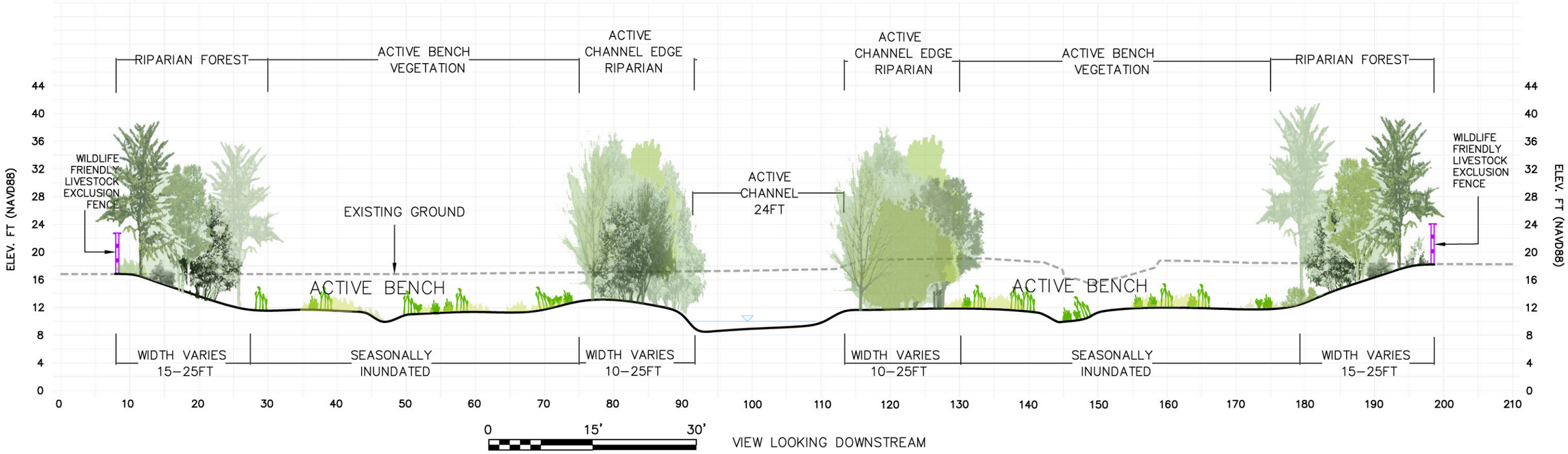
Figure 7: Salt River and Riverside Ranch Restoration Areas: Spruce/Cottonwood Riparian Forest with Freshwater Channel Wetland

Salt River Ecosystem Restoration Project
Habitat Mitigation and Monitoring Plan (3117-06)
July 2012

Cross-Section C

Spruce/ Cottonwood Riparian Forest with Freshwater Channel Wetland



Riparian Forest Trees

Sitka spruce *(Picea sitchensis)* (50%)
Black cottonwood *(Populus balsamifera* ssp. *trichocarpa)* (35%)
Grand fir *(Abies grandis)* (5%)
Red alder *(Alnus rubra)* (5%)
Bigleaf maple *(Acer macrophyllum)* (5%)

Riparian Forest Shrubs/ Ferns

Twinberry *(Lonicera involucrata)* (15%)
Cascara buckthorn *(Rhamnus purshiana)* (10%)
California wax myrtle *(Myrica californica)* (15%)
Thimbleberry *(Rubus parviflorus)* (15%)
Salmonberry *(Rubus spectabilis)* (15%)
Red elderberry *(Sambucus racemosa)* (20%)
Mosquito fern *(Azolla filiculoides)* (2%)
Giant chain fern *(Woodwardia fimbriata)* (2%)
Sword fern *(Polystichum munitum)* (4%)
Spreading wood fern *(Dryopteris expansa)* (2%)

Active Channel Edge Riparian Trees

Pacific willow *(Salix lasiandra)* (10%)
Arroyo willow *(Salix lasiolepis)* (10%)
Sitka willow *(Salix sitchensis)* (10%)
Sitka spruce *(Picea sitchensis)* (30%)
Black cottonwood *(Populus balsamifera* ssp. *trichocarpa)* (20%)
Red alder *(Alnus rubra)* (30%)

Active Bench Vegetation* (Freshwater Channel Wetland)

Slough sedge *(Carex obnupta)*
Common spike rush *(Eleocharis macrostachya)*
Salvaged plugs *(*native plants only*)*

*species planted in isolated areas compatible with active bench habitat elements, such as side channels, alcoves, and backwater areas

Base cross- section is provided by
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Figure 8
Salt River Ecosystem Restoration Project (3117-06)
July 2012

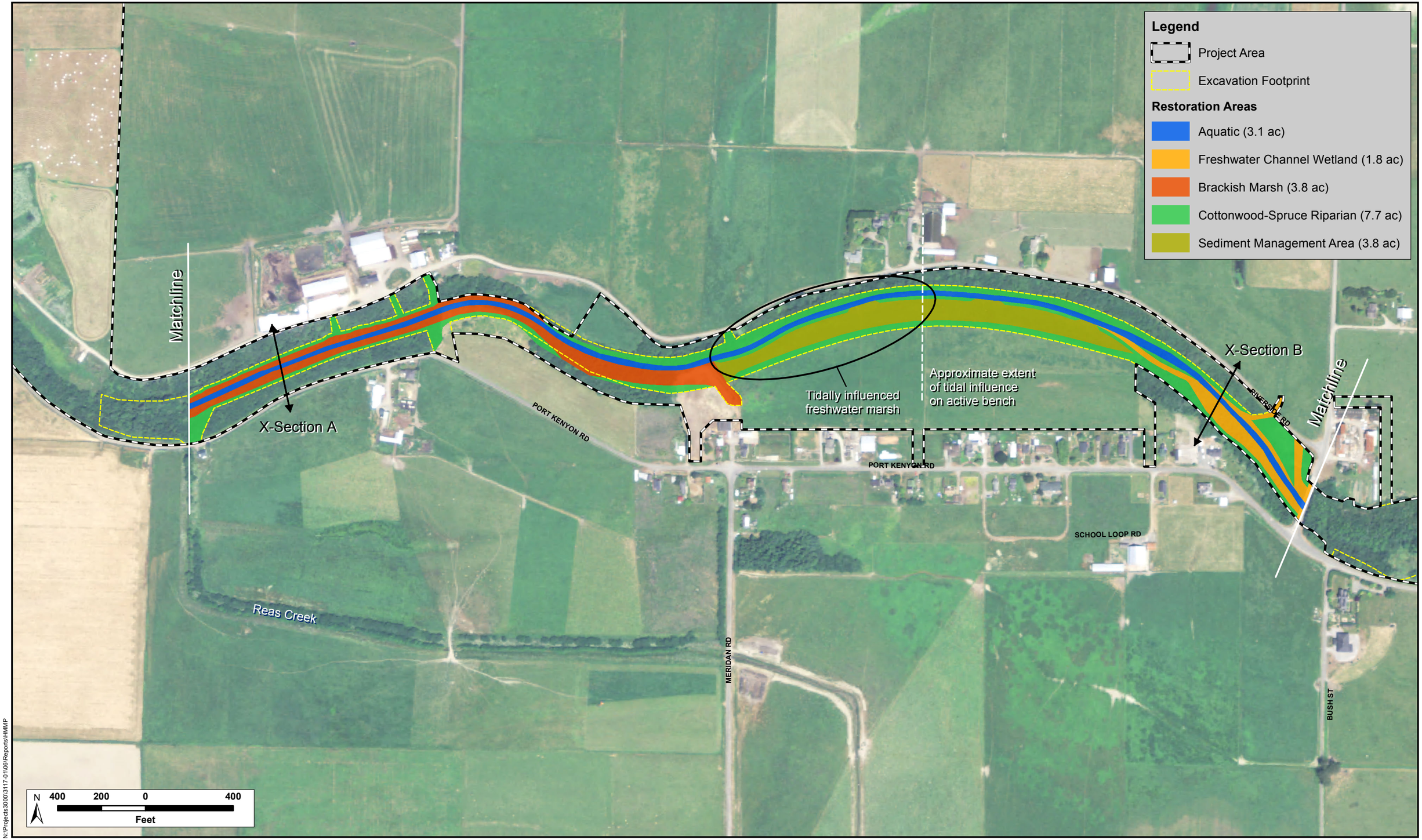

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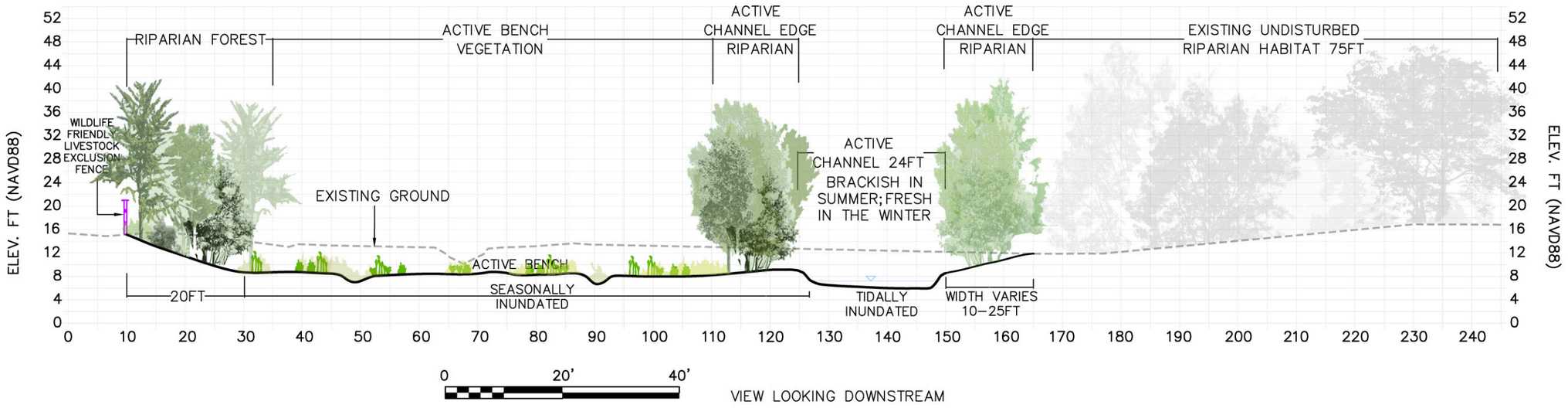
Figure 9: Salt River and Riverside Ranch Restoration Areas: Spruce Dominated Riparian Forest with Brackish Marsh & Freshwater Channel Wetland

Salt River Ecosystem Restoration Project
Habitat Mitigation and Monitoring Plan (3117-06)
May 2011 (Revised July 2012)

Cross-Section B

Spruce/ Cottonwood Riparian Forest with Freshwater Channel Wetland



Riparian Forest Trees

Sitka spruce *(Picea sitchensis)* (50%)
Black cottonwood *(Populus balsamifera* ssp. *trichocarpa)* (30%)
Grand fir *(Abies grandis)* (8%)
Red alder *(Alnus rubra)* (5%)
Bigleaf maple *(Acer macrophyllum)* (7%)

Riparian Forest Shrubs/ Ferns

Red currant *(Ribes sanguineum)* (15%)
Twinberry *(Lonicera involucrata)* (15%)
Cascara buckthorn *(Rhamnus purshiana)* (15%)
California wax myrtle *(Myrica californica)* (5%)
Thimbleberry *(Rubus parviflorus)* (10%)
Salmonberry *(Rubus spectabilis)* (10%)
Red elderberry *(Sambucus racemosa)* (20%)
Mosquito fern *(Azolla filiculoides)* (2%)
Giant chain fern *(Woodwardia fimbriata)* (2%)
Sword fern *(Polystichum munitum)* (4%)
Spreading wood fern *(Dryopteris expansa)* (2%)

Active Channel Edge Riparian Trees*

Sitka willow *(Salix sitchensis)* (40%)
Hooker's willow *(Salix hookeriana)* (30%)
Arroyo willow *(Salix lasiolepis)* (30%)

*Active channel edge riparian tree species will vary through the reach based on bioengineering approach for higher and lower shear zones.

Active Bench Vegetation** (Freshwater Channel Wetland)

Slough sedge *(Carex obnupta)* (30%)
Common spike rush *(Eleocharis macrostachya)* (30%)
Salvaged plugs *(native plants only)* (10%)

**Species planted in isolated areas compatible with active bench habitat elements, such as side channels, alcoves, and backwater areas.

Base cross- section is provided by
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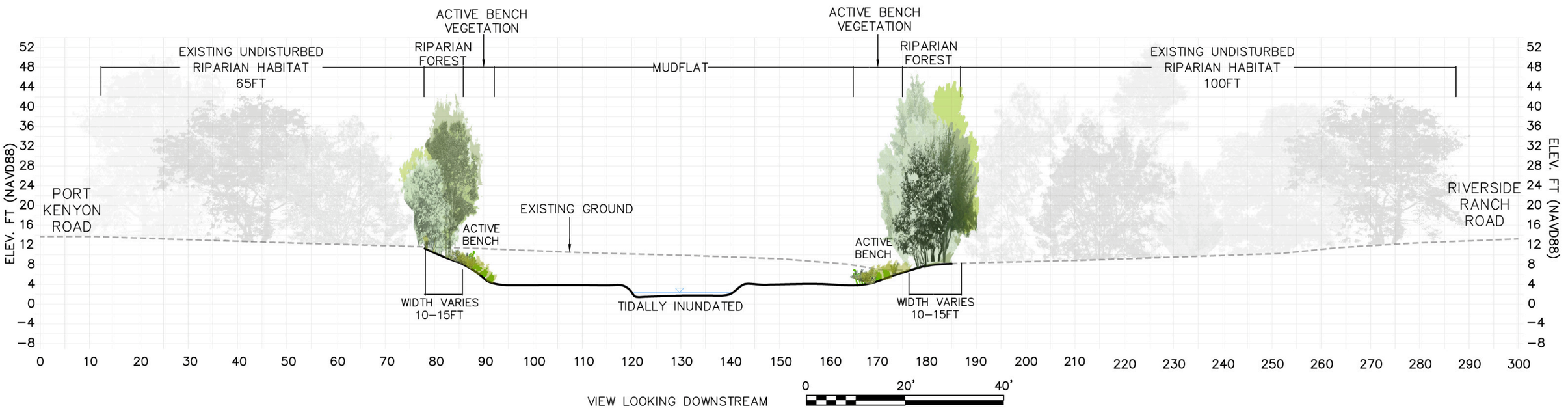
Figure 10
Salt River Ecosystem Restoration Project (3117-06)
July 2012

Cross-Section A

Spruce Dominated Riparian Forest with Tidal Brackish Marsh



Riparian Forest Trees

Sitka spruce *(Picea sitchensis)* (75%)
Red alder *(Alnus rubra)* (10%)
Sitka willow *(Salix sitchensis)* (15%)

Riparian Forest Shrubs/ Ferns

California wax myrtle *(Myrica californica)* (40%)
Twinberry *(Lonicera involucrata)* (30%)
Coyote brush *(Baccharis pilularis)* (30%)

Active Bench Vegetation (Tidal Brackish Marsh)

Tufted hairgrass *(Deschampsia cespitosa)* (30%)
Lyngbye's sedge *(Carex lyngbyei)* (natural recruitment)
Alkali bulrush *(Bolboschoenus maritimus)* (30%)
Salvaged plugs *(*native plants only*)* (40%)

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Figure 11
Salt River Ecosystem Restoration Project (3117-06)
July 2012

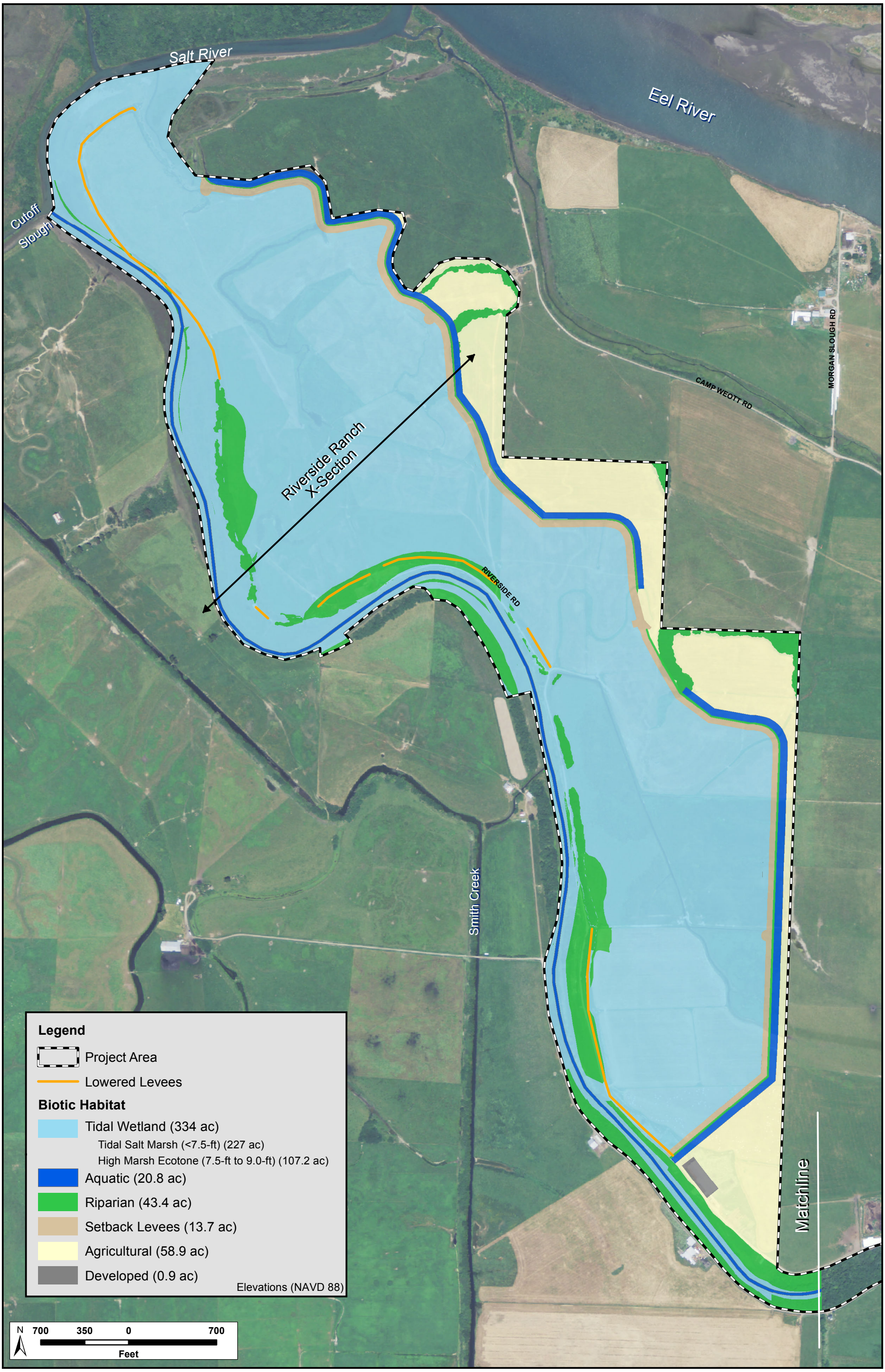

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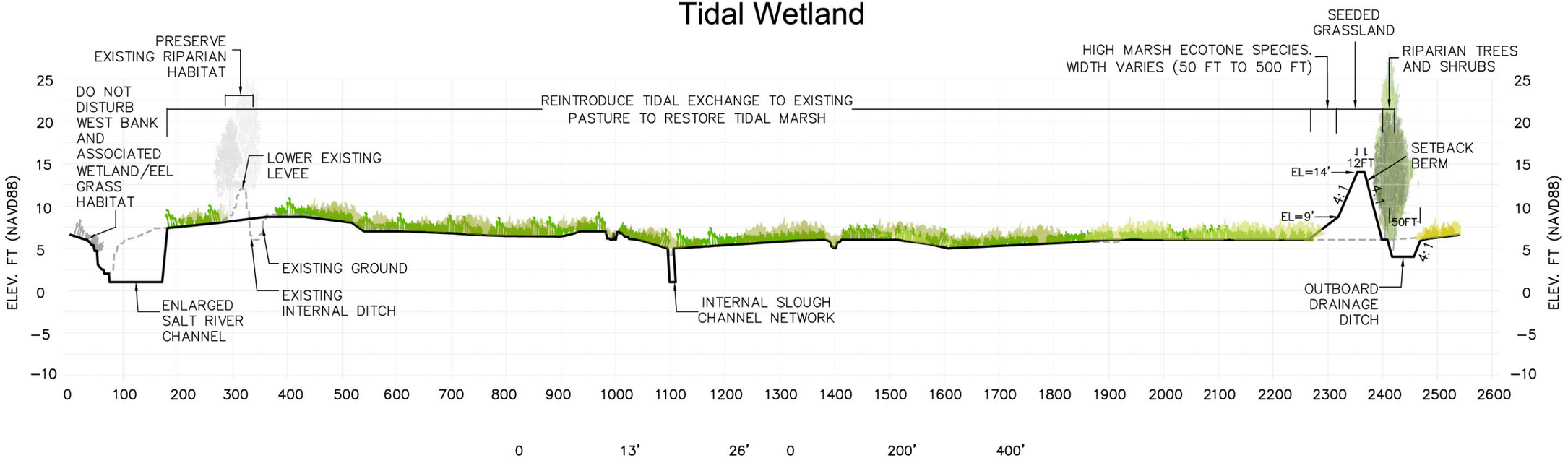
Figure 12: Salt River and Riverside Ranch Restoration Areas: Tidal Salt Marsh

Salt River Ecosystem Restoration Project
Habitat Mitigation and Monitoring Plan (3117-06)
July 2012

Riverside Ranch Cross-Section

Tidal Wetland



0 13' 26'
VERTICAL SCALE

0 200' 400'
HORIZONTAL SCALE

Riparian Trees

Sitka spruce *(Picea sitchensis)* (45%)
Shore pine *(Pinus contorta)* (25%)
Sitka willow *(Salix sitchensis)* (15%)
Hooker's willow *(Salix hookeriana)* (15%)

Riparian Shrubs

California wild rose *(Rose californica)* (25%)
California blackberry *(Rubus ursinus)* (25%)
Coyote brush *(Baccharis pilularis)* (25%)
California wax myrtle *(Myrica californica)* (25%)

Tidal Salt Marsh Plain Species (expected natural recruitment)

Pickleweed *(Sarcocornia pacifica)*
Lyngbye's sedge *(Carex lyngbyei)*
Saltgrass *(Distchlis spicata)*
Jaumea *(Jaumea carnosa)*
Slender arrowgrass *(Triglochin* ssp.*)*
Gumplant *(Grindelia stricta)*
Spearscale *(Atriplex patula)*

High Marsh Ecotone Species

Saltgrass *(Distchlis spicata)* (20%)
Jaumea *(Jaumea carnosa)* (20%)
Slender arrowgrass *(Triglochin* ssp.*)* (20%)
Gumplant *(Grindelia stricta)* (20%)
Marsh rosemary *(Limonium californicum)* (20%)

Base cross- section is provided by
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Figure 13
Salt River Ecosystem Restoration Project (3117-06)
July 2012

bank stability, promote sediment deposition and natural levee formation adjacent to the active channel, and provide vegetation cover and shading once established. This bioengineering approach provides quick vegetation establishment benefiting bank stability, desirable roughness characteristics and riparian habitat. The active channel will contain summer base flows and high flow capacity that will be exceeded approximately 60 to 70 days/year, limiting woody vegetation to those species that can tolerate frequent inundation. Unvegetated segments along the banks of the active channel are proposed to allow hydraulic connectivity to the active bench. Flow will be allowed to exit onto the active bench as well as reenter the active channel encouraging deposition and the formation of side channels and topographic diversity on the active bench. Sustained flow velocities in the active channel are intended to impede colonization of woody vegetation that could promote aggradation. However, some natural recruitment of woody vegetation is anticipated to occur in the active channel and shall be monitored, and removed if necessary. The monitoring and adaptive management of the channel are described in the project's AMP (H. T. Harvey & Associates 2011a). Although there is considerable uncertainty regarding the persistence of the constructed active channel, removal of sediment from the active channel is not anticipated to be necessary.

Active Bench

Flows exceeding the active channel capacity will occupy the active bench, providing an area for sediment deposition, morphological diversity outside of the active channel and the establishment of vegetation and wildlife habitat. The active bench is anticipated to be a highly dynamic interface between the active channel and the floodplain. Topographic diversity will be graded into the active bench to both create slower water areas for deposition as well as low-flow constrictions that promote scour of side channels and allow return of flow back into the active channel. Vegetation throughout the active bench will be managed in and around sediment management areas to ensure the desired channel morphology and hydraulics, to establish and maintain function, and to avoid disruptions to flow conveyance within the active sediment management areas. Outside of active sediment management areas, natural recruitment of woody vegetation is anticipated on the active bench and will be maintained and managed pursuant to the channel design intent per the AMP. Vegetation within the active channel will be managed per the AMP to ensure that significant vegetation establishment does not limit the hydraulic and geomorphic function.

Multi-function Active Bench Habitat Elements

Multi-function habitat elements (elevated vegetated berms, engineered log jams (ELJs), high flow pathways, backwater slough alcoves, areas of seasonal ponding and in-stream wood structures) are integrated into the channel corridor design with the intent to provide habitat and morphologic benefit consistent with the project goals and objectives. These elements will be situated at the interface between the active channel and the active bench, providing opportunities to diversify aquatic habitat, increase morphological complexity and either promote or discourage sedimentation on the active bench. Such elements will also be used to force flow into passive and active sediment management areas and backwater slough alcoves. Depending on their placement and intended purpose, these elements will create aquatic

habitat by creating pools, cover, and areas suitable for macro-invertebrates and refugia for fish and amphibians.

Sediment Management Areas

Over time it is expected that sediment inputs to the mainstem Salt River will be reduced through implementation of erosion control and sediment trapping activities in the upper watershed. Nevertheless, the sediment load is high, and necessitates active management for the foreseeable future. Therefore, there are three active sediment management areas in the upper reaches of the project area. Sediment will periodically be removed from these areas in the summer when disturbance of the aquatic habitat can be minimized and access is facilitated. These areas will provide interim habitat values in between sediment removal activities; such as temporary salmonid refugia in the winter, and in the summer the grasslands will provide foraging for avian species such as white-tailed kite and northern harrier.

Riverside Ranch Tidal Wetland

The Riverside Ranch restoration will re-establish intertidal wetland habitat to the Eel/Salt River Estuary. The increase in tidal exchange associated with a restored marsh will also help sustain a restored Salt River channel. Restoring tidal prism to the lower Salt River, (i.e., increasing the volume of water exchanged on each tidal cycle) increases channel scour and helps maintain and equilibrate the width and depth of the channel. Figure 12 shows a plan view and Figure 13 shows a cross-section of the restoration areas.

Habitat Restoration Design by Reach

Within the project footprint all available and suitable areas have been utilized to maximize the acreage of wetland and riparian habitat that can be created. Existing infrastructure such as roads, bridges, and agricultural facilities limit corridor alignment variable width options. Where feasible, the corridor alignment avoids contiguous stands of adjoining mature riparian forests to minimize temporal impacts while maximizing riparian widths within the constrained landscape. The sub-sections below summarize the revegetation approach, organized on a reach basis.

Cottonwood/Spruce Riparian Forest with Freshwater Channel Wetland (Figures 5 and 6)

This upper reach of the project area has no tidal influence and therefore all proposed plant species are freshwater species. The land available for restoration is fairly narrow compared with downstream reaches. Riparian forest will be established on the upper parts of the slopes that rise up from the active bench; species will include black cottonwood, Sitka spruce, grand fir, red alder, and big leaf maple (see cross-section for percent composition of each species). As the larger stature evergreen Sitka spruce trees develop they will shade out naturally recruiting willow, which will limit the development of undesirable willow thickets onto the active bench where they could limit flow conveyance. Native shrubs and ferns will be installed to provide understory cover (see cross-section for proposed species). Native species expected to naturally recruit on the upper slope include pacific willow, Sitka willow, sandbar willow, arroyo willow, California blackberry, wild rose, and common horsetail.

The active bench is designed to support low growing native freshwater wetland plants such as slough sedge and spike rush. It is expected that willow will recruit on this bench but these will be periodically managed on an as-needed basis per the AMP.

A strip of active channel edge riparian will also be established to promote a succession of woody riparian species. This vegetation will provide shading of the aquatic habitat, help shade out invasive reed canarygrass, protect the banks from erosion during flood events, and promote scour of the active channel. The approach incorporates the reuse of onsite native plant material and woody vegetation for the use in various bioengineering techniques such as sod mat and brush bundles applied to the toe of the active channel. These treatments provide immediate bank stability upon installation and for several years post construction. Live willow stakes from onsite stock will be incorporated into the bioengineered bank thru the higher shear zones providing additional bank stability and early succession canopy over the active channel. The active channel edge zone will also include planting of alders and spruce on the adjoining active channel berms to provide late successional canopy designed to suppress willow growth in the long-term while maintaining a defined active channel.

Spruce/Cottonwood Riparian Forest with Freshwater Channel Wetland (Figures 7 and 8)

This reach of the project is predominantly influenced by freshwater, but the lower section within 500 ft upstream of Dillon Road is subject to tidal inundation in the active channel, but not onto the active bench. The land available for restoration becomes considerably wider in this reach, ranging as high as 500+ ft in width for riparian forest and channel areas. The plant species proposed for the riparian forest in this reach are identical to those cited above under Cottonwood Spruce Riparian Forest with Freshwater Channel Wetland, but the percent composition of the species is shifted to establish Sitka spruce as the dominant tree species. The shrubs and fern palette is very similar with minor adjustments (see cross-section for full plant palette).

The active bench will be vegetated in isolated areas with freshwater channel wetland species such as slough sedge and spike rush and where scour and deposition are anticipated to be minimal. Naturally recruiting woody vegetation on the active bench will be maintained per the AMP.

An ecologically valuable active channel edge riparian habitat element has been added to the design and referred to as the active berm. Shown in the cross-section, this is where riparian strips will be established immediately adjacent to the active channel to provide channel shading, stabilize the channel banks and induce sediment accumulation on natural levees along each side of the channel. These natural levees or active berms will vary in elevation, with the higher elevations receiving inundation approximately 5-10 days per year; this modest level of inundation allows for the planting of Sitka spruce, alder, and cottonwood intermixed with the willow plantings. As these natural levees aggrade over time and the inundation period decreases even further, additional plantings of Sitka spruce and other compatible species can be installed to gradually establish a dense evergreen riparian corridor that will limit willow establishment and also shade out reed canarygrass.

Spruce/Cottonwood Riparian Forest with Freshwater Channel Wetland(Figures 9 and 10)

Figure 9 provides an overview of this habitat area as well as the one described immediately below; this is an important transition zone in the project area, where a purely freshwater influenced setting transitions to an area with tidal influence and brackish water. In this habitat area there is tidal influence on the active bench up to a point approximately 1800 ft downstream of the Dillon Road Bridge (under the matchline in Figure 9). There is no cross-section for the area with a tidally influenced bench. . Within the area of tidal influence the channel will be fresh in the winter and brackish in the summer. The inundation regime for the channel and bench are largely influenced by tidal backwater effects on freshwater flows in the Eel River. An upstream portion of that tidally influenced area remains freshwater wetland as the water levels are affected by the tides but there is minimal mixing of fresh and brackish waters. Figure 10 (cross-secton B) is a cross-section placed just below the bridge. In the vicinity of that cross-section the plant species to be installed and expected to recruit remain the same as in the reach upstream .

Spruce Dominated Riparian Forest with Brackish Marsh (Figures 9 and 11)

Cross-section A for the downstream portion of this reach has several notable changes from upstream areas. First, a substantial width and acreage of existing riparian will be preserved on both sides of the channel, providing an average riparian corridor width of approximately 280 feet (ft). The outer slopes will be planted with Sitka spruce, red alder and Sitka willow and a mix of native shrubs and ferns. A small fringe of brackish marsh will be established along the lower outer slope, and a mudflat will occupy the active bench. The channel and active bench will be tidally influenced and inundated 60-70 days per year.

Riverside Ranch Tidal Salt Marsh/Riparian Forest (Figures 12 and 13)

The restored tidal salt marsh reach of the Salt River (from below Reas Creek to Cutoff Slough) is intended to accommodate optimal tidal exchange to restore wetlands in Riverside Ranch as well as provide flood flow conveyance. The channel will be sized for unrestricted tidal exchange of the restored wetland tidal prism, having a characteristic tidal channel shape with relatively steep (1.5:1; H:V) side slopes. Channel dimensions (width, depth and area) decrease in an upstream direction in response to reduced tidal prism volumes. The channel is designed to maximize tidal amplitudes through the reach to the Riverside Ranch inlet channels. This reach is also designed to maintain naturally high flow velocities during both neap and spring tides to maintain channel equilibrium morphology. The channel will experience increased tidal influence, and the regular wetting and drying cycles, associated scour velocities and increased salinity will promote the establishment of salt and brackish marsh vegetation further upstream in the Salt River. The channel has also been designed to maintain a range of water depths which are anticipated to be suitable for eelgrass colonization.

The channel will be excavated into the existing Salt River alignment, maintaining the historic channel sinuosity and adjacent marsh habitat. Tides at and above MHHW will overtop the central tidal channel, flowing onto the adjacent marshplain. Natural recruitment of tidal

marsh vegetation is anticipated on the adjacent marshplain after construction. The Salt River tidal salt marsh reach was designed as an equilibrium channel and is not intended to erode or aggrade substantially after construction, therefore on-going removal of sediment from this reach is not anticipated.

The Riverside Ranch component will restore tidal marsh habitat to create extensive habitat improvements and ecological benefits to numerous fish, wildlife and wetland plant species. This effort entails restoring tidal exchange from the Salt River tidal salt marsh reach into Riverside Ranch through removal of levees and excavation of connector and internal slough channels. Restoring tidal wetlands to the Ranch will significantly increase the volume of water exchanged on each tidal cycle (tidal prism) between the restored wetland and the Eel River estuary. This will result in higher flow velocity and increased tidal scour that will maintain the newly restored morphology of the Salt River. Thus, the two main connections between restored marsh and the Salt River channel are strategically located to maximize the length of Salt River tidal channel exposed to increased tidal prism. Restoration efforts also include significant grading of internal Ranch areas to eliminate existing drainage ditches, create more natural sinuous channel networks, and increase micro-topography for distinct marsh habitat zones. The project also involves constructing a new setback berm to project adjacent properties from tidal inundation with an outboard drainage ditch to maintain the current level of drainage from surrounding properties. Before the setback berm is constructed, the top 6 inches of the berm footprint and any nearby graded areas will be excavated from the surface and stockpiled to provide a source of seed and organic rich topsoil. After grading is complete, the stockpiled soil will be re-spread and disked over the surface of the berm (and any higher elevation filled areas) in order to provide a source of native seed and organic matter, and to augment the seeding in these areas. Any agricultural areas and/or potentially erosional areas not adequately covered with the stockpiled topsoil may still receive a treatment with an erosion control seed mix.

Because the existing elevations within Riverside Ranch are relatively high (majority of the site is between mean tide level and mean higher high water), it is anticipated that low- to high-marsh habitats (occupying elevations ranging from mean tide level (MTL) through and above mean higher high tide level (MHHW)) will establish rapidly after restoration is complete. The only subtidal (below MTL) habitat inside Riverside Ranch will be restricted to the internal slough channels. Elevations to accommodate upland ecotone habitat will be maintained and created at selected locations around the perimeter of the restored marsh. The main connector channels to the Salt River along with internal slough channels are sized to optimize tidal exchange and maintain adequate flow velocity and scour to flush sediments out of the marsh through tidal action if deposited within the marsh channels during storms.

Based on monitoring and modeling data, it is anticipated that these reaches will experience very low salinity through the rainy season, transitioning through brackish conditions and into high/marine salinities by early summer through late fall period, mirroring the salinity signature and seasonal cycle of the Eel River estuary (H. T. Harvey & Associates 2009). It is anticipated that a mix of salt and brackish marsh vegetation will naturally recruit and colonize Riverside Ranch based on seasonal inundation and salinity patterns. Features will be designed to create tidewater goby habitat that mute tides and retain water at all tides, yet

are hydraulically connected: these habitat features include confluence pools, natural topographic features (terminal ponds, pannes), and earthen sills within main channels that provide slack water. The majority of the internal slough channels are also designed to provide adequate water depths and conditions for eelgrass recruitment.

The setback berms will be offset from the property boundary to allow for continued grazing access to approximately 75 ac of contiguous agricultural land along the southeast portion of the property, and aligned to avoid impacting existing willow habitat. The creation of upland transition habitat is balanced with the ability to take full advantage of the restored tidal prism and promote salt marsh development.

Two areas on Riverside Ranch in the vicinity of the new breaches will be graded to elevations at or below MHW to provide additional drainage from the property and to enhance the tidal prism in the upstream portions of the adjacent Salt River. Additional habitat features include the retention of a grassland area with seasonal wetland characteristics in the northeast corner adjacent to a significant thicket of mature willows. This area will be grazed and managed for Aleutian cackling geese.

Projected habitats include the riparian habitat planting areas (Sitka spruce, shore pine, and alder) to restore historic Salt River Delta forested habitat on the Riverside Ranch property. Preservation of existing willow habitat on-site will also maintain habitat values for avian species.

The HCRCD and CDFG have an MOU in place for administering leases on CDFG lands. The project will retain land specifically for agricultural use to enhance short grass habitat. This area is located outside of the tidally restored areas, on the outboard side of the setback berm. This area provides a contiguous area of approximated 75 ac that can be used for grazing and provides a habitat enhancement opportunity for Aleutian cackling goose.

The plan view for Riverside Ranch is shown in Figure 12 and the cross-section is depicted in Figure 13. The cross-section is adjacent to Riverside Ranch and depicts the trapezoidal shaped channel, and the marsh plain that extends to a new setback berm. This interior area of Riverside Ranch is presently dominated by pastures with a salt marsh fringe on the outboard side of the berm. Once a tidal connection is re-established, the newly vegetated portions of the restored ranch will be dominated by naturally recruiting tidal salt marsh species including slough sedge, pickleweed, salt grass, slender arrowgrass, fat hen, jaumea, gumplant and sand spurry. Other naturally recruiting species that may occur include Lyngbye's sedge, common rush and common spike rush. The higher elevation salt marsh will be monitored to determine whether it is developing the diversity representative of native high marshes in Humboldt County estuaries. If necessary, planting may occur in this area to augment natural recruitment and to increase the diversity of salt marsh species. Plantings could include salt marsh species such as gumplant, saltgrass, jaumea, seaside arrowgrass, and sea lavender.

Dense-flowered cordgrass is also likely to colonize this area and ongoing maintenance will be necessary to control the spread of any existing cordgrass plants and to limit the establishment of this species after construction activities are completed. Dense-flowered

cordgrass management is described in the Maintenance Plan of this MMP and in the AMP (H. T. Harvey & Associates 2011a).

Fish and Wildlife Use

Cottonwood/Spruce Riparian Forest with Freshwater Channel Wetland

Bird and terrestrial wildlife species that are expected to occur in the cottonwood/spruce riparian forest are similar to those that are expected to occur in the spruce dominated riparian forest (see below). However, the addition of cottonwood to the association enhances the habitat value for some riparian associates such as the yellow warbler and Bullock's oriole and will support long-term nesting habitats for raptors. Raptor nesting habitat is a limiting factor in the Eel River Valley.

When inundated the low-gradient freshwater wetland is expected to provide rearing habitat for juvenile salmonids and other freshwater species as described above. Riparian vegetation along the floodplain will slow velocities and provide overwintering refuge for juvenile salmonids during high flows. The freshwater reach will improve/reconnect access to approximately 15 miles of salmonid spawning and rearing habitat in Reas, Francis and Williams Creeks (Downie and Lucey 2005). Backwater alcoves and active bench depressions will provide northern red-legged frog habitat and winter refuge habitat for juvenile salmonids.

Spruce/Cottonwood Riparian Forest with Freshwater Channel Wetland

Bird and terrestrial wildlife species that are expected to occur in the spruce/cottonwood riparian forest are similar to those that are expected to occur in the spruce dominated riparian forest.

The tidally influenced freshwater channel wetlands are expected to provide important overwintering habitat for juvenile coho and Chinook salmon, steelhead, and cutthroat trout, as has been observed in restored freshwater tidal ecotones of Humboldt Bay (Wallace and Allen 2009) and in other restored estuaries of the Pacific Northwest (Miller and Simenstad 1997, Simensted and Cordell 2000, Koski 2009). Juvenile coho salmon in particular have been found using low gradient freshwater tidal habitats to overwinter after high winter flows. Freshwater species also likely to occur include prickly sculpin, stickleback, Sacramento sucker (*Catostomus occidentalis*), California roach (*Lavinia symmetricus*), and Sacramento pikeminnow (Downie and Gleason 2007).

Spruce Dominated Riparian Forest with Brackish Marsh

The spruce dominated riparian forest is expected to provide habitat for bird species such as the golden-crowned kinglet (*Regulus satrapa*), brown creeper (*Certhia americana*), gray jay (*Perisoreus canadensis*) and hermit warbler (*Dendroica occidentalis*). Neotropical migrants may also occur in the spruce dominated riparian forest, including some that likely breed on the site (e.g., Bullock's oriole), some that would occur primarily during migration (MacGillivray's warbler), and some that would occur during the winter months (golden-

crowned sparrow). Bird species expected to occur as residents in this habitat type include the black-capped chickadee, and summer breeding residents such as Swainson's thrush, Wilson's warbler, yellow warbler, and Bullock's oriole. The willow flycatcher, listed by the State of California as endangered, may occur as a summer resident or breeder, although occurrences have been very rare in the project area (Harris 2006, Hunter et al. 2005, Winzler & Kelly 2010b). In addition to birds, the riparian forest could provide habitat for reptile species such as the northern alligator lizard, western terrestrial garter snake, and common garter snake, amphibian species such as the Pacific treefrog, northern red-legged frog, and California slender salamander and mammal species, such as black-tailed deer (*Odocoileus hemionus*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), and a variety of shrews, moles, voles (*Microtus* sp.), and mice (*Peromyscus* sp.).

The brackish marsh is expected to provide overwintering habitat for juvenile salmon rearing and important transition habitat for outmigrating juvenile Chinook and coho salmon as they move from freshwater to the ocean (Bottom et al. 2005; Miller and Sadro 2003). In the lower Eel River Estuary this zone typically is brackish but slightly stratified, with saltier water at the bottom and fresher water at the surface (H. T. Harvey & Associates 2009); in the winter it tends to be fresher and in the summer more saline with decreasing freshwater flows. These habitats tend to be used more seasonally, preferred by freshwater species in the winter and marine assemblages in the summer (Downie and Gleason 2007).

Federally endangered tidewater gobies have been observed in small quiet pools (i.e., 4-5 m diameter) downstream of tide gates adjacent to the Salt River channel in Riverside Ranch (USFWS 2010). Thus, tidewater gobies could occur in the brackish marsh if it contains features such as seasonally disconnected, low-velocity, off-channel, or tidally muted slough channels and swales (Chamberlain 2006).

Riverside Ranch Tidal Salt Marsh/Riparian Forest

Tidal salt marsh is expected to provide habitat for shorebirds, herons, rails, waterfowl, raptors, and gulls, and could support breeding for some of these species. Tidal salt marsh is also expected to provide year-round habitat, and possibly breeding habitat, for passerine bird species such as the song sparrow and marsh wren. A number of other passerine birds will likely occur as seasonal transients in the tidal salt marsh and adjacent riparian forest, including red-winged blackbird, yellow warbler, yellow-rumped warbler, Lincoln's sparrow, white-crowned sparrow, and golden-crowned sparrow. Special-status species that could use the tidal salt marsh as habitat include the northern harrier and short-eared owl. Mammals that could occur in the tidal salt marsh include the California vole and white-footed mouse, both native species, as well as Old World introduced murids (rats and house mouse). The grassland area with seasonal wetland characteristics that will be retained in the northeast corner of Riverside Ranch is expected to provide foraging habitat for Aleutian cackling geese.

Tidal salt marsh may also provide habitat for estuarine and marine fish species, and transition habitat for out-migrating or over-wintering juvenile salmonids. Based on the species assemblages that occur in the lower Eel River Estuary (Downie and Gleason 2007), fish species that could occur in the restored tidal salt marsh include the longfin smelt, listed as

threatened by the State of California, as well as a host of marine fish species including herring, sardine, anchovy, top smelt, staghorn sculpin, surfperches, English sole, and starry flounder. Juvenile Dungeness crab are also likely to use restored tidal salt marsh habitat as a nursery area.

Federally endangered tidewater gobies and juvenile coho salmon have been observed in small quiet pools (i.e., 4-5 m diameter) downstream of tide gates adjacent to the Salt River channel in Riverside Ranch (USFWS 2010). Thus, tidewater gobies could occur in the restored tidal salt marsh if it contains created features such as seasonally disconnected, low-velocity, off-channel, or tidally muted slough channels and swales (Chamberlain 2006; Winzler & Kelly 2010d). Some habitat types specifically created for gobies and juvenile salmonids are likely to provide short-term value, however, these habitats will adjust over time as the marsh evolves and responds to natural processes such as scour, deposition and sea level rise. It is anticipated that as the marsh evolves, some created habitat may lose value but other habitats will persist and provide long term benefits for these species. Ultimately, the restoration of Riverside Ranch and increased hydrologic connectivity throughout this reach of the Salt River will improve the functions and values of the habitat to these and other important fish species.

RESTORATION TIMELINE

It is anticipated that hydrologic and aquatic functions in the Salt River will be fully restored in 15-25 years; the new channel will function hydrologically as soon as construction is completed (e.g., it will convey the design flow within the channel). However, full aquatic habitat functionality will not be supported until forested streamside vegetation approaches maturity, which is anticipated to take 15-25 years. Estuarine habitat at Riverside Ranch is likely to be functioning hydrologically as soon as tidal circulation is restored, but full restoration of aquatic habitat functions is expected to gradually establish over 5-10 years.

RESTORED HABITATS

The Salt River Ecosystem Restoration project is projected to result in increases of 290 ac of new tidal wetland habitat, 12 ac of high marsh ecotone, 24 ac of additional aquatic and mudflat habitat, 31 ac of riparian forest/scrub habitat, and 8 ac of freshwater channel wetlands (Table 1). The project will also establish 13 ac of Sediment Management Areas that will provide wetland functions and values while the site is developing as well as long-term sustained geomorphic function of the riparian corridor. These habitat gains will come at the expense of about 8 ac of developed areas, as well as agricultural grassland (303 ac), scrub-scrub (8ac), and ruderal (20 ac) habitats (Table 1). However, these tradeoffs in habitat types will result in substantial ecosystem-level benefits and increased hydrologic functioning of the Salt River corridor.

The Salt River is currently flanked by agricultural and urban land. Some characteristics of the Salt River project area include poor water quality and hydrologic disconnectedness, limited habitat access for fish species, and low habitat complexity (for example the riparian habitat is dominated primarily by willow and alder) with a predominance of agricultural grasslands (Winzler & Kelly 2010d). The existing hydrologic conditions include reduced channel flow from high levels of sedimentation with little tidal influence. Benefits related to the restoration

include improvements in: sediment management, hydraulic connectivity with tributary streams, increased acreage of valuable wildlife habitat area, improved habitat connectivity and fish passage, shading of the channel, nutrient inputs, improved and increased fish habitat, and the creation of micro-climates within the different habitat zones.

One of the major components of the project is the restoration of large areas of tidal wetlands within the Eel River Delta, at least 60% of which has been lost over time. Tidal wetlands support a great variety of marsh associated birds including herons, rails, shorebirds, waterfowl and others. Marshes in general and freshwater marshes in particular provide valuable bird habitat because standing water and saturated soil promote a biologically rich environment (Evens and Tait 2005). Estuarine habitats are highly productive systems and marshes within those habitats accumulate high levels of nutrients that encourage prolific plant growth which in turn provides cover for nesting and roosting and provides food resources in the form of invertebrates and seeds. The increase in acreage and diversity of new tidal wetlands, high marsh ecotone, and additional aquatic channels and mudflats will significantly increase habitat functions and values for a wider variety of wildlife species relative to existing conditions, for example birds that forage on macroinvertebrates. By achieving a nearly 15% increase in the size of the Eel estuary, tidal marsh restoration in Riverside Ranch will also provide new habitat suitable for longfin smelt, coho salmon, Chinook salmon, steelhead trout, cutthroat trout, and tidewater goby.

The other significant habitat benefit of the project is the restoration of the Salt River channel, including an increase in the quantity and quality of riparian habitat present in the system. Riparian habitats have been identified as the most important habitats to landbird species in California (RHJV 2004.). They provide habitat for some of the most diverse avian assemblages in North America due to the structural complexity of vegetation, the association with water and typically high prey availability. In addition, many special-status species of birds are riparian associates and riparian habitats provide high quality habitat for a large number of Neotropical migrant birds, of major conservation interest throughout the North, Central and South America, that variously use riparian habitats for breeding, migratory stopover, and wintering. The restoration actions will increase the *diversity* of riparian vegetation within the Salt River riparian corridor and provide numerous terrestrial and aquatic food web benefits that translate into an increase in riparian function. For example, an increase in riparian canopy diversity will provide an increase in the quantity and quality of leaf litter provided to the stream. This leaf litter which decomposes and is broken down by bacteria, fungi, microorganisms, and invertebrates, creates a food source for additional invertebrate species, which in turn, provide a food source for predators such as salmonids. The created riparian corridor will provide increased structure and diversity of riparian tree and plant species and thus support a broader suite of bird species. This increase in the amount and diversity habitat will likely increase the potential for migration and dispersal of additional terrestrial wildlife species than currently use the riparian corridor. The restored riparian channel will also provide an increase in the amount and quality of overwintering and rearing habitat for juvenile coho salmon and other juvenile salmonids (Koski 2009). Freshwater channel habitat above the reach of tidal influence will also be increased and will provide additional overwintering and rearing habitat for salmonids.

The agricultural grassland and ruderal habitats that will be impacted are regionally abundant, highly disturbed habitats and lack the structural complexity and habitat diversity of the wetland

and riparian habitats that will replace them. As such, these highly disturbed habitats support relatively low wildlife species diversity and many if not most of the species that occur in these areas are widespread, common and associated with anthropogenic disturbance.

IMPLEMENTATION PLAN

RESPONSIBLE PARTIES

The HCRCD will be the responsible party for implementing the Salt River Ecosystem Restoration work.

PROJECT PHASING, SITE PREPARATION AND GRADING

Vegetation removal and grading limits will be clearly defined and identified on the final construction plans. Project work areas currently vegetated with native plants will be protected unless they are in areas slated for excavation, fill, access roads or other essential items of work that involve ground disturbance. Protective fencing around trees to remain shall be at the edge of the canopy or greater, unless fencing closer to the trunk is approved by a qualified biologist or arborist as not harmful to the survival/health of the tree. If excavation near very large trees encounters large roots (greater than 3 inches in diameter) a qualified biologist or arborist will be consulted to determine the least harmful manner of cutting and treating the large roots. Existing fences will be utilized as much as practical to protect any habitat areas slated for protection.

In order to avoid take of nesting birds, especially the state-listed willow flycatcher and western yellow-billed cuckoo, surveys for nesting birds will be conducted prior to the start of any removal of riparian vegetation during initial project construction or vegetation maintenance that occurs during the breeding season between March 1 and August 15. Nesting surveys will be conducted by a qualified biologist and will occur no more than one week prior to the initiation of site preparation. If active nests are found during surveys, a 100, 300, or 500-ft buffers (depending on species) will be established around each nest in which no construction activities will occur until nesting is completed (Grassetti Environmental Consulting 2011). The duration of the no-activity exclusion area(s) will be determined in consultation with DFG.

Because the construction of the overall project will occur in two phases in successive years the restoration work will also occur in two related phases (Table 4 and Table 5). The EMMP and Geotechnical and Engineering Geology Report (LACO Associates, 2011) also provides additional detail on construction methods, soils and grading and the construction design plans and specifications will finalize the details. Generally, the excavated soils are relatively homogeneous and versatile and will not require significant segregation to support reuse for specific applications. Given the saline conditions of the estuarine soils within the Riverside Ranch and proximity to proposed Riverside Ranch berms, these materials will be targeted for berm construction. The non-saline soils have similar reuse characteristics and may be considered interchangeable throughout the project area to support the designated reuse opportunities.

The Phase I work for the overall project will include constructing the improvements on Riverside Ranch and excavation of the lower 10,400 ft of the Salt River channel. The saline-sodic soils located within this lower reach of the Salt River can be reused in construction of the new and refurbished berms on Riverside Ranch. Phase 1 will likely also include partial or complete vegetation removal through the channel corridor in the Phase II area.

One variation on the approach to vegetation removal in the Phase II area would be to remove the vegetation from most of the trees and leave the unvegetated portions in place on the floodplain to provide some erosion protection during the winter between Phase I and II. Some of the trees may be moved back from the areas closest to the active channel to minimize the potential for them to move downstream during flood events and create logjams.

Non-native and undesirable weeds will be removed and disposed of at an approved location offsite or deeply buried onsite encapsulated in the toe of the set-back berm. Particular care needs to be taken during the removal and disposal of invasive weeds to ensure that removal activities do not in effect spread the weeds downstream and exacerbate infestations elsewhere. A control plan for dense-flowered cordgrass (*Spartina densiflora*) is currently being prepared by the California Coastal Conservancy and its partners for populations of the species in Humboldt Bay, the Eel River Delta, and the Mad River Estuary. In the long-term, the methods prescribed in that plan shall be used to during any efforts to control dense-flowered cordgrass. During construction, non-native *Spartina* will be removed from all grading areas as one of the first items of work under clearing and grubbing. It will be removed en masse using mechanical equipment, taking care to not spread seed or roots, and either buried onsite or disposed of at a suitable facility offsite.

Live native plant material will be salvaged where possible; to provide material for sod matting, native willow stakes, and active bench plantings. Some of the salvaged woody material may be used as cuttings or live stumps. Live plant material may be held in a moist collection area onsite or offsite if it is in good condition and will be planted within 1-2 months. Specific planning for reuse of salvaged native plant material will be included in the final planting plans and specifications.

The Phase II work for the overall project will include excavation of the remaining Salt River channel including Francis Creek and Eastside Drainage and transporting the excavated material to the beneficial reuse locations. It will also include the removal of remaining vegetation within the work areas. Removed vegetation will either be re-utilized by chipping and spreading as mulch in revegetation areas, incorporated back into the channel or high marsh areas as habitat features, integrated into the bioengineered active channel bank, or disposed of offsite.

SOILS

As described in greater detail in the EMMP (Winzler & Kelly 2010a) and the Geotechnical and Engineering Geologic Report (LACO Associates 2011), the current proposed project involves reuse of excavated soils for the construction of earthen embankments, infilling of existing ditches, and beneficial reuse on nearby agricultural land. Thus some of the restoration area will occur on soils that will have been placed during site grading. The remaining restoration areas will occur on the *in situ* soils.

Table 4. Salt River Ecoysystem Restoration Construction Sequence

ITEM	PHASE 1: RIVERSIDE RANCH TIDAL MARSH RESTORATION	Notes	2/15/11	3/1/11	3/15/11	4/1/11	4/15/11	5/1/11	5/15/11	6/1/11	6/15/11	7/1/11	7/15/11	8/1/11	8/15/11	9/1/11	9/15/11	10/1/11	10/15/11	11/1/11	11/15/11	12/1/11
1	Native seed collection - Lyngbye's Sedge, Humboldt Bay Owl's Clover and if present Point Reyes Bird's Beak																					
			2/15/12	3/1/12	3/15/12	4/1/12	4/15/12	5/1/12	5/15/12	6/1/12	6/15/12	7/1/12	7/15/12	8/1/12	8/15/12	9/1/12	9/15/12	10/1/12	10/15/12	11/1/12	11/15/12	12/1/12
2	Identify and relocate or install temporary exclusions for sensitive species	(3)																				
3	Limited manual removal of *Spartina* in adjoining areas																					
4	Site Preparation (remove existing fencing and watering troughs, demolish and remove existing concrete slab and relocate water line)	(1)																				
5	Remove riparian vegetation within proposed limits of excavation and stockpile on-site for re-use	(1) (2)																				
6	Conduct earthwork internal to Ranch (construct internal slough channels and remain disconnected to Salt River)	(2) (3)																				
			2/15/13	3/1/13	3/15/13	4/1/13	4/15/13	5/1/13	5/15/13	6/1/13	6/15/13	7/1/13	7/15/13	8/1/13	8/15/13	9/1/13	9/15/13	10/1/13	10/15/13	11/1/13	11/15/13	12/1/13
7	Conduct remaining earthwork internal to Ranch after conducting Item 2 above	(2) (3) (4)																				
8	Construct new and refurbished berm and water control structures	(2) (5) (6)																				
9	Install coffer dams, dewater and excavate salt river channel	(2) (7)																				
10	Lower existing levees and fill existing inboard ditches	(2) (4)																				
11	Construct outboard drainage ditch and new berm																					
12	Fill ditches after removing internal water control structures	(7) (8)																				
13	Lower remaining levees to final grade	(9)																				
14	Connect internal channel network to Salt River	(10)																				
15	Seed, mulch and install fencing																					
16	Site Clean-up/rehab temporary roads/final punch list items/demobilization	(11)																				
17	Plant riparian, wetland and upland vegetation per Habitat Mitigation and Monitoring Plan and Revegetation Plans																					

ITEM	PHASE 2: SALT RIVER CHANNEL AND RIPARIAN CORRIDOR RESTORATION	Notes	5/1/13	6/1/13	7/1/13	8/1/13	9/1/13	10/1/13	11/1/13	12/1/13	1/1/14	2/1/14	3/1/14	4/1/14	5/1/14	6/1/14	7/1/14	8/1/14	9/1/14	10/1/14	11/1/14	12/1/14
1	Establish channel corridor access and temporary haul routes	(2) (12)																				
2	Excavate Sediment Management Areas and channel corridor reaches	(2)																				
3	Install coffer dams, divert Francis Creek, Eastside Drainage, Salt River and Williams Creek	(2) (7)																				
4	Excavate Francis Creek, Eastside Drainage and channel corridor reaches	(2) (7)																				
5	Construct agricultural bridge crossings on Francis Creek and Eastside Drainage																					
6	Construct Port Kenyon Road bridge crossing and relocate City of Ferndale sanitary sewer main																					
7	Remove dense riparian vegetation within limits of excavation and stockpile on-site for reuse or haul off-site	(2)																				
8	Excavate remaining channel corridor and relocate Riverside CSD water main crossing	(2)																				
9	Construct instream habitat elements and bioengineered streambank																					
10	Haul excavated sediment to beneficial reuse locations including agricultural uplands																					
11	Seed, mulch and install fencing throughout channel corridor																					
12	Site clean-up/rehab temporary roads/final punch list items/demobilization	(11)																				
13	Plant riparian and wetland vegetation per Habitat Mitigation and Monitoring Plan and Revegetation Plans																					

Notes:

1. Exclude disturbance to existing aquatic habitats including ditches, channels and ponded water areas. Minimize disturbance to Humboldt Bay Owl's Clover and Lyngbye's Sedge (prior to seed collection).
2. Pending results of pre-construction nesting and migratory bird surveys.
3. Pending Dry Conditions and Avoid disturbance to Humboldt Bay Owl's Clover and Lyngbye's Sedge (prior to seed collection), Tidewater Goby Habitat (prior to dewatering), Nesting and migratory birds and Northern Red Legged Frog
4. Transfer non-saline soil between these two activities and pending environmental clearance for dewatering existing ditches.
5. Construct berm using saline soil derived from Salt River channel excavation and local material derived from Item 9.
6. Lower levees to grade that restricts tidal exchange. Initial work to facilitate material hauling associated with Item 9.
7. Start date pending fish relocation
8. Start date pending environmental clearances. Install ditch plugs to segregate work into 300-ft cells.
9. Work to be completed during neap tide period and provide sufficient lead-time to remaining construction.
10. Work to be completed only after all other Items complete.
11. Prior to onset of winter rain.
12. Pending dry conditions - install temporary fencing, gates and stabilized construction entrance/exits from County roads

The bulk of soils within the project area are silty fine sands and sandy silts. Minor amounts of clay, poorly graded sand, and poorly graded fine gravels may exist as discontinuous lenses. Larger volumes of coarse sand and fine gravel may be present within the vicinity of the Francis Creek drainage. All of the soils within the project area represent relatively young soft/loose alluvial deposits. As discussed in the EMMP and the Geotechnical and Engineering Geologic Report the majority of the soils sampled in the project excavation areas were classified as non-saline, but one was saline and 2 were saline-sodic soils. The non-saline soils will provide a suitable revegetation substrate, the saline soil will be suitable if planting follows sufficient rainfall to leach the soluble salts, and the saline-sodic soil will not be spread in any of the restoration areas as it will hinder vegetation establishment. However, it may be used in certain areas of Riverside Ranch to provide fill in projected estuarine habitat.

In general the *in situ* soils do not appear to pose constraints to vegetation establishment. Vegetation establishment appears more closely related to hydrology, salinity related to tidal influence, grazing pressure, and other agricultural land uses that disturb vegetation. However, topsoil may be salvaged from excavated areas, and stockpiled until needed to create the upper soil layer in riparian planting areas. All other excavated materials can be respread in specific areas where needed, retained for agricultural use, used to build berms if the material is suitable for the purpose (to be determined by a qualified engineer), etc.

It is important to avoid soil compaction in all areas slated for restoration, whether by natural recolonization by vegetation or by active planting. All actively graded areas, including planting and recolonization areas will therefore be monitored for compaction, which shall not exceed 80-85%. If compacted soils are found they will be ripped and tilled to relieve compaction. All planting areas (excluding reuse sites) that are not salt marsh or brackish marsh, in which soils have been placed, will be tested for salinity prior to planting. Planting will not take place in areas with salinity above 3-4 parts per million (ppm) until sufficient rainfall leaching has reduced salinity to acceptable levels, verified by repeated testing.

The final construction plans and specifications will address placement of the soils to provide stable surfaces and minimize erosion. The plans and specifications will also specifically address how compaction will be avoided and suitable (texture and fertility) surface soils will be provided to support successful plant establishment in restoration areas.

EROSION CONTROL

The grading operations will be per the construction documents and subject to project permits including a Stormwater Pollution Prevention Plan (SWPPP) administered by the State General Permit for Storm Water Discharges associated with Construction and Land Disturbance Activities (Order No. 2009-0009 DWQ, NPDES No. CAS000002). The SWPPP shall be developed by a Qualified SWPPP Developer (QSD) and implemented by a Qualified SWPPP Practitioner (QSP) to ensure the receiving waterbodies are not impacted as a result of erosion and sedimentation during construction activities and until the disturbed areas are stabilized and sheet and rill erosion potential are minimized and a Notice of Termination of the general permit has been filed with the Regional Board. Because of the proximity of the proposed grading activities to the Eel River, which is a 303(d) listed waterbody impaired by sediment and has beneficial uses related to Cold Freshwater Habitat specifically for Spawning, Reproduction, Early

Development and Migration of Aquatic Organisms such as Salmonids, the project will be subject to turbidity and pH monitoring during site stabilization.

The SWPPP will detail the location and type of erosion and sediment control Best Management Practices (BMPs). Sediment source control BMPs applicable for this project include silt fencing, fiber rolls, sediment basins and check dams and will be implemented prior to or during grading and excavation activities and removed once the site has stabilized. Applicable erosion control BMPs include seeding, mulching, erosion control blankets, plastic coverings and geotextiles. Erosion control BMPs will also include the greatest extent practical reuse of native top soil, mulch and organic material that is generated onsite, segregated and spread onto the exposed earth surfaces upon finished grading. Additional erosion control BMPs including seeding (see seed mix discussed below) and mulching will be implemented upon completion of the grading activities. Seed will be broadcast by hand or mechanically. Drill seeding is applied using an 8-12 ft tractor towing a seed drill. This method shall be used to sow seeds in the grassland re-establishment area. Drill seeding rates are lower than broadcast rates and have a higher percentage of germination because seeds are drilled shallowly into the soil providing better contact with the soil medium and moisture.

Upon completion of grading and seed application, bare soil areas (except areas subject to tidal influence or active creek flow) shall be covered with up to a maximum of 3 inches of sterile rice straw or wood chips from on-site woody debris chipping, which will protect areas from erosion and reduce establishment of non-native weedy species. Alternatively, re-distributed native top soils and organic material will be utilized as much as practical. If straw is utilized, crimping will be the practice applied to anchor the straw mulch to the ground. Mechanically punching the straw in the soil can be done using a shovel or spade to anchor the mulch

LARGE WOODY DEBRIS STRUCTURES

Large woody debris structures will be placed where compatible with the geomorphic design of the active channel and active benches to provide escape cover for juvenile salmon and to add diversity to the aquatic habitat. Where and how these structures will be placed will be shown in the final construction plans. Imported redwood, cedar or fir will be utilized for in-channel structures where necessary and supplemented with salvaged alder and willow.

CONSTRUCTION MONITORING

The HRCD will be responsible for providing suitable monitoring during construction to confirm that all project regulatory permits and environmental conditions of approval are complied with; sensitive habitat and species, and water quality, are protected; and that the final construction PSE and this HMMP are properly implemented. Qualified biologists will conduct regular construction monitoring visits to document project compliance, photo-document project implementation, and a summary report will be prepared on the implementation of this HMMP and the final revegetation construction documents that will detail significant deviations from those documents. Likewise, qualified engineers and landscape architects will prepare Record Drawings to document project construction compliance with the final 100% PS&E.

PLANTING PLAN

Plant Species List

The restoration approach is described previously in this document under *Habitat Restoration Design by Reach* and in the cross section figures (Figures 6, 8, 10, 11, and 13). Table 5 below provides the planting palettes for the different restoration areas, relative proportions, on-center spacing, and container sizes. The plant numbers shown are preliminary estimates, and assume that in most areas extensive planting will be utilized in combination with natural recruitment to establish vegetation and meet success criteria. This plan was developed in concert with the geomorphic and hydraulic design of the corridor and provides short-term erosion/sediment control while promoting long-term habitat benefit.

Only native and or/non-persistent, non-invasive and/or pasture mix plants shall be used in all proposed plantings and seed mixes to be used in the project (CDP No. 1-10-032; Condition 2[A]17).

. **Table 5. Plant Palette for Salt River / Riverside Ranch Restoration Areas**

REACH SPECIFIC HABITATS	HABITAT TYPE	VEGETATION TYPE	COMMON NAME	SCIENTIFIC NAME	ON-CENTER PLANT SPACING (ft)	PROPAGULE TYPE	ESTIMATED PLANT QUANTITIES
Spruce/ Cottonwood Riparian Forest with Freshwater Channel Wetland (Figure 6)	Riparian Forest	Trees	Black cottonwood	*Populus balsamifera* spp. *trichocarpa*	16-20	DP + salvage	5,200 (13.0 ac.)
			Sitka spruce	*Picea sitchensis*	16-20	DP + salvage	
			Grand fir	*Abies grandis*	16-20	DP + salvage	
			Red alder	*Alnus rubra*	14-18	DP + salvage	
			Big leaf maple	*Acer macrophyllum*	14-18	DP	
		Shrubs/ Ferns	Twinberry	*Lonicera involucrata*	6-12	TB + salvage	
			Cascara buckthorn	*Rhamnus purshiana*	6-12	TB + salvage	
			California wax myrtle	*Myrica californica*	6-12	TB + salvage	
			Thimbleberry	*Rubus parviflorus*	6-12	TB + salvage	
			Salmonberry	*Rubus spectabilis*	6-12	TB + salvage	
			Red elderberry	*Sambucus racemosa*	6-12	TB + salvage	
			Giant chain fern	*Woodwardia fimbriata*	6-12	TB + salvage	
			Sword fern	*Polystichum munitum*	6-12	TB + salvage	
			Spreading wood fern	*Dryopteris expansa*	6-12	TB + salvage	
	Active Channel Edge Riparian	Trees	Pacific willow	*Salix lasiandra*	8-12	DP + cuttings	
			Arroyo willow	*Salix lasiolepis*	8-12	DP + cuttings	
			Sitka willow	*Salix sitchensis*	8-12	DP + cuttings	
			Hooker's willow	*Salix hookeriana*	8-12	DP + cuttings	
			Black cottonwood	*Populus balsamifera ssp. trichocarpa*	16-20	DP + salvage	
			Sitka spruce	*Picea sitchensis*	16-20	DP + salvage	
			Red alder	*Alnus rubra*	14-18	DP + salvage	
	Active Bench Vegetation (Freshwater Channel Wetland)	Freshwater Plugs	Slough sedge	Carex obnupta	4-6	TB + salvage	14,500 (8.3 ac.)
			Common spike rush	*Eleocharis macrostachya*	4-6	TB + salvage	
			Salvaged plugs	Native species only	4-6	SC	

REACH SPECIFIC HABITATS	HABITAT TYPE	VEGETATION TYPE	COMMON NAME	SCIENTIFIC NAME	ON-CENTER PLANT SPACING (ft)	PROPAGULE TYPE	ESTIMATED PLANT QUANTITIES
Spruce/Cottonwood Riparian Forest with Freshwater Channel Wetland (Figure 8)	Riparian Forest	Trees	Sitka spruce	*Picea sitchensis*	16-20	DP + salvage	12,100 (30.3 ac.)
			Black cottonwood	*Populus balsamifera* spp. *trichocarpa*	16-20	DP + salvage	
			Grand fir	*Abies grandis*	16-20	DP + salvage	
			Red alder	*Alnus rubra*	14-18	DP + salvage	
			Bigleaf maple	*Acer macrophyllum*	14-18	DP	
		Shrubs/ Ferns	Twinberry	*Lonicera involucrate*	6-12	TB + salvage	
			Cascara buckthorn	*Rhamnus purshiana*	6-12	TB + salvage	
			California wax myrtle	*Myrica californica*	6-12	TB + salvage	
			Thimbleberry	*Rubus parviflorus*	6-12	TB + salvage	
			Salmonberry	*Rubus spectabilis*	6-12	TB + salvage	
			Red elderberry	*Sambucus racemosa*	6-12	TB + salvage	
			Mosquito fern	*Azolla filiculoides*	6-12	TB + salvage	
			Giant chain fern	*Woodwardia fimbriata*	6-12	TB + salvage	
			Sword fern	*Polystichum munitum*	6-12	TB + salvage	
			Spreading wood fern	*Dryopteris expansa*	6-12	TB + salvage	
	Active Channel Edge Riparian	Trees	Pacific willow	*Salix lasiandra*	8-12	DP + cuttings	
			Arroyo willow	*Salix lasiolepis*	8-12	DP + cuttings	
			Sitka willow	*Salix sitchensis*	8-12	DP + cuttings	
			Sitka spruce	*Picea sitchensis*	16-20	DP + salvage	
			Black cottonwood	*Populus balsamifera ssp. trichocarpa*	16-20	DP + salvage	
			Red alder	*Alnus rubra*	14-18	DP + salvage	
	Active Bench Vegetation (Freshwater Channel Wetland)	Freshwater Plugs	Slough sedge	*Carex obnupta*	4-6	TB + salvage	19,750 (11.3 ac.)
			Common spike rush	*Eleocharis macrostachya*	4-6	TB + salvage	
			Salvaged plugs	Native plants only	4-6	SC	

REACH SPECIFIC HABITATS	HABITAT TYPE	VEGETATION TYPE	COMMON NAME	SCIENTIFIC NAME	ON-CENTER PLANT SPACING (ft)	PROPAGULE TYPE	ESTIMATED PLANT QUANTITIES
Spruce/Cottonwood Riparian Forest with Tidal Freshwater Channel Wetland (Figure 10)	Riparian Forest	Trees	Sitka spruce	*Picea sitchensis*	16-20	DP + salvage	1,400 (3.5 ac.)
			Black cottonwood	*Populus balsamifera* spp. *trichocarpa*	16-20	DP + salvage	
			Grand fir	*Abies grandis*	16-20	DP + salvage	
			Red alder	*Alnus rubra*	14-18	DP + salvage	
			Bigleaf maple	*Acer macrophyllum*	14-18	DP	
		Shrubs/ Ferns	Red currant	*Ribes sanguineum*	6-12	TB + salvage	
			Twinberry	*Lonicera involucrate*	6-12	TB + salvage	
			Cascara buckthorn	*Rhamnus purshiana*	6-12	TB + salvage	
			California wax myrtle	*Myrica californica*	6-12	TB + salvage	
			Thimbleberry	*Rubus parviflorus*	6-12	TB + salvage	
			Salmonberry	*Rubus spectabilis*	6-12	TB + salvage	
			Red elderberry	*Sambucus racemosa*	6-12	TB + salvage	
			Mosquito fern	*Azolla filiculoides*	6-12	TB + salvage	
			Giant chain fern	*Woodwardia fimbriata*	6-12	TB + salvage	
			Sword fern	*Polystichum munitum*	6-12	TB + salvage	
			Spreading wood fern	*Dryopteris expansa*	6-12	TB + salvage	
			Twinberry	*Lonicera involucrate*	6-12	TB + salvage	
			Cascara buckthorn	*Rhamnus purshiana*	6-12	TB + salvage	
	Active Channel Edge Riparian	Trees	Sitka willow	*Salix sitchensis*	8-12	DP + cuttings	
			Hooker's willow	*Salix hookeriana*	8-12	DP + cuttings	
			Arroyo willow	*Salix lasiolepis*	8-12	DP + cuttings	
	Active Bench Vegetation (Freshwater Channel Wetland)	Freshwater plugs	Slough sedge	*Carex obnupta*	4-6	TB + salvage	3,150 (1.8 ac.)
			Common spike rush	*Eleocharis macrostachya*	4-6	TB + salvage	
			Salvaged plugs	Native plants only	4-6	SC	

REACH SPECIFIC HABITATS	HABITAT TYPE	VEGETATION TYPE	COMMON NAME	SCIENTIFIC NAME	ON-CENTER PLANT SPACING (ft)	PROPAGULE TYPE	ESTIMATED PLANT QUANTITIES
Spruce Dominated Riparian Forest with Tidal Brackish Marsh (Figure 2011)	Riparian Forest	Trees	Sitka spruce	*Picea sitchensis*	16-20	DP	1,300 (3.2 ac.)
			Red alder	*Alnus rubra*	14-18	DP + salvage	
			Sitka willow	*Salix sitchensis*	12-14	DP	
		Shrubs/ Ferns	California wax myrtle	*Myrica californica*	6-12	TB	
			Twinberry	*Lonicera involucrate*	6-12	TB	
			Coyote brush	*Baccaris pilularis*	6-12	TM	
	Active Bench Vegetation (Brackish Marsh)	Brackish marsh plugs	Tufted hairgrass	*Deschampsia cespitosa*	4-6	TB	6,700 (3.8 ac.)
			Lyngbye's sedge	*Carex lyngbyei*	4-6	TB	
			Alkali bulrush	*Bolboschoenus maritimus*	Natural recruitment		
			Salvaged plugs	Native plants only	4-6	SC	
Tidal Wetland (Figure 13)	Riparian Vegetation	Trees	Sitka spruce	*Picea sitchensis*	16-20	DP	8,800 (22.1 ac.)
			Shore pine	*Pinus contorta*	14-18	DP	
			Sitka willow	*Salix sitchensis*	12-14	DP	
			Hooker's willow	*Salix hookeriana*	12-14	DP	
		Shrubs	California wild rose	*Rose californica*	6-12	TB	
			California blackberry	*Rubus ursinus*	6-12	TB	
			Coyote brush	*Baccharis pilularis*	6-12	TB	
			California wax myrtle	*Myrica californica*	6-12	TB	
	Tidal Marsh Plain (Expected Natural Recruitment)	Halophyte recruits	Pickleweed	*Sarcocornia pacifica*	Natural recruitment		N/A
			Lyngbye's sedge	*Carex lyngbyei*	Natural recruitment		
			Saltgrass	*Distichlis spicata*	Natural recruitment		
			Jaumea	*Jaumea carnosa*	Natural recruitment		
			Slender arrowgrass	*Triglochin spp.*	Natural recruitment		
			Gumplant	*Grendelia stricta*	Natural recruitment		
			Spearscale	*Atriplex patula*	Natural recruitment		

REACH SPECIFIC HABITATS	HABITAT TYPE	VEGETATION TYPE	COMMON NAME	SCIENTIFIC NAME	ON-CENTER PLANT SPACING (ft)	PROPAGULE TYPE	ESTIMATED PLANT QUANTITIES
	High Marsh Ecotone	Halophyte recruits	Saltgrass	*Distichlis spicata*	2	TB	Combination of seeding, planting and natural recruitment-quantities not estimated
			Jaumea	*Jaumea carnosa*	2	TB	
			Slender arrowgrass	*Triglochin spp.*	Seed		
			Gumplant	*Grindelia stricta*	2-4	TB/seed	
			Marsh rosemary	*Limonium californicum*	2-4	TB/seed	
			Tufted hairgrass	*Deschampsia caespitosa*	Seed		
			Regreen hybrid wheatgrass	*Elymus X triticum*	Seed		
			Meadow barley	*Hordeum brachyantherum*	Seed		
			Red fescue	*Festuca rubra*	Seed		
			California oat grass	*Danthonia californica*	Seed		
			Fat hen	*Atriplex triangularis*	Seed		

Active Bench Seeding

Native topsoil, organics and mulch segregated during the earthwork will be re-distributed onto the active benches in cross-sections 6 and 8 and seeded with the following seed mix (Table 6), which comprises regionally native species adapted to wet floodplain conditions. Seeds will be obtained from within a regionally appropriate source. This seeding will thus be conducted only in the brackish and freshwater reaches, not in the tidally influenced saline reach of the channel. The restored saline tidal areas will not be seeded as natural salt marsh vegetation recruitment is expected to be relatively rapid and the majority of this area will be stabilized by the existing grasslands.

Table 6. Active Bench Seed Mix (30 lbs/ac)

COMMON NAME	SCIENTIFIC NAME	PURE LIVE SEED/AC (LBS.)
Meadow barley	*Hordeum brachyantherum*	7.8
Creeping wild rye	*Leymus triticoides*	7.5
Vancouver wildrye	*Lymus vancouverensis*	8.7
Tufted hairgrass	*Deschampsia cespitosa*	1.5
Slender hairgrass	*Deschampsia elongata*	1.5
Sedge species	*Carex spp.*	3.0

Erosion Control Seeding

Regionally appropriate native plants shall be used for erosion control and soil stabilization. If infeasible, (e.g., on privately owned pasturelands disturbed by temporary construction impacts proposed to be restored to agricultural production), the use of non-native species or varieties may be used (e.g., sterile, short-lived, non-persistent cereal grasses such as barley [*Hordeum vulgare*], buckwheat [*Fagopyron esuclentum*], rye [*Secale cereale*], and wheat [*Triticum aestivum*)]) only if the proposed species or varieties are known not to persist or spread in the ecosystem. Alternatively the pasture mix shown in Table 7 may be used in areas proposed to be restored to pasture grazing use (CDP No. 1-10-032; Special Condition 12[B]). Areas disturbed during construction that are outside/above the active bench will be seeded with the following seed mix (Table 7) or a mix specified by the landowner and approved by the HCRCD. This seed mix is compatible with grazing (Gunderson 2011) which will likely occur on many of those areas.

Table 7. Erosion Control Seed Mix (22 lbs/ac)

COMMON NAME	PURE LIVE SEED/AC (lbs.)
Kenland red clover	5.1
Ladino clover	3.1
Salina strawberry clover	2.0
Alsike clover	1.3
New Zealand white clover	0.6
Tetraploid perennial ryegrass	7.0
Tetraploid annual ryegrass	2.9

Plant Material Sources/Nursery Production

Only native plant species shall be planted in the proposed restoration areas. All proposed planting, with the exception of seed mixes, shall be obtained from local genetic stock within Humboldt County, preferably collected from either the project site or from locations within the Eel and Salt River watersheds within 10 miles of the project area or from a native plant nursery which has available stock that meet this criterion. If documentation is provided to the Executive Director of the Coastal Commission demonstrating that native vegetation from local stock is not available, native vegetation obtained from genetic stock outside of the local area may be used with the approval of the Executive Director (CDP No. 1-10-032; Special Condition 12[A]).

Native plant seed will be provided by a nursery approved by the HCRCD who will verify that seeds are of local watershed origin. If sufficient existing collection sources are not found within 10 mi, then the collection perimeter can be expanded with prior approval by the HCRCD in consultation with the project biologists to other areas within the Eel and Salt River watershed. See also, salvage of onsite native plant material above under *Project Phasing, Site Preparation and Grading*. If cuttings are taken from vegetation to remain, then no more than 30% of the tree canopy can be removed in a single season. A contract shall be established with a nursery specializing in native plantings to collect and propagate the required plant materials. It will be important to maximize advance contracting with native plant nurseries to allow time to collect and multiply seed to maximize the number of propagules. The seed mixes can be obtained commercially by the installation contractor.

No plant species listed as problematic and/or invasive by the California Native Plant Society, the California Invasive Plant Council, or as may be identified from time to time by the State of California shall be used or allowed to naturalize or persist on the site. No plant species listed as a "noxious weed" by the governments of the State of California or the United States shall be used within the project area (CDP No. 1-10-032; Special Condition 12[A]).

Plant Installation Methods/Schedule

Seeding (Broadcast or Drill Seeding)

All soils that are disturbed by project construction on the floodplains, adjacent slope the Riverside Ranch setback berm, access routes, stockpile areas, etc. will be seeded with the seed mixes described above to control erosion and to establish ground covers for habitat value. All proposed planting and seed mixes shall comprise only native and/or non-persistent, non-invasive and/or pasture mix plants. Different methods will likely be employed in different areas depending on access for equipment, soil type, etc. Seeding will be conducted in or September or October, prior to the onset of the rainy season.

Wetland Plug Planting Methods

Wetland plugs, both nursery grown in treebands or salvaged during grading, will be installed by hand in holes at least 8 inches deep and 3 inches wide in selected parts of the active bench such as side channel, alcoves and backwater areas (the salt marsh plain will be revegetated by natural recruitment with no active wetland plant installation). No irrigation basins are required for these plantings. The soil excavated from the planting hole will be firmly tamped back around the installed plant such that large air gaps in the soil are avoided, but care must

be taken to avoid overcompaction of the soil, particularly if it is damp. The root crown of the plug shall be slightly higher (approx. 0.5 inch) than the surrounding soil surface. Plant installation will take place towards the end of the flood season in April/May/June, contractors shall be prepared for possible flooded site conditions; plants will only be installed when flood waters have receded.

Container and Cutting Planting Methods

Container plants and live cuttings will be installed between October and November before the onset of the time when the site is most likely to flood, but when rainfall has likely saturated the site's soils. Planting holes for trees will be 2 ft wide and 2 ft deep, and for shrubs will be 1 ft wide and 1.5 ft deep. All plants will be installed so that their root crowns are at or slightly above (0.5 inches) the soil surface following planting, soil settlement, and initial irrigation. Cuttings will be installed by creating a pilot hole at each planting location and inserting a single cutting into the hole such that approximately 2/3 of the cutting is below ground and 1/3 is aboveground. Container plants will be manually irrigated once immediately following planting.

Phasing of Planting

Phased planting will be an integral component of the planting plan. The overall project will be constructed in two phases as described above under *Project Phasing, Site Preparation and Grading*. In Phase I, planting will occur on the internal slopes of the Riverside Ranch setback berm and the plants will consist of high marsh ecotone seeding and/or planting (Table 4). The development of the marsh plain vegetation of Riverside Ranch will rely heavily on natural recruitment during the first 2 years. If, in Year-3 the monitoring results determine that sufficient vegetation is not developing on the marsh plain, salt marsh plants will be installed per the AMP or Rare Plant Mitigation and Monitoring Plan (H. T. Harvey & Associates 2011b).

In Phase II, the Salt River channel corridor area will be planted. In Years 1-3 of Phase II, plantings may be focused solely on tree species, or a combination of tree species and limited shrub and understory species. Planting of tree and shrub species is designed in this phased method to encourage the larger tree species to establish and create shaded areas and to allow naturally recruiting shrub species to colonize. An adaptive management approach will guide the plantings of additional shrub or tree species. The addition of any tree and shrub species will be guided by the habitat descriptions and recommended species for each reach based on this HMMP and per the Revegetation Plan (H. T. Harvey & Associates 2010). Depending on the extent and location of naturally recruiting shrubs, additional shrub species may be planted to augment the naturally recruiting species, and to create a denser understory layer to enhance functions and values along the channel corridor.

All proposed plantings shall be completed by the end of the first full optimal planting season that occurs after completion of construction (CDP No. 1-10-032; Special Condition 12[C]). A report documenting that the biological/ habitat restoration based on seeding and container planting was built per the design plans will be prepared and submitted within 4 months of completion of restoration activities for each of the Phase 1 and Phase 2 construction activities (CDP No. 1-10-032; Special Condition 2[A]18d).

Salvaged Plant Materials/Cutting Planting Methods

Salvaged plant materials that have been retained for planting will be installed under the supervision of a qualified restoration ecologist. These materials may come in a variety of sizes and conditions and therefore custom installation has the greatest potential for improved survival. In general they will be placed in locations with suitable soils and hydrology that will allow them to effectively root in place. If such materials are large, such as root wads, and are placed near the active channel the project engineers may recommend cabling the materials in place or otherwise reinforcing them (deeper burial, use of boulders, etc.) to avoid the material moving downstream and causing channel blockage. Salvaged plant materials will be installed in October or November. The species to be salvaged will be native only, and could include the species listed in the cross-section figures under the listing "Active Bench Vegetation".

Infill Planting Clusters

In an effort to reduce gaps in the riparian corridor the HRCD will work with willing landowners to identify locations where small "planting clusters" can be installed to infill openings in the riparian habitat. These will consist of small fenced groupings of trees, perhaps as few as 3-5, established to improve the continuity of the riparian corridor. These plantings may not represent a substantial acreage but a description of these clusters is included here, representing an opportunity to maximize riparian habitat functions and values in areas where landowners are amenable to planting. The locations for these have not yet been identified but the most likely areas will be in the upper reaches of the project area. The species will be compatible with plantings in other areas of the project and will be selected based on the soils and hydrology of the specific site.

MAINTENANCE PLAN

INTRODUCTION

This maintenance plan section provides for maintenance activities that will take place during the plant establishment period, which lasts for 3 years following restoration/planting implementation. Following that plant establishment period, the AMP will govern all site maintenance and management activities. The ultimate responsibility for all maintenance activities rests with the RCD, who may contract out various activities to qualified second parties, or collaborate with other qualified entities to accomplish maintenance activities.

CHANNEL MAINTENANCE ACTIVITIES

Maintenance of the channel, including vegetation and sediment removal, will occur as directed by the AMP. In the event that channel transport and SMA performance are not capable of eliminating undesirable sediment accumulation in the mainstem Salt River channel or sediment accumulation poses an undesirable threat to property or project performance, excavation may be performed on a small scale within the River corridor (excavating specific areas of the channel). Larger-scale excavation across the entire width of the channel corridor may be necessary at sediment deposition-prone areas such as at the confluence with Francis Creek, if designed SMAs and adjacent Salt River corridor are overwhelmed with sediment, which overflows into the adjacent River corridor. Routine vegetation maintenance activities within SMAs will occur during late summer or early fall months when the channel flows are lowest to minimize the potential for erosion and sediment transport and to minimize impacts to salmonid and wildlife species (Grassetti Environmental Consulting 2011).

RESTORATION VEGETATION MAINTENANCE

Irrigation

A formal irrigation system is not proposed for this project for several reasons: 1) given the plant species to be installed, the seasonal timing for installation, suitable soils and hydrology, and the moist cool climate of the project area, plant survival shall be acceptable without frequent irrigation unless severe drought conditions prevail; 2) the areas of active revegetation are vast and the cost would be prohibitive; 3) some areas are subject to regular flooding that would destroy standard irrigation systems. That being said, there is provision for an initial manual irrigation of the plantings at the time of installation, likely by watering truck and hoses. And secondly, if drought conditions do prevail or plant survival is observed to be severely affected by a lack of water then the project will need to provide irrigation to plants as a remedial action. At this time the latter is considered unlikely.

Weed Control around Woody Plantings during Plant Establishment Period

Weeds will be controlled around all installed woody plants during the first three years following planting. During the growing season all weeds within 3 ft of the base of the plantings will be manually controlled (hand weeding, weed-eaters, mowers, etc.) whenever the average height of the weeds exceeds 4 inches. Special care will be taken to train weed control crews to recognize and protect all desirable native plants recruiting into the project area, and even to weed carefully around recruits to encourage their rapid establishment. This is particularly important, since the

large scale of this project requires that it rely to some degree on natural recruitment to establish substantial native habitat cover.

Plant Replacement

All required plantings shall be maintained in good growing condition throughout the life of the project and whenever necessary shall be replaced with new plant materials to ensure continued compliance with the restoration goals and objectives (CDP No. 1-10-032; Special Condition 12[D]).

Fencing/Grazing

Given the large scale of the project, cost-effective control of weeds in the restoration areas is expected to be a challenge. One option that will be considered is flash grazing. Flash grazing may be carefully employed to control weed cover in active planting areas and natural recruitment areas but will be managed to avoid excessive damage to native plantings and recruits. Flash grazing involves bringing specific levels of grazing animals onsite in the spring for very brief periods when the animals will target new growth of the weeds over the vegetation that has been planted. Grazing will be limited to specific time periods across limited acreages within active bench areas and upland berm areas only. Pre-construction surveys for rare plants shall be conducted in proposed grazing areas within or adjacent to suitable rare plant habitat. Grazing will be supervised by someone familiar with weed management and restoration activities to ensure protection of these desired species during grazing activities. In general, grazing will be used relatively less during the first 3-5 years when the plantings are establishing and growing to heights that will put them beyond grazing damage. However, during that period flash grazing can be used for very brief periods, if it is monitored to ensure that damage to plantings is at an acceptable level (e.g., it is not impeding the ability of the site to meet the habitat establishment success criteria). If substantial damage to native plants (or demonstrable introduction of invasive species) occurs as a result of flash grazing, then it will likely be suspended. Temporary fencing will be employed to allow flash grazing of specific areas in and around the active revegetation and recruitment areas to control expanses of weeds without unduly damaging desirable native plants.

No grazing will occur in the low flow active channel. Temporary livestock exclusion fencing shall be installed to exclude livestock from channels, riparian areas, and other sensitive habitat areas. Grazing by sheep and/or goats will be preferred to cattle grazing to minimize impacts to the restored floodplain areas. Temporary fencing will consist of insulated fence posts and rods supporting multiple strands of electric wire or tape; the wire and posts could be easily be moved depending on grazing needs in a particular area. Depending on the size of the herd and the capacity of the animals, the Salt River channel will be broken up into reaches that will be flash grazed for a set number of days. Electricity for the hot wires will need to come from either an established 110-V connection or a solar charger. Solar chargers may be set up in connection with adjacent landowner's existing operations.

Invasive Species Control

Freshly disturbed and newly restored sites typically provide a suitable environment for invasive species to colonize unless an active maintenance program is in place to ensure that these species

do not colonize during the plant establishment period. Invasive species which have the potential to invade the Salt River/Riverside Ranch restoration area and could impede success of the restoration goals are described below. Active maintenance and eradication will be necessary to ensure that these species do not establish in the restored corridor. Brief methods to control these species are included here.

Invasive Spartina

Dense-flowered cordgrass is a non-native invasive perennial that competes with native salt marsh species and typically invades bare mudflat and pickleweed habitats to form dense monospecific stands. Colonization by dense-flowered cordgrass in channel areas can also result in increased sedimentation. Dense-flowered cordgrass is difficult to eradicate and the current eradication techniques being used with some success in Humboldt County include mowing and hand-digging. Herbicide use for large-scale *Spartina* eradication has been applied as a successful technique in San Francisco Bay, but has not been utilized in Humboldt County. A regional management plan for dense-flowered cordgrass is currently being prepared by the California Coastal Conservancy and its partners for invasive *Spartina* in Humboldt Bay, the Eel River Delta, and the Mad River Estuary. The methods developed in that plan shall be used to eradicate dense-flowered cordgrass during long term monitoring. During clearing and grubbing, all *Spartina* within the grading footprint shall be removed offsite or buried onsite so that it does not present an opportunity to spread vegetatively or by seed.

Purple Loosestrife

Purple loosestrife in a non-native perennial that competes with wetland plants and its vigorous growth forms dense colonies which can choke freshwater wetland areas. Established populations of purple loosestrife can dominate the seedbank of invaded areas. Purple loosestrife has been found in the Eel River area in Humboldt County; as with most invasive species, it is difficult to remove once established. Management recommendations include monitoring areas not yet infested and hand-pulling newly discovered seedlings to prevent its spread. Mechanical removal (mowing) before the seeds mature may help reduce its spread but cut stems may re-root. Neither burning nor flooding has been shown to be an effective control method (Bossard et al. 2000; DiTomaso and Healy 2003). Chemical control is currently not an option for treatment in Humboldt County. Herbicide treatment had been previously proposed to treat populations along the Eel River in Humboldt County, but the planned spraying has been halted until a full environment impact report is prepared under the guidelines of the California Environmental Quality Act. Another option for control is the use of a biocontrol agent to eradicate and limit the spread of purple loosestrife. Biocontrol has been used with some success in the eastern United States. The Illinois Department of Natural Resources has been using three beetle species since 1994 to feed on the roots, leaves and growing tips of purple loosestrife. Reductions in up to 95% of the plant's biomass have been observed (Blossey 2011).

Reed Canarygrass

Reed canarygrass is an aggressive waist high perennial grass which tolerates wet soil conditions and invades and dominates wetland habitats. Reed canarygrass is often one of the first wetland plants to emerge early in the growing season and readily invades bare or disturbed areas. Once established, it reduces plant diversity because it can outcompete seedlings of other establishing plants. It can also modify the hydrology of streams because of its ability to trap sediment, leading to constriction of waterways. Control of reed canarygrass will need to address suppressing above-ground vegetative growth and underground rhizomes and as well as the seed bank. An integrated approach shall be used to control reed canarygrass. In Washington and Oregon, physical methods have included mowing, grazing when stems and leaves are young, use of ground coverings, burning, inundation, herbicide application and shading (Miller et al. 2008; Antieau 1998). Competitive exclusion is can also be a potential option to discourage reed canarygrass seedling establishment. Planting competitive grass species such as tufted hairgrass, spike rush, and bentgrass (*Agrostis* sp.) will help to exclude reed canarygrass. The planting of riparian vegetation, particularly coniferous forested wetland plant communities, may also provide adequate shading to limit reed canarygrass growth (Antieau 1998).

Himalayan Blackberry

Himalayan blackberry is a sprawling, evergreen shrub that occurs along disturbed areas and streambanks. It is commonly found in riparian areas, where it forms dense thickets. It can tolerate periodic inundation in both fresh and brackish conditions. It also can readily colonize disturbed areas. Once it is established, it can form impenetrable thickets that shade and outcompete native vegetation, including native blackberry. Mechanical removal or burning are potential methods of removing the plants, but these methods require persistent treatment to be successful. Removing only the aboveground growth will stimulate the growth of root sprouts. Repeated cutting, particularly while the plant is flowering can help in exhausting the root stores. The canes and the roots also need to be removed as Himalayan blackberry can easily resprout from any remaining roots, in addition to regenerating from seed. In areas where mature plants have been removed, regrowth may be successfully controlled by grazing of sheep and goats, particularly when the plants are exhibiting new growth. As with reed canarygrass, the establishment of fast-growing native shrubs or trees will aid in preventing colonization as shading can limit establishment and growth of Himalayan blackberry (Humboldt County Weed Management Area 2010; DiTomaso and Healy 2003; Bossard et al. 2000).

Insect or Pest Control

The restoration plantings will be regularly inspected for signs of insect or pest damage. If insect or pest damage threatens the health of the restoration plantings, the local agricultural extension agency shall be consulted to determine the best control methods. The use of rodenticides containing any anticoagulant compounds including, but not limited to Bromadiolone, Brodifacoum, or Diphacinone is prohibited (CDP No. 1-10-032; Special Condition 12[E]).

Maintenance Inspection Activities and Frequencies

Maintenance of the site shall be regularly monitored by a qualified biologist to ensure that the plantings are being properly cared for, that the removal of undesirable species is done in a manner that does not compromise the establishment of the target habitat functions and values, and that desirable recruiting species are protected. A site inspection shall be conducted quarterly for the first 3 years and twice yearly thereafter until the end of the 10-year monitoring period or until the success criteria outlined in this Plan are met. If significant problems are encountered with the site, then inspections shall be scheduled more frequently until the problems are resolved.

Maintenance Schedule

Maintenance activities will take place during the 3 year plant establishment period. Maintenance schedule will vary depending on weather conditions, but will be most intense during the spring and summer months. The actual schedule for maintenance will be determined by the landscape contractor who will be responsible for plant establishment.

REMEDIAL ACTIONS

If during the three year plant establishment period the target habitats are not establishing properly and the success criteria outlined above are not being met, then experts from the disciplines relevant to the specific issues encountered will conduct a site visit and determine the cause of the problem. These experts may include restoration ecologists, landscape architects, hydrologists, geomorphologists, soil scientists, etc. Remedial measures will then be proposed in a technical memo, and if appropriate submitted to the regulatory agencies for approval prior to implementation. Any remedial actions implemented will be accompanied by monitoring to determine if they are successful. Possible future remedial measures may include, but are not limited to: active replanting, increased weed abatement activities, supplemental irrigation, and changes to the grazing/fencing plan. After the 3-year plant establishment period, the AMP will be the primary guide for ongoing maintenance and management activities.

MONITORING PLAN

The monitoring plan for this HMMP is focused on ensuring the long-term viability of vegetated habitats created and restored as part of the project's goals and/or habitat mitigation needs. Monitoring measures for other project features, including channel geomorphology and individual wildlife or plant species, will be dealt with in other documents, including the Adaptive Management Plan, Biological Assessments and Opinions, and the Rare Plant Mitigation and Monitoring Plan to be prepared for listed species, and other regulatory technical documents and permits.

Annual monitoring of the Salt River/Riverside Ranch restoration area is designed to determine whether the site is progressing along a trajectory that will meet the habitat goals of creating native forested riparian and wetland habitats along the Salt River corridor and riparian, salt marsh, and upland ecotone habitat within Riverside Ranch.

The following monitoring plan describes success criteria and monitoring methods for measuring these criteria to assess the degree to which the habitat restoration goals are being met. Given the scale of the changes proposed for the ecosystem, the wetland and riparian habitat areas will be monitored for 10 years after project completion.

Progress towards performance criteria, or lack thereof, will provide a basis for any remedial action recommendations (if needed). The results of the wetland and riparian habitat monitoring in Year 10 will be compared to the final success criteria to determine if these criteria have been met. If the final success criteria have not been met, remedial actions and monitoring will continue until they have been met. Given the size of the project, its linear nature, and likely distinction between specific hydrologic zones, certain reaches may achieve their final success criteria before other areas. With agency coordination and approval, it may be possible that segments of the project are deemed successful, while targeted monitoring and remedial measures may be necessary for other specific areas. Attainment of the final success criteria will indicate that the project will likely meet the project's long-term habitat goals.

The California Rapid Assessment Method for Wetlands (CRAM) provides a methodology to measure buffer/landscape connectivity, hydrology, and physical structure (Collins et al. 2008). CRAM would be useful for the SRERP as an evaluation measure to help track pre- and post-construction habitat development, particularly given the amount of grading and vegetation removal that will occur during construction of the restored areas. CRAM can provide a solid understanding of the functional progression of restored areas that may not be captures solely by monitoring vegetation establishment. A project-wide habitat assessment using CRAM was initially proposed for this project but was removed from the monitoring program. While both pre- and post-construction CRAM evaluations would be ideal to track habitat development, CRAM can still be used at a later date to determine post-project conditions and to evaluate the success of habitat development.

The project will be making dramatic landscape scale changes within the project footprint, and the result will be a dynamic and shifting mosaic of habitats that will be difficult to monitor using methods typically used on smaller mitigation sites. Given the large scale and complexity of this

project, the following monitoring elements are proposed to attempt to capture the ecosystem benefits of the project:

- Short Term Monitoring for Tidal Exchange Verification
- Quantitative Habitat Monitoring
- Tidewater Goby Surveys
- Salmonid Surveys
- Avian Surveys
- Eelgrass Monitoring
- Annual Qualitative Assessments:
  - Photo-documentation
  - Channel stability
  - Hydrologic function
  - Invasive species
  - Natural Recruitment

SHORT TERM MONITORING FOR TIDAL EXCHANGE VERIFICATION

Tidal exchange monitoring is prescribed for the first three years following construction per the AMP (Appendix A) (H. T. Harvey & Associates 2011a). The first component of this monitoring is continuous water level and salinity monitoring in Riverside Ranch. This monitoring during the first summer following construction will determine the extent and duration of tidal exchange within the Riverside Ranch restoration area. The second component is spot salinity measurements in the Salt River Channel. Spot salinity measurements will be used to create a depth profile of salinity and the upstream limit and shape of the tidal salt water wedge. This monitoring will help determine whether the project has established the desired tidal exchange, functional tidal prism, and healthy salinity structure.

Success Criteria

Table 1 in the AMP (Appendix A) provides detail on the management triggers (essentially the success criteria for this monitoring), and potential management actions.

Monitoring Methods

The frequency of this monitoring is prescribed in Table 1 of the AMP, but at a minimum will commence annually in Years 1-3, and every other year thereafter.

Continuous Water Level and Salinity Monitoring in Riverside Ranch. Continuous water level and salinity monitoring will be conducted throughout the Salt River channel and within Riverside Ranch per the Adaptive Management Plan (AMP) (H. T. Harvey & Associates 2011a). Tidal exchange monitoring conducted per the AMP will ensure that continuous water level and salinity data are collected for the period between 1 July and 31 October during the first summer following completion of restoration and grading of Riverside Ranch. This monitoring will be

consistent with the monitoring protocol described in the AMP. In addition to locations identified in the AMP, water level monitoring stations shall be established at one location in the Eel River Estuary near the mouth of the Salt River and at two locations within the Riverside Ranch tidal restoration area. Within the restoration area, one station shall be located in the northernmost portion of the restoration area within the internal slough channel most distant from the Salt River, and one station shall be similarly located in the most southern portion of the restoration area (CDP No. 1-10-032; Special Condition 2[A]6).

Spot Salinity Measurements in the Salt River Channel. Spot salinity measurements shall be collected in the Salt River channel within one hour of each higher high tide from 1 July through 31 October during the first summer following completion of restoration dredging in order to create a depth profile of salinity at several locations and to determine the upstream limit and approximate shape of the tidal salt water wedge (CDP No. 1-10-032; Special Condition 2[A]7). This monitoring will be consistent with continuous salinity monitoring per the AMP.

QUANTITATIVE HABITAT MONITORING

Tidal Wetland Habitat

Percent Cover Success Criteria. The percent cover values for naturally recruited native salt marsh and high marsh ecotone species in Riverside Ranch will show a steady trend toward meeting the success criteria (Table 8) for native wetland salt marsh species for Years 3, 5, 7, and 10. By Year 10, there shall be at least 60% cover of native plant species within the restoration areas that are within the appropriate elevation range for the target habitats. There are no salt marsh success criteria for percent cover for Years 1 and 2 as it will take several years for naturally recruiting salt marsh species to establish. The presence of invasive, non-native species will be limited to less than 5% within the restoration areas at the end of the 10-year monitoring period. Non-invasive non-native species will be limited to less than 15% of salt marsh and high marsh ecotone restoration areas. Sterile wheat seeded into areas for erosion control will not count towards percent cover success criteria.

Table 8. Percent Cover Success Criteria for Naturally Recruiting Salt Marsh and Planted High Marsh Ecotone Species in Riverside Ranch

HABITAT	YEAR 1	YEAR 2	YEAR 3	YEAR 5	YEAR 7	YEAR 10
Salt Marsh	-	-	10%	30%	50%	60%
High Marsh Ecotone	5%	15%	30%	40%	50%	60%

Habitat Acreage Success Criteria. Habitat mapping will take place pre-construction, and in Years 1, 3, 5, 7 and 10. The results will be reported in a format similar to Table 1 (Land Use and Habitat Projections). Deviations greater than 10% from the projected values in Year 5 (or later) may trigger more detailed evaluations of specific reaches to evaluate potential remedial or adaptive management actions. The final success criterion for the habitat mapping is to be within +/- 10% of the projected habitat (by category, see Table 1) by Year 10.

Monitoring Methods. Quantitative monitoring of the Riverside Ranch tidal restoration area will include mapping and estimating the total cover of broad community types (habitat acreage) and

percent cover based on aerial or commercially available satellite imagery (CIR and true color satellite imagery). The imagery will be acquired in Years 1, 3, 5, 7, and 10 and used as the base for mapping. The scale and level of effort will be similar to the Existing Conditions habitat map (Figure 3) and will be presented in tabular form similar to Table 1. This will allow the changes in the mosaic of habitats to be tracked and compared to the habitat projections.

Field sampling to verify the mapping and cover of community types and percent cover will be conducted and will include spatially stratified, random samples with visual estimates of cover by species within elevational strata in both the north and south restoration areas. Elevational strata will be spatially stratified to ensure uniform sampling of the entire restoration area. The Kershaw method (1973) evaluates the relationship between cumulative average percent cover and quadrat number to ensure that a sufficient sample size is achieved. This is accomplished by graphing the cumulative average percent cover on the Y-axis against the number of quadrats on the X-axis. The point at which the slope approaches zero indicates a sufficient sample size (i.e. number of quadrats) (Kershaw 1973). Quadrats will be located throughout the site in a stratified-random design along permanently marked transects. The application of this method will guide the initial data collection for years zero and one and subsequently data will be examined in a power analysis to determine if there is sufficient statistical power (defined as 80% power to detect a difference of 20% between years, at an 80% confidence level) to detect a significant difference in percent cover between the observed state and the success criterion based on a t-test. A power analysis will not be possible until year one; because in year zero, there is no anticipated variance (the site will have been recently graded, so there will not be any cover yet, and therefore there would be no variance for estimates of percent cover). If the results of the power analysis based on year one initial data collection suggest that statistical power is below the defined minimum (see above), then data from additional transects will be collected to achieve adequate statistical power. For each subsequent year of data collection, this same process will be applied: collect data based on the best initial estimate of adequate sample size (based on power analysis from the previous year), then perform another power analysis after initial data collection, and collect additional samples if the power analysis indicates the need for additional sampling. Sampling will occur between 1 June and 31 August during monitoring years following completion of restoration activities (CDP No. 1-10-032; Special Condition 2[A]8).

Riparian Habitat

Percent Cover Success Criteria. Average percent cover of native trees, shrubs, and herbaceous species will be estimated for all areas planted with riparian trees and/or shrubs (riparian forest and active channel edge riparian). Table 9 provides the performance criteria for native riparian species. It is expected that species diversity and composition of native riparian plants observed will initially include many of the species planted (see Table 5), but over time as the site evolves and natural recruitment engages the species composition will likely change, as would occur in a natural ecosystem. Additionally, the presence of invasive, non-native species will be limited to less than 5% within the active replanting areas within the project footprint at the end of the 10-year monitoring period. Non-invasive non-native species will be limited to less than 15% of active replanting areas.

Table 9. Percent Cover Success Criteria for Riparian Areas in the Salt River

MONITORING YEAR	AVERAGE TOTAL PERCENT COVER OF NATIVE RIPARIAN SPECIES[1]
Year 1	--
Year 2	15
Year 3	30
Year 5	40
Year 7	60
Year 10	80

[1] No percent cover is targeted in Year 1 as the newly installed plants will be establishing.

Average Tree Diameter Success Criteria. The average diameter of tree species planted in the riparian restoration area will show a trend of increasing size between sampling years during Years 3, 5, and 10.

Habitat Acreage Success Criteria. Riparian habitat mapping will take place pre-construction, and in Years 1, 3, 5, 7 and 10. The results will be reported in a format similar to Table 1 (Land Use and Habitat Projections). Deviations greater than 10% from the projected values in Year 5 (or later) will trigger more detailed evaluations of specific reaches to identify potential remedial or adaptive management actions. The final success criterion for the habitat mapping is to be within +/- 10% of the projected habitat (by category, see Table 1) by Year 10.

Salt River Wetland Species Percent Cover Criteria.

The percent cover criteria for native wetland plant species in the Salt River corridor are provided in Table 10. These criteria apply to the freshwater channel wetland, seasonal wetland and brackish marsh habitats (active bench areas).

Table 10. Average Total Percent Cover of Native Wetland Species in the Salt River

MONITORING YEAR	AVERAGE TOTAL PERCENT COVER OF NATIVE WETLAND SPECIES[1]
Year 1	10
Year 2	20
Year 3	30
Year 5	50

Monitoring Methods. Percent cover of the riparian restoration areas shall be measured using spatially stratified, random samples within each habitat reach (e.g., "spruce dominated riparian forest with brackish marsh") and within each habitat type (i.e., active channel edge riparian vegetation, active channel edge shrub and herbaceous vegetation, and riparian forest). Total percent cover within each habitat type will be estimated from aerial or satellite imagery; if the size of the mapping unit and imagery resolution allow (CDP No. 1-10-032; Special Condition 2[A]9). If not then field sampling will be employed. Ground-truthing of aerial or satellite imagery will include representative transect sampling within each habitat reach and type.

Percent cover of native wetland plants within the Salt River channel will also be measured using spatially stratified, random samples within each habitat reach and type estimating cover by species. The initial data collection for years zero and one will be guided by the relationship

between cumulative average percent cover and quadrat number during the first sampling (Kershaw 1973). This is accomplished by graphing the cumulative average percent cover on the Y-axis against the number of quadrats on the X-axis. The point at which the slope approaches zero indicates a sufficient sample size (i.e., number of quadrats).

Subsequent data will be examined in a power analysis to determine if there is sufficient statistical power (defined as 80% power to detect a difference of 20% between years, at an 80% confidence level) to detect a significant difference in percent cover between the observed state and the success criterion based on a t-test. A power analysis will not be possible until year one; because in year zero, there is no anticipated variance (the site will have been recently graded, so there will not be any cover yet, and therefore there would be no variance for estimates of percent cover). If the results of the power analysis based on year one initial data collection suggest that statistical power is below the defined minimum (see above), then data from additional transects will be collected to reach adequate statistical power. For each subsequent year of data collection, this same process will be applied: collect data based on the best initial estimate of adequate sample size (based on power analysis from the previous year), then perform another power analysis after initial data collection, and collect additional samples if the power analysis indicates the need for additional sampling. Sampling will occur between 1 June and 31 August during the 3rd, 5th, and 10th years following completion of restoration activities (CDP No. 1-10-032; Special Condition 2[A]8).

Diameter-at-breast height (DBH) will be measured using a stratified random sampling method with a subset of samples collected within each habitat reach and type (CDP No. 1-10-032; Special Condition 2[A]9). Measurements will be taken using a specialty diameter tape measure (d-tape or girthing tape) which is available from forestry supply companies. DBH shall be measured 4.5 ft above ground level on the uphill side of the tree and above and above any branches or swellings that may exist at that height. If there are several trunks close to ground level below 4.5 ft, then each trunk shall be measured separately and DBH calculated by taking the square root of the sum of all squared stem DBHs. Samples will be randomly collected each year within a polygon of adequate size to capture the full suite of planted tree species within the sampled habitat type and reach. The sampled polygon will be mapped using a GPS unit and the location will be located on a map which will be included in the annual report. The collected measurements for each tree species will be averaged and will show a statistically significant increasing trend for each tree species (and of the riparian forest) throughout the restoration area.

TIDEWATER GOBY SURVEYS

Success Criteria

As described in the AMP, the project objective to restore and enhance aquatic habitat and to create habitat and water quality conditions that support tidewater goby will be considered successful if tidewater gobies occur each year for 5 years of monitoring in habitat specifically created to support gobies.

Monitoring Methods

At a minimum, tidewater goby surveys consisting of beach seine or dip net surveys will be conducted in suitable habitats and within habitats specifically created for gobies within the project restoration areas in Years 3, 5, and 10 following the completion of restoration activities (CDP No. 1-10-032; Special Condition 2[A]12). Per the AMP, tidewater goby surveys will also be conducted annually at three or more locations within Riverside Ranch for the first 5 years after restoration using USFWS protocol for gobies (H. T. Harvey & Associates 2011). Surveys will be focused in habitats specifically created to support gobies.

Surveys will be conducted using the USFWS tidewater goby survey protocol, which is described in detail in Appendix F of the tidewater goby recovery plan (USFWS 2005) (Appendix B). The intent of the protocol is to document goby presence or absence. The survey protocol defines levels of effort based on size of habitat for either seine hauls or dip netting, with the intent on maximizing the likelihood of capture of gobies. However, during field surveys, once a goby is captured and presence has been verified, sampling at the specific site must cease. Mesh size for dip nets or seines is specified at 3 mm or less. The protocol also specifies that sampling occur between July 1 and October 31 to maximize the probability of capture (the time of year when gobies are most abundant).

SALMONID SURVEYS

Success Criteria

As described in the AMP, the project objective to restore and enhance aquatic habitat and to create habitat and water conditions that support salmonids will be considered successful if juvenile salmonids occur in the project area each year for 5 years of monitoring.

Monitoring Methods

Baited traps or beach seining for salmonids will be conducted at 1-2 locations within the Salt River tidal freshwater ecotone. Salmonid surveys will be conducted in the restoration areas at a minimum in Years 3, 5, and 10 following completion of restoration activities (CDP No. 1-10-032; Special Condition 2[A]13). Per the AMP, salmonid surveys will be conducted annually for the first 5 years after restoration using methods described in Wallace and Allen (2009).

Depending on the size of the area/habitat and amount of vegetation, either a small beach seine (approximately 9m x 2m, with <=6mm mesh) or larger beach seine (approximately 30m x 2m, with wing mesh approximately 19mm and bag with <=6mm mesh) will be used to survey with 1-2 hauls per site. Time of year for surveys would ideally be between March and July. At sites where seines cannot be hauled (too deep, current too fast, too much vegetation or large wood), minnow traps baited with frozen salmon roe will be deployed. Fish lengths will be measured to the nearest 0.1 mm.

AVIAN SURVEYS

Success Criteria

After a possible initial decrease in species richness in Year 1, it is anticipated that the increased diversity of habitats at Riverside Ranch and along the Salt River corridor will result in increased avian species richness by Years 5 and 10. Avian surveys shall be conducted in Years 3, 5, and 10 following completion of restoration activities at the restoration areas and at nearby reference areas (CDP No. 1-10-032; Special Condition 2[A]14). Interim success criterion will be a trajectory toward increased avian species richness through Year 10. The final success criterion will be greater avian species richness in Year 10 when compared to pre-project conditions.

Monitoring Methods

Point count surveys will be used to determine avian relative abundance and species richness at a minimum of 15 fixed monitoring stations along the Salt River, 5 survey locations around the perimeter of Riverside Ranch, as well as an additional 5 survey locations in reference habitats (both riparian and wetland) in the immediate vicinity of the project site to help control for interannual variability in species abundance. The point counts will follow standardized protocols (Ralph et al. 1993). That protocol is as follows: all surveys will be conducted within 4 hours of sunrise, which corresponds to the peak period of bird activity. No surveys will be conducted during rain or strong winds or after 10:00 am. Each location will be surveyed once per month during each of the following breeding season months- May, June and July. Late June or July surveys will be conducted to increase the probability of detection of breeding willow flycatchers and cuckoos, which typically arrive quite late in the spring/early summer. One set of surveys will take place prior to construction, and then the surveys will be repeated post-construction in Years 3, 5 and 10.

Surveys in tidal marshes shall be conducted at a similar tidal stage for each replicate survey both within and across years (Conway 2009). Survey points shall be placed at least 400 m apart in marsh habitats to avoid potential double counting of individual birds

Survey personnel must be highly experienced in avian identification, including vocalizations, as well as in the specific method being employed to help reduce error associated with using different observers. Ideally, the monitoring biologist will be the same for all surveys. However, given the long timeframe of the monitoring, this may not be feasible. Therefore, it is important that highly experienced personnel be utilized.

EELGRASS MONITORING

Success Criteria

Natural recruitment will be monitored pursuant to Eelgrass Monitoring Methods, listed below, for the first three years following the completion of construction. If the impacted eelgrass areas have not met the natural recruitment success criteria in three years, the areas shall be remediated within one year of a determination by the permittee or the Executive Director of the Coastal Commission that monitoring results indicate that recovery has not taken place;

A detailed remediation plan shall be included that provides for mitigation site identification, planting methods, monitoring methods, and schedule. Specific success and monitoring criteria are as follows:

a. A minimum of 70 percent aerial coverage and 30 percent density in the mitigation area after the first year;
b. A minimum of 85 percent aerial coverage and 70 percent density in the mitigation area after the second year;
c. A minimum of 100 percent aerial coverage and 85 percent density in the mitigation area after the third year.

If post-construction eelgrass survey results demonstrate adequate natural recruitment to the satisfaction of the Executive Director, or if remediation plan success criteria are met, a mitigation completion letter report shall be provided to the Executive Director of the Coastal Commission, DFG, and NOAA-Fisheries. If the eelgrass performance criteria, above, have not been met at the end of the three-year remediation period, the permittee shall submit an application for an amendment to Coastal Development Permit No. 1-10-032 proposing additional mitigation to ensure all performance criteria are satisfied consistent with all terms and conditions of this permit.

Monitoring Methods

An eelgrass mitigation and monitoring plan has been prepared and implemented as part of the Rare Plant Mitigation and Monitoring Plan (H. T. Harvey & Associates 2011b) to ensure that eelgrass is sufficiently restored to compensate for direct impacts to approximately 1.2 ac of eelgrass. The plan includes additional provisions as designated by Special Conditions [Number 2(A)11 and Number 11] of the CDP No 1-10-032. The Rare Plant Mitigation and Monitoring Plan will be approved by the Executive Director of the Coastal Commission.

ANNUAL QUALITATIVE ASSESSMENTS

A qualitative assessment of the project area will be performed annually in Years 1-10 by a qualified hydrologist/engineer and biologist. After Year 10, the Adaptive Management Team will evaluate the need to continue (or possibly decrease the frequency of) these assessments. Elements of this annual assessment will include the following:

- Photo-documentation
- Channel Stability
- Hydrologic function
- Invasive species
- Natural recruitment of desirable native vegetation

Permanent Photo-Documentation Points. Photo-documentation points will be established at fixed locations and photos will be taken in Years 1-10. Photographs will also be taken to document the annual progress of the restoration. Photographs will also be taken to record any events that may have a significant effect on the success of restoration such as flood, fire, or vandalism. The locations of the photo-documentation points will be selected in the first year of

monitoring after plant installation and mapped for future reference. Type of camera, focal length of lens, height above ground, and any other relevant information will be noted for each event.

Channel Stability. Periodic documentation of channel profiles of the Salt River and of tidal creeks in the Riverside Ranch tidal restoration area will be conducted to determine channel stability and to measure changes that may need to be addressed by adaptive management (CDP No. 1-10-032; Special Condition 2[A]16). Detailed monitoring protocols for to measure excessive sediment deposition and bank erosion are included in the AMP (H. T. Harvey & Associates 2011a).

Hydrologic Function. More detailed monitoring of the hydrologic function of the SRERP project is outlined in the AMP (H. T. Harvey & Associates 2011a). A qualitative summary of this monitoring will be reported annually to the regulatory agencies. Monitoring elements will include erosion, sedimentation, scour, tidal exchange, and functioning of the Sediment Management Areas. A report documenting the results of hydrological monitoring will be prepared and submitted by 30 November of the first year following completion of each phase of construction documenting that the physical restoration was built according to the design plan. The hydrological monitoring report will include results of the continuous water level and salinity monitoring and of the spot salinity monitoring.

Invasive Species. The presence of invasive wetland species such as dense-flowered cordgrass, purple loosestrife (*Lythrum salicaria*), reed canarygrass (*Phalaris aquatica* and *Phalaris arundinacea*) shall be identified and mapped during all site visits to the revegetated areas. Invasive species of Humboldt County with potential to occur include Himalayan blackberry (*Rubus discolor*), poison hemlock, pampas grass (*Cortaderia* spp.), French, Scotch and Spanish broom (*Genista* and *Cytisus* spp), common gorse (*Ulex europaea*), Italian thistle (*Carduus pycnocephalus*), yellow starthistle (*Centaurea solstitialis*), Canada thistle (*Cirsium arvense*) bull thistle, Japanese and Himalayan knotweed (*Polygonum* spp.) foxglove (*Digitalis purpurea*) and periwinkle (*Vinca major*). Maintenance protocols will include methods for eradication of any invasive plant species from the project area if they should colonize during the monitoring period.

The revegetated areas will be surveyed for non-native plant species by a qualified plant biologist, contracted independent of the site maintenance contractor and reporting to the Program Coordinator. Monitoring will take place annually Years 1-10, and will be conducted in the late spring and early fall until two successive years have shown the sites meet the success criteria (less than 5% invasive non-native plant species and less than 15% non-invasive non-native plant species within active replanting areas until Year 10). Once the sites have met the success criteria, monitoring can be reduced to once per year until Year 10, at which time monitoring will proceed per the AMP. Locations will be identified using GPS technology to create a map which will be provided to the RCD within two weeks of the field survey for distribution to the maintenance contractors. The responsibility for non-native plant monitoring and maintenance is ultimately held by the RCD, and may be contracted out as necessary to qualified second parties or accomplished through collaboration with other qualified entities.

Natural Recruitment of Desirable Native Vegetation. Natural recruitment is an important component in the successful revegetation of native plants within the restoration area. The revegetated areas will be qualitatively surveyed for naturally recruiting species for the duration of the monitoring period. A general description of the densities and locations of naturally occurring species will be included in the annual monitoring report.

BUILT-TO-PLAN FIELD VERIFICATION

The general location of active replanting areas, as well as any enhancement and pocket planting areas, will be surveyed using a GPS unit so that appropriate success criteria can be applied to the specific planting zones. Deviations that will be documented include changes in the numbers and species of plants installed, deviations from plant installation locations, unplanted areas, and any hardscape or other features added to the site. Future analysis of the site will be based on this field verification. Field Verification will be conducted to document that the restoration plan for the Salt River channel and Riverside Ranch has been implemented as designed.

All grading, filling, and dredging within each of the restoration areas within the Salt River channel and Riverside Ranch will be documented in the field to ensure that all elevations within each restoration area have been built according to the design plans. Elevation data shall be collected by an independent qualified surveyor, engineer, or landscape architect. Field documentation the that physical restoration has been built according to the design plans shall be submitted for review and approval by the Executive Director of the Coastal Commission within three months of completion of grading, filling, and dredging activities (CDP No. 1-10-032; Special Condition 2[A]1). In addition, a map of the Riverside Ranch tidal restoration areas will be developed and will include 1-ft elevation contours. This map will be developed and submitted for review and approval by the Executive Director of the Coastal Commission within six months following completion of all restoration grading, filling, and dredging within the tidal restoration areas of Riverside Ranch or within three months and concurrently with the documentation that the physical restoration has been built according to the design plans (CDP No. 1-10-032; Special Condition 2[A]5).

In addition, a report describing that all areas temporarily impacted by construction (~535 ac), such as all wetlands, agricultural lands, and other sensitive habitats have been restored to pre-project conditions as proposed. This report will be submitted for review and approval of the Executive Director of the Coastal Commission within 180 days of each phase of construction (CDP No. 1-10-032; Special Condition 2[A]4)

The installation of restoration plantings and livestock-exclusion fencing shall also be documented by an independent restoration ecologist. Field documentation shall include verification that the location, spacing, and species diversity of plantings have accurately been installed per the design plans with regard to location, spacing, and species diversity (CDP No. 1-10-032; Special Condition 2[A]2). Documentation will also verify that the livestock-exclusion fencing has been installed per the design plans. Field documentation that the planting plan and the live-stock exclusion fencing has been installed per the design plans shall be reviewed and approved by the Executive Director of the Coastal Commission within 3 months of completions of planting and fencing in the Salt River channel and in Riverside Ranch (CDP No. 1-10-032; Special Condition 2[A]2 and 3).

WETLAND DELINEATION

A delineation of mitigation wetland areas within the project footprint will be undertaken 5 years following site construction (CDP No 1-10-032; Special Condition 2[A]15). The delineation will include an examination of vegetation, soils, and hydrology to determine the acreage and distribution of the jurisdictional areas associated with each wetland. However, field indicators of hydric soils are not anticipated to be present by Year 5 in created wetlands. Such features typically develop over long periods of time (e.g., tens to hundreds of years). As such, the protocol outlined in Section F "Atypical Situations," Subsection 4 "Man-Induced Wetlands" of the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) describing the use of 2 parameters (hydrology and plants) will be followed. A wetland delineation report will be prepared which will include the results of the required wetland delineation and will document that a minimum of 757 ac of wetland exists within the project area footprint.

If the desired jurisdictional acreage is not achieved in Year 5 or if climatic conditions were atypical in that year, the wetland delineation will be repeated at the site in subsequent years to accurately determine the wetland acreage achieved.

RIPARIAN BOUNDARY ASSESSMENTS

The boundaries of riparian areas will be estimated from aerial photographs or on-the-ground GPS surveys during habitat mapping activities in Years 3, 5, and 10. Detailed boundaries of riparian areas will be mapped in the 15th and 20th years following completion of restoration activities. The riparian boundaries from each survey shall be overlain on any previous boundary determinations in order to determine the spatial stability of the riparian restoration. The results of riparian habitat boundary assessments will be included in annual biological monitoring reports will document whether a minimum of 128 ac of riparian habitat has been created within the project area footprint as documented by quantitative monitoring of the riparian restoration areas as described in this monitoring plan (CDP No. 1-10-032; Special Condition 2[A]9).

MANAGEMENT RECOMMENDATIONS

Management recommendations will be included in each monitoring report. Recommendations will identify any items inhibiting the progress toward successful restoration and will propose solutions to any identified problems as appropriate.

MONITORING SCHEDULE

Wetland and riparian vegetation will be monitored for 10 years to ensure successful establishment of the desired native habitat. Table 11 shows the monitoring schedule for the SRERP.

DATA COLLECTION, ANALYSIS AND REPORTING

Data collection will take place between April and October of each monitoring year. Data analysis will be conducted as soon as possible after data collection so that the data may be

reviewed and additional site visits may be conducted if required to verify any discrepancies in the data.

A biological monitoring report will be submitted to the regulatory permitting agencies by 31 December of each monitoring year. Annual monitoring reports will include a brief description of the project, maps showing the monitoring areas, the methods used to collect and analyze the data, the results of the data analysis, a discussion of the results, and conclusions regarding the present condition of the site. Biological monitoring reports will also include the results of biological monitoring including fish, bird, eelgrass, and other rare plant survey results in Years 3, 5 and 10 following completion of Phase 2 restoration activities, including an assessment of success relative to established criteria within one year of completion of field sampling. The report will also include a Recommendations section, which will discuss any additional actions required to achieve the final success criteria. Representative photographs will be included.

Table 11. Salt River/Riverside Ranch Monitoring Schedule

	PRE-CONSTRUCTION	8 WEEKS POST-CONSTRUCTION	3 MONTHS POST-CONSTRUCTION	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	YEAR 15	YEAR 20
Short term Monitoring for Tidal Exchange Verification				X	X	X		X		X		X			
Non-native Invasive Plants				X	X	X	X	X	X	X	X	X	X		
Built-to-plan Field Verification			X												
Percent Cover Salt Marsh						X		X		X			X		
Percent Cover High Marsh Ecotone				X	X	X		X		X			X		
Percent Cover Riparian					X	X		X		X			X		
DBH Riparian						X		X					X		
Salt Marsh Habitat Acreage	X			X		X		X		X			X		
Riparian Habitat Acreage	X			X		X		X		X			X		
Salt River Wetland Percent Cover				X	X	X		X							
Tidewater Goby, Salmonid, Eelgrass Surveys	Per the AMP														
Avian Surveys	X					X		X					X		
Annual Qualitative Assessments				X	X	X	X	X	X	X	X	X	X		
Wetland Delineation								X							
Riparian Habitat Boundary Assessments						X		X					X	X	X

In addition to the annual biological monitoring report, individual reports will be submitted to the Executive Director of the Coastal Commission as described below. If appropriate within the required timelines described below, the results of these individual reports may be submitted as part of the annual monitoring report or as appendices to the annual monitoring reports for the given year in which they are required.

- A report describing that all areas temporarily impacted by construction (~535 ac), such as all wetlands, agricultural lands, and other sensitive habitats have been restored to pre-project conditions within 180 days of each phase of construction. This report will be submitted for review and approval of the Executive Director of the Coastal Commission within 180 days of each phase of construction (CDP No. 1-10-032; Special Conditions 2[A]4 and 2[A]18a).
- A map of the Riverside Ranch tidal restoration areas with 1-ft elevation contours will be submitted for review and approval of the Executive Director of the Coastal Commission within 6 months following completion of all Phase 1 restoration grading, filling, and dredging within the tidal restoration areas (CDP No. 1-10-032; Special Conditions 2[A]5 and 2[A]18b)
- A report documenting the results of hydrological monitoring by 30 November of the first year following completion of each phase of construction documenting that the physical restoration was built according to the design plan. The hydrological monitoring report will include results of the continuous water level and salinity monitoring and of the spot salinity monitoring (CDP No. 1-10-032; Special Condition 2[A]18c).
- A report documenting that the biological/ habitat restoration based on seeding and container planting was built per the design plans within 4 months of completion of restoration activities for each Phase 1 and Phase 2 construction activities (CDP No. 1-10-032; Special Condition 2[A]18d.
- Biological monitoring reports will also be submitted describing the results of biological monitoring including fish, bird, eelgrass, and other rare plant survey results in Years 3, 5 and 10 following completion of Phase 2 restoration activities, including an assessment of success relative to established criteria within one year of completion of field sampling (CDP No. 1-10-032; Special Condition 2[A]18e).
- Year 5 Wetland Delineation Report. This report will include the results of the required wetland delineation and will document that a minimum of 757 ac of wetland exists within the project area footprint (CDP No. 1-10-032; Special Condition 2[A]18f).
- Report documenting a minimum of 128 ac of riparian habitat has been created within the project area footprint as documented by quantitative monitoring of the riparian restoration areas described in this monitoring plan (CDP No. 1-10-032; Special Condition 2[A]18g).

- If the Year 10 biological monitoring report indicates that the project has not met the approved goals and objectives set forth in the approved CDP application, an application for an amendment to CDP No. 1-10-032 shall be submitted proposing a revised or supplemental restoration and monitoring program to compensate for those portions of the original program which did not meet the approved goals and objectives. This application shall be submitted

within 6 months of submittal of the Year 10 monitoring report (CDP No. 1-10-032; Special Condition 2[B].

Monitoring-Maintenance Linkage

The results of monitoring and any management and/or maintenance recommendations will be included in the project's annual monitoring report. These recommendations will be conveyed to the administrator of the maintenance contractor to allow the information to be used in their ongoing maintenance program. In addition, if monitoring crews notice significant problems related to the site's maintenance and performance, then verbal reporting will be conducted to ensure that maintenance issues are addressed in a timely manner.

Completion of Restoration

A final monitoring report will be completed at the end of the monitoring period, at which time a final monitoring report will be prepared to determine if the project has met the final success criteria. If the project has successfully met the expected success criteria, a copy of the final report and a letter will be sent to permitting agencies acknowledging the site conditions at the project and requesting their concurrence.

If the Year 10 biological monitoring results indicate that the project has been unsuccessful, in part, or in whole, based on the approved goals and objectives set forth in the approved Coastal Development permit application, the permittee shall submit an application of an amendment to CDP No. 1-10-032 proposing a revised or supplemental restoration and monitoring program to compensate for those portions of the original program which did not meet the goals and objectives within 6 months of submittal of the Year 10 biological monitoring report (CDP No 1-10-032; Special Condition 2[B].

CONTINGENCY MEASURES

If the initial monitoring determines that the site is not developing along a trajectory to meet the project goals and objectives and the regulatory permit requirements, additional monitoring and management activities may be prescribed through the adaptive management process. The AMP provides a structure and process to address project elements which may not be meeting the goals and objectives. The adaptive management process applies to the project as a whole, but management actions can be identified and implemented on individual reaches or sub-reaches, as determined by the monitoring results and consensus by the Adaptive Management participants. The process is flexible as it allows for a wide range of management actions but just as importantly it imposes a structured approach as management actions must derive from monitoring results. The adaptive management process also accommodates different physical and temporal scales for management actions.

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APPENDIX A.
SALT RIVER AMP REPORT

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SALT RIVER ECOSYSTEM RESTORATION PROJECT
ADAPTIVE MANAGEMENT PLAN

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1.0 EXECUTIVE SUMMARY

The Salt River Ecosystem Restoration Project (SRERP) is located in Humboldt County, near the City of Ferndale, California. The purpose of the Salt River Ecosystem Restoration Project is to restore historic processes and functions to the Salt River watershed. These processes and functions are necessary for re-establishing a functioning riverine, riparian, wetland and estuarine ecosystem as part of a land use, flood alleviation, and watershed management program. The goals of the Salt River Ecosystem Restoration Project include:

- Restore the Salt River channel and adjacent riparian floodplain by increasing hydraulic conveyance and constructing habitat features that re-establish ecological processes beneficial to fish and other native species.
- Restore historic estuarine habitat and tidal connectivity within the lower Salt River.
- Improve water quality and drainage efficiency across the floodplain.
- Manage excess sediment loads by maximizing fluvial and tidal channel sediment transport capacity and designing sediment management areas.

In an effort to achieve the project goals, 4 project components have been identified, including 1) restoration of the Salt River channel and riparian floodplain, 2) tidal marsh restoration at Riverside Ranch, 3) sediment maintenance in the channel and riparian floodplain, and 4) upslope sediment reduction.

Given the watershed-level scale of the SRERP, the variety of habitats and hydrologic conditions, the high initial disturbance to the ecosystem, interactions with agricultural land uses, and typical level of uncertainty associated with the evolution of ecosystem restoration projects, this project will benefit from an adaptive management program. Adaptive management employs a structured approach, yet it is also a flexible tool that can adjust to a dynamic environment and an evolving project. Adaptive management can thereby keep a project 'on track' toward meeting its goals and objectives, despite the variability inherent in dynamic, natural systems over spatial and temporal scales.

This AMP describes the organizational structure for the adaptive management process and identifies the initial monitoring activities proposed to evaluate project progress towards meeting the goals and objectives, establishes the triggers or thresholds that would initiate a management response, and describes a range of potential adaptive management actions. If project monitoring determines that a management trigger has been "activated" then there are 3 possible response pathways:

- Determine that more data is required and continue (or modify) monitoring,
- Identify and implement a remedial action, or

Modify project goals and objectives (this option would *only* be considered as a last resort and upon careful consideration by and consensus of the Project Management Team).

There may be multiple management action options when a particular trigger or threshold is activated, depending on a variety of factors such as how far the project is from achieving a specific goal, whether the situation is an imminent threat to local infrastructure, ecosystem services/functions or site stability, etc. The process is flexible as it allows for a wide range of management actions but just as importantly it imposes a structured approach as management actions must derive from monitoring results.

This Adaptive Management Plan (AMP) has been designed to provide a strong long-term adaptive management program while still providing flexibility within both the organizational structure and the monitoring program to ensure that the project can work toward meeting the long-term SRERP goals and objectives.

2.0 INTRODUCTION

2.1 PROJECT BACKGROUND

The Salt River Ecosystem Restoration Project is located in Humboldt County, near the City of Ferndale, California (Figure 1). The purpose of the Salt River Ecosystem Restoration Project (SRERP) is to restore historic processes and functions to the Salt River watershed. These processes and functions are necessary for re-establishing a functioning riverine, riparian, wetland and estuarine ecosystem as part of a land use, flood alleviation, and watershed management program. Levees constructed to protect the productive agricultural lands of the Salt River floodplain from the adjacent Eel River's tidal and flood influences have changed regional drainage patterns. As a result, naturally high influent sediment loads are no longer effectively transported across the Salt River floodplain. The ongoing aggradation of the Salt River channel, and aggradation and flooding of local infrastructure and residential properties, have led to loss of habitat, diminished property value, and declining agricultural productivity.

The SRERP will re-connect the Eel River estuary - via the historic Salt River channel- to a series of 5 streams draining the Wildcat Mountains. In order to do this, 7 river/riparian corridor miles and 400 acres (ac) of tidal wetland will be restored to support a broad list of special status and native species. The SRERP focuses on re-establishing hydraulic connections across the floodplain and will also serve community needs including water quality improvement, flood alleviation, and carbon sequestration. Specific goals of the Salt River Ecosystem Restoration Project include the following:

- Restore the Salt River channel and adjacent riparian floodplain by increasing hydraulic conveyance and constructing habitat features that re-establish ecological processes beneficial to fish and other native species;
- Restore historic estuarine habitat and tidal connectivity within the lower Salt River;
- Improve water quality and drainage efficiency across the floodplain;
- Manage excess sediment loads by maximizing fluvial and tidal channel sediment transport capacity and designing sediment management areas;
- Initiate a long-term corridor adaptive management process that maximizes ecological restoration success in a working landscape by:
    - reducing headwater erosion and sediment delivery to the Salt River floodplain;
    - increasing the volume and efficiency of clear water drainage from the upstream watershed and adjacent agricultural land, and;
    - providing and maintaining sediment management areas that minimize impacts to land use and ecological function.

In an effort to achieve these goals, 4 components have been identified to serve as the framework of the SRERP. They include:

1. Salt River Channel and Riparian Floodplain Corridor Restoration
2. Riverside Ranch Tidal Marsh Restoration
3. Channel and Riparian Floodplain Sediment Maintenance
4. Upslope Sediment Reduction

Each component has a pivotal role in the overall success and long-term benefit of the project. Restoration objectives have been established for each project component in an effort to achieve the overall project goals.

2.1.1 Salt River Channel and Riparian Floodplain Corridor Restoration

One element of the Salt River Ecosystem Restoration Project is the Salt River channel and riparian floodplain corridor restoration. This component will re-establish a defined channel and riparian corridor from the Salt River confluence with Williams Creek downstream to the confluence of the Salt River with Cutoff Slough, a total corridor length of approximately 7.4 miles. The corridor design is intended to re-establish a functioning channel and floodplain corridor that integrates long-term sediment management and regional drainage needs while restoring significant aquatic and riparian habitat value and ecologic function to the project area.

The following Salt River Channel and Floodplain Corridor Restoration objectives are designed to attain the overall project goals of the Salt River Ecosystem Restoration Project:

- Establish and sustain a dynamic river corridor by optimizing flow and sediment conveyance, integrated with natural floodplain interaction and discrete sediment management areas.
- Integrate sediment capture and removal (sediment management) actions into the Adaptive Management Plan in order to help sustain hydraulic conveyance and ecologic function.
- Minimize the cost, frequency and extent of required sediment management related maintenance activities which disturb the riparian corridor and disrupt ecosystem function.
- Maximize riparian habitat functions and values, extent and complexity by increasing plant species diversity, corridor shading, large wood recruitment, and minimizing invasive species.
- Optimize floodplain habitat complexity.
- Introduce instream salmonid rearing and refugia habitat where acceptable and sustainable within corridor design.
- Incorporate opportunities to re-connect the corridor to watershed tributaries to improve fish access to spawning and rearing habitats.
- Improve and maintain adjacent land drainage.
- Integrate a Regional Landowner Drainage Management planning process into the Adaptive Management Plan that establishes the framework for the development, coordination and funding to enhance the integration of overland drainage with agricultural land practices adjoining the corridor.

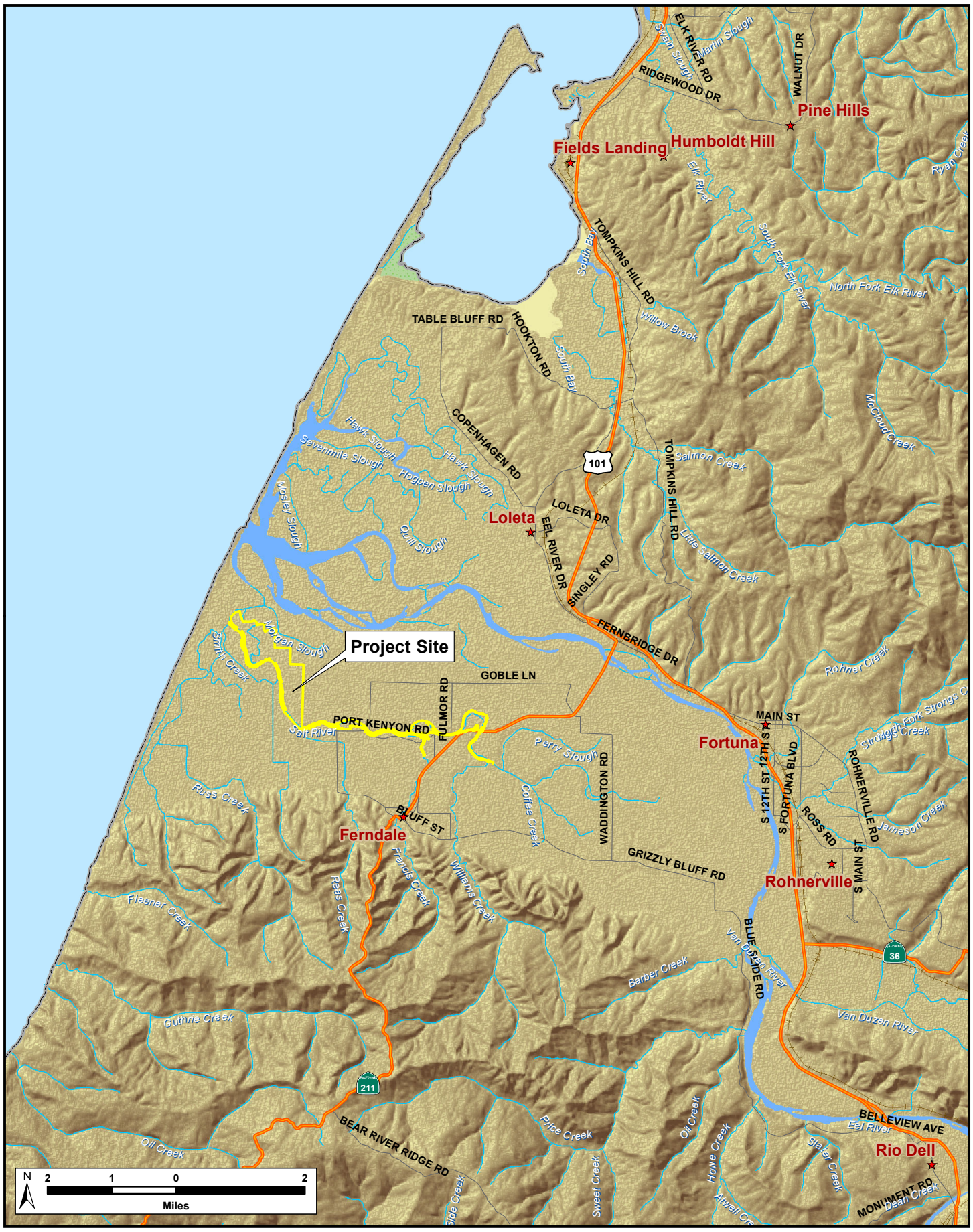

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Figure 1: Vicinity Map
Salt River Ecosystem Restoration Project
Adaptive Management Plan (3117-06)
July 2012

2.1.2 Riverside Ranch Tidal Marsh Restoration

The Riverside Ranch restoration will re-establish intertidal wetland habitat to the Eel/Salt River Estuary. The increase in tidal exchange associated with a restored marsh will also help sustain a restored Salt River channel. Restoring tidal prism to the lower Salt River, (i.e., increasing the volume of water exchanged on each tidal cycle) increases channel scour and helps maintain and equilibrate the width and depth of the channel.

The objectives of the Riverside Ranch Tidal Marsh Restoration include the following specific items to help attain the overall project goals of the Salt River Ecosystem Restoration Project.

- Use the increase in tidal prism to help maintain the constructed Salt River channel geomorphology and conveyance.
- Improve drainage and water quality in the lower Salt River and Eel/Salt River estuary.
- Restore tidal connectivity to historic tidal wetlands to allow for the natural evolution of diverse and self-sustaining salt- and brackish water tidal marshes, intertidal mudflat and shallow water habitats.
- Restore the marsh to include and expand the transition zone between tidal wetland and upland.
- Create a template for the natural evolution of a complex tidal drainage network. The network will maximize subtidal and intertidal habitats beneficial to target fish and wildlife species. This includes the enhancement of rearing and migration conditions for estuarine-dependent species including: coho salmon, Chinook salmon, steelhead trout, coastal cutthroat trout, tidewater goby, and commercially and recreationally valuable species such as redtail perch.
- Retain approximately 70 acres where agricultural management techniques can be used for short-grass Aleutian cackling goose habitat.
- Provide wintering habitat for migratory waterfowl and shorebirds.
- Provide public access to the extent feasible without compromising the physical and biological project objectives.
- Avoid adverse impacts to the existing drainage of adjacent parcels.
- Design site components that can support natural geomorphic response to sea-level rise.

Restoration of Riverside Ranch is intended to strike a balance between creating significant amounts of new tidal marsh habitat, retaining and enhancing some of the important existing upland features, preserving sufficient acreage for creation of short grass habitat, minimizing long-term site maintenance, and incorporating design features that accommodate sea-level rise.

2.1.3 Riparian Floodplain and Channel Corridor Maintenance

Ongoing maintenance activities will be vital to ensuring lasting hydraulic and ecological function of the restored system. Maintaining the proposed project components, such as the channel,

sediment management areas, drainage ditches, and the berms, will require optimizing overland drainage inflows to the system, and integrating land use with sediment and vegetation maintenance areas. Although minimized, and circumscribed as much as possible, these designated maintenance areas may require vegetation removal, ongoing riparian planting and/or repeated excavation or reworking of deposited sediments.

The channel maintenance activities will be conducted during seasons that avoid impacts to most salmonid and wildlife species. These include conducting in-water activities between July and October to avoid water quality impacts that could affect salmonids, and conducting upland activities, including vegetation removal, after mid-August when the breeding season is over to avoid impacts to actively nesting birds, unless the area has been cleared by pre-construction surveys.

2.1.4 Upslope Sediment Reduction

Activities that will be employed under this project component include: on- and off-channel sediment retention basins; debris basins; stream bank stabilization; and road improvements such as culvert replacement, revegetation of riparian habitat, rock armoring, stabilizing stream banks or small streamside landslides, road rehabilitation, watercourse-crossing improvements, ditch relief culverts and drainage ditches. These road drainage improvements will reduce sediment loading into the headwater streams. Using the information from an upslope erosion inventory in the Wildcat Mountain tributaries, sediment sources have been identified and prioritized. As opportunities arise and funding allows, Best Management Practices (BMPs) and other site-specific erosion control measures will be implemented to reduce fine sediments from upslope areas. Upslope activities are excluded from the AMP.

2.2 RATIONALE FOR ADAPTIVE MANAGEMENT

This project will benefit from an adaptive management program for a number of reasons. The watershed is situated in a region with a combination of a relatively active tectonic regime, highly erodible soils, and high rates of annual precipitation. This creates an extremely dynamic natural system in which to work. Given the large scale of the Salt River project, the variety of habitats and hydrologic conditions, the high initial disturbance to the ecosystem, interactions with agricultural land uses, and typical level of uncertainty associated with the evolution of ecosystem restoration projects, this project will benefit from an adaptive management program. Additionally, in light of the technical challenges involved in maintaining the restored channel, and resultant complexity of the associated monitoring program, this Adaptive Management Plan (AMP) has been developed as the most effective and flexible management tool.

Adaptive management is a systematic and iterative process that provides for feedback between monitoring and management actions. The feedback mechanism is engaged when monitoring data are analyzed, and the results are utilized to adjust project operations in a manner that optimizes the achievement of project goals.

Adaptive management employs a structured approach, yet it is also a flexible tool that can adjust to a dynamic environment and an evolving project. Adaptive management can thereby keep a project 'on track' toward meeting its goals and objectives, despite the variability inherent in

dynamic, natural systems over spatial and temporal scales. Adaptive management assists managers in responding to unanticipated changes in the various components of a project such as hydrology, sedimentation, target habitat development, or changes in the species' response along a restoration trajectory (NRC 2004).

2.3 GOALS AND OBJECTIVES OF THE ADAPTIVE MANAGEMENT PLAN

This AMP describes the organizational structure for the adaptive management process to ensure that project goals and objectives are attained while providing for on-going, long-term input from local property owners. We have included the following critical elements which we consider integral to a successful Adaptive Management Plan:

- Specify the structure and responsibilities of the Project Management Team;
- Assign responsibility to identify/obtain funding for monitoring and adaptive management activities;
- Identify monitoring program components for use in evaluating the results of project implementation;
- Identify triggering mechanisms or early stress indicators that will be used to alert the project management team of the need to take action;
- Identify potential adaptive project management options once trigger thresholds have been reached;
- Develop an appropriate conceptual model of adaptive management process, which will:
    - outline a feedback loop between management actions and monitoring,
    - inform managers,
    - select adaptive management actions, and
    - refine the on-going monitoring program.

3.0 ADAPTIVE MANAGEMENT APPROACH

Two key elements of this AMP are 1) a description of the organizational structure for the Adaptive Management Participants that will implement the adaptive management process (Figure 2), and 2) the conceptual model of the adaptive management process itself (Figure 3). This AMP also provides descriptions of the roles and responsibilities of the Adaptive Management Participants, monitoring activities, management triggers and actions, and other elements that together constitute a functional AMP. This AMP is a companion document to the project's CEQA document, the Habitat Mitigation and Monitoring Plan (HMMP), and the other various technical documents that are incorporated into the project's regulatory permits, such as the Biological Opinions (BO).

The adaptive management process is outlined in Figure 3. The entire process is driven by the project goals and objectives together with the regulatory permit requirements. The Adaptive Management Participant group provides the structure to ensure that the project goals and objectives are met through the monitoring and adaptive management activities described in this document. This AMP group is composed of the Project Management Team, the Program Coordinator, the Stakeholder Work Group, the Regulatory Work Group, the Technical Advisory Work Group, and the Monitoring Group. As shown on Figure 2, the various parties have different responsibilities ranging from decision making, to project management and coordination, to advisory.

This AMP also identifies the initial monitoring activities proposed to evaluate project progress towards meeting the goals and objectives, establishes the triggers or thresholds that would initiate a management response, and describes a range of potential adaptive management actions. If project monitoring determines that a trigger has been "activated" then there are 3 possible response pathways:

1. Determine that more data is required and continue (or modify) monitoring,
2. Identify and implement a remedial action, or

Modify project goals and objectives (this option would *only* be considered as a last resort and upon careful consideration by and consensus of the Project Management Team). Any proposed modification to project goals and/or objectives must be reviewed and approved by the Executive Director of the Coastal Commission and may require an amendment to CDP No. 1-10-032 .

There may be multiple management action options when a particular trigger or threshold is activated, depending on a variety of factors such as how far the project is from achieving a specific goal, whether the situation is an imminent threat to local infrastructure, ecosystem services/functions or site stability, etc. The adaptive management process applies to the project as a whole, but management actions can be identified and implemented on individual reaches or sub-reaches, as needed. The process is flexible as it allows for a wide range of management actions but just as importantly it imposes a structured approach as management actions must derive from monitoring results. The adaptive management process also accommodates different physical and temporal scales for management actions.

Adaptive Management Participants

Roles

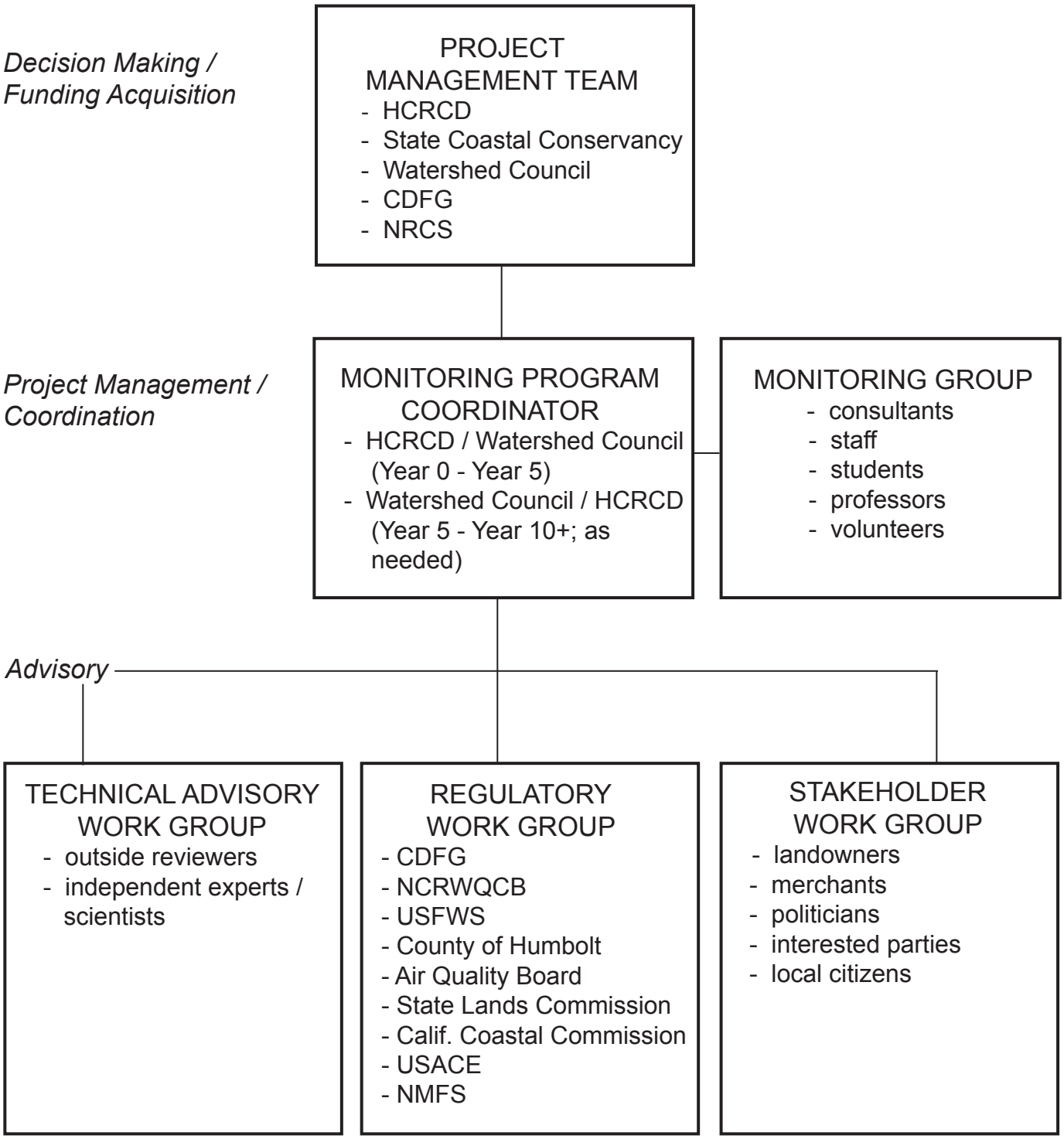

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Figure 2: Organizational Structure for the Adaptive Management Participants
Salt River Ecosystem Management Project (3117-06)
July 2012

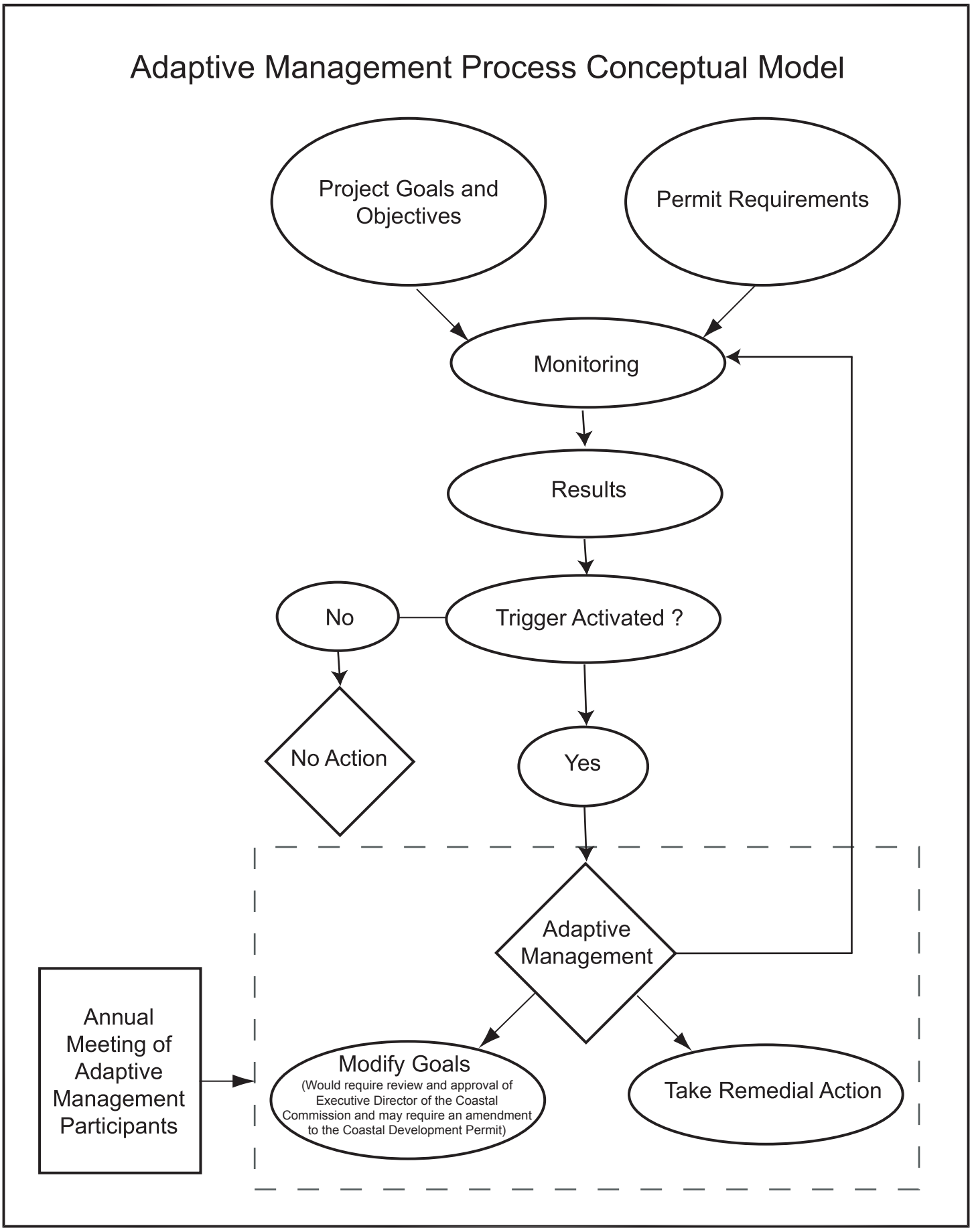

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Figure 3: Organizational Structure for the Adaptive Management Participants
Salt River Ecosystem Management Project (3117-06)
July 2012

4.0 ADAPTIVE MANAGMENT PARTICIPANTS

4.1 PROJECT MANAGEMENT TEAM

The Project Management Team (PMT) will comprise the Humboldt County Resource Conservation District (HCRCD), the Natural Resources Conservation Service (NRCS), the Salt River Watershed Council (Watershed Council), the California State Coastal Conservancy (SCC), the California Department of Fish and Game (CDFG), and possibly 1 or 2 other active project participants (to be determined prior to the completion of construction). The PMT is responsible for ensuring that the project goals and objectives are met. This includes day-to-day and long-term decision-making and ensuring that adaptive management decisions are implemented. The PMT is also responsible for ensuring that adequate funding is available to ensure that project goals and objectives are met, which includes funding for implementation, restoration, monitoring and adaptive management, maintenance, and daily operations. They will also be responsible for any ongoing communication that needs to be distributed to the rest of the Adaptive Management Participants (see Figure 2) such as reports, e-mails, newsletter, and website materials.

Below is a description of the roles of each of the PMT member agencies.

4.1.1 Humboldt County Resource Conservation District (HCRCD)/Salt River Watershed Council.

The duties described here will be the responsibility of the HCRCD, with assistance from the Watershed Council in Years 0-5. After Year-5, the Watershed Council will assume primary responsibility with guidance and assistance from the HCRCD.

4.1.1.1 General Project Management

The HCRCD will be responsible for the general day-to-day management of the project for the first 5 years after implementation. The HCRCD will work with the Program Coordinator to report to the Adaptive Management Participants on project conditions and will be responsible for implementing any maintenance and management actions. They will review and revise the restoration targets and triggers and ensure that management actions and recommendations received from the Project Management Team and the Technical Advisory, Stakeholder, and Regulatory Work Groups are considered in ongoing management. The Watershed Council will assist the HCRCD in these duties during the first 5 years.

4.1.1.2 Funding

The HCRCD will oversee budgeting and funding and will ultimately be responsible as part of the PMT for ensuring that the necessary funding is in place to perform project management. The HCRCD will be responsible for assuring necessary staff (including the Program Coordinator), consultants as needed, and any additional staff to perform maintenance and monitoring.

4.1.1.3 Meetings, Outreach, and Communication

The HCRCD will convene the various members of the Project Management Team for a mandatory annual meeting to discuss management items and to ensure that the project is progressing as designed and is in compliance with all regulatory requirements. The HCRCD will ensure that regular reports are provided to the Technical Advisory, Stakeholder, and Regulatory Work Groups for comment and review before the annual meeting. Additional meetings will be scheduled as necessary to address any ongoing maintenance or management concerns. They will communicate regularly with stakeholder groups (including local landowners) to inform those groups on the progress of the project, coordinate access for maintenance and monitoring to address any concerns. The HCRCD, in coordination with the Watershed Council, will take the lead in encouraging and developing volunteer community restoration, maintenance, and monitoring activities.

4.1.2 Salt River Watershed Council

The Salt River Watershed Council (Watershed Council) was incorporated as a 501(c)(3) in 2008 to manage and maintain the project once it is completed. The Watershed Council comprises an all-volunteer Board of Directors with the mission to foster education and encourage public cooperation to restore, improve, protect and maintain ecosystem functions and agricultural, economic, and community sustainability in the Salt River Watershed. The Watershed Council will assist the HCRCD by providing input on the project design. Once the project is implemented, the Watershed Council will work cooperatively with the HCRCD during the first 5 years of the project to provide assistance and guidance for ongoing activities such as project management, funding, monitoring, reporting, outreach, meetings and establishing volunteer programs.

After Year-5, the Watershed Council will assume the primary management responsibilities for the project. These responsibilities will include those spelled out above for the HCRCD for Years 0-5. The HCRCD will take a lesser role in Years 5-10 and beyond, and will function to assist and guide the Watershed Council in management activities.

4.1.3 California State Coastal Conservancy

The California State Coastal Conservancy (SCC) will provide advisory input, project management and review, as well as assistance with the identification of funding avenues.

4.1.4 California Department of Fish and Game (Riverside Ranch)

The California Department of Fish and Game (CDFG) as owners of Riverside Ranch will have primary responsibility for developing overall resource management goals and objectives for their property. Additional management activities may occur per CDFG objectives.

4.1.5 Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS) will be responsible for some monitoring and maintenance activities in connection with a Wetlands Reserve Program (WRP) contract on Riverside Ranch and also on other Conservation Easements throughout the channel corridor.

4.1.6 Program Coordinator

The Project Management Team will hire or designate a Program Coordinator who will be responsible for developing and overseeing the implementation of the monitoring program as outlined in this AMP and in the project's Mitigation and Monitoring Plan (HMMP) (HTH 2010, in process). The Program Coordinator will report to the Project Management Team and will oversee the funding process to hire consultants or research teams, manage monitoring programs, and/or coordinate with interns or volunteers through HSU Graduate programs or other educational or volunteer organizations to collect monitoring data. As part of this coordination, the Program Coordinator will develop an annual training program to provide instruction on monitoring methods to any volunteer staff performing field work.

The Program Coordinator will oversee the Monitoring Group activities and will ensure that all monitoring data are collected, analyzed and stored in a credible and timely fashion. He/she will perform an initial review of the data to ensure that data collection is complete, analyzed properly and that reports are prepared in a timely manner. The Program Coordinator will evaluate the data per the AMP, and the HMMP schedules to determine progress toward meeting project goals and identifying the need for management triggers as they arise. He/she will ensure the Project Management Team prepares results, monitoring reports, and management recommendations for review before they are disseminated to the Technical Advisory, Stakeholder, and Regulatory Work Groups. The Program Coordinator will attend funder, stakeholder, agency, and other meetings as needed.

4.1.7 Monitoring Group

The PMT, with assistance from the Program Coordinator, will assume responsibility for selection or hiring of the Monitoring Group members and will ensure that the Monitoring Group provides sound scientific monitoring. The HCRCD and the Watershed Council will provide oversight, management, direction, leadership, and coordination for the Monitoring Group activities. The Monitoring Group members may include private consultants, volunteer organizations, and academic institutions such as Humboldt State University. Monitoring may be performed by any of these entities, either individually or in coordination with others.

4.1.8 Technical Advisory Work Group

The Technical Advisory Work Group shall be made up of a committee of outside reviewers and independent technical experts and scientists. The Technical Advisory Work Group will perform a peer review of the annual monitoring report. They will review the annual monitoring report and provide feedback and recommendations for the upcoming year at the annual meeting with the Project Management Team, the Stakeholder and Regulatory Work Groups. This feedback

could consist of potential management actions, revisions to the monitoring program, and general recommendations to management actions.

4.1.9 Stakeholder Work Group

An additional component of a successful adaptive management strategy includes providing an avenue to inform and educate the public about the project, as well as soliciting their regular input and providing an opportunity for them to voice observations, concerns and opinions. A Stakeholder Work Group will provide this avenue and will serve in an advisory capacity to the Project Management Team. The Stakeholder Work Group will serve as the 'eyes and ears' on the ground and will be able to immediately report any problems to the Project Management Team. The Stakeholder Work Group may comprise local landowners and businesses, local government staff, elected officials, local citizens, environmental organizations, public works managers, or other interested parties. They will review the annual monitoring report and participate in an annual meeting with the Project Management Team, the Technical Advisory and Regulatory Work Groups to provide input and recommendations on the ongoing implementation of the project. The Watershed Council may also be an appropriate entity to serve in this capacity, augmented by additional public meetings to solicit input from the larger community.

4.1.10 Regulatory Work Group

A Regulatory Work Group has been established as part of the permit application process, and will be maintained to evaluate the progress of the project toward meeting the various regulatory requirements. The Regulatory Work Group will include agency members from the CDFG, the California State Coastal Commission (CCC), United States Fish and Wildlife Service (USFWS,) NOAA Fisheries/NMFS, the United States Army Corps of Engineers (USACE,) the RWQCB, North Coast Regional Water Quality Control Board (NCRWQCB), the County of Humboldt, the State Lands Commission, (SLC) and others as identified during the permitting process. The Regulatory Work Group members will be invited to participate in the annual meeting with the Project Management Team, and the Stakeholder and Technical Advisory Work Groups to provide review, input and recommendations to the project for the upcoming year.

4.2 ADAPTIVE MANAGEMENT PROCESS

The Adaptive Management Plan process shown in Figure 3 outlines the decision making process. Each element of this process is briefly described below.

4.2.1 Project Goals and Objectives

The Project goals and objectives have been described in the Project Background section above. The goals and objectives have been developed from various supplemental materials during the project planning phases. These supplemental documents include, but are not necessarily limited to:

- Riverside Ranch Conceptual Restoration Plan (H. T. Harvey & Associates 2008)
- Salt River Channel Excavation Design Report (Tauzer and Chow 2009)

- Excavation Materials Management Plan- Salt River Ecosystem Restoration Project (Winzler & Kelly 2010)
- Salt River/Riverside Ranch Revegetation and Land Use Plan (H. T. Harvey & Associates 2010)
- Salt River Ecosystem Restoration Project 30% Restoration Design Plans (Humboldt County Resource Conservation District 2010)
- Salt River Habitat Mitigation and Monitoring Plan (H. T. Harvey & Associates 2010)
- Draft Environmental Impact Report: Salt River Ecosystem Restoration Project (Grassetti 2010).

4.2.2 Permit Requirements

Agencies with permitting or regulatory responsibility for the project are detailed in the Draft Environmental Impact Report (Grassetti 2010) and the HMMP (H. T. Harvey & Associates 2010, in prep). Results of annual monitoring per the HMMP and the AMP will be compared with the project's permitting and monitoring requirements. Management actions will be determined based on the requirements in those documents and in other project regulatory documents.

Potential maintenance/adaptive management actions and impact avoidance measures are included in Appendix B (Table B-1). The Coastal Development Permit also includes a set of Special Conditions that are required to be met for issuance of the Coastal Development Permit (CDP No. 1-10-032); Table B-1 addresses many of the special conditions' requirements. Those CDP Special Conditions are also included as an appendix to this AMP (Appendix C).

The AMP is a document intended to guide monitoring, maintenance and management of the project in perpetuity. However, CDP Condition 15 provides specific limits on the duration of authorization provided by the Coastal Commission for implementation of the AMP. The initial authorization is for a period of 5 years, until October 5, 2016. That authorization may be extended for additional periods per the process described in Condition 15.

4.2.3 Monitoring

The purpose of monitoring per the HMMP and the AMP is to assess progress of the project toward meeting Project goals and objectives, to track regulatory compliance during the required monitoring period, evaluate management actions, and to detect areas displaying potential problems or changes that may require remedial actions.

4.2.3.1 Monitoring Per the Habitat Mitigation and Monitoring Plan

The HMMP serves as a companion document to CEQA and permit support documents and describes the mitigation associated with project impacts under regulatory jurisdiction. The DEIR does not specifically call for development of a HMMP. Various project alternatives cover the restoration that is the project's mitigation. The HMMP includes a detailed description of the project impacts and a conceptual plan to mitigate for those impacts, including a description of

implementation and planting plans for revegetated areas of the project. The HMMP also includes a description of the project's long-term mitigation site monitoring and maintenance requirements, and provides management recommendations for ongoing maintenance during the mitigation monitoring period.

4.2.3.2 Monitoring per the Adaptive Management Plan

The HMMP only addresses the 3 years of mitigation site maintenance during the plant establishment period and the 10 years of mitigation site monitoring required for regulatory compliance. This Adaptive Management Plan is a supplement to the HMMP and describes the process of monitoring and management to ensure the long term viability of the project relative to the overall goals and objectives.

4.2.4 Maintenance/Adaptive Management Operations

Maintenance and adaptive management actions are included in a supplemental table in Appendix B (Table B-1). This table summarizes actions that pertain to channel excavation, pre- and post-storm maintenance, riparian forest vegetation removal, sediment removal, disposal and reuse activities, and BMPs. Table B-1 also includes management actions that are required per the mitigation measures included in the project Final Environmental Impact Report.

Furthermore, prior to commencement of annual maintenance and/or adaptive management operations in any year in which maintenance and/or adaptive management operations are conducted pursuant to the Coastal Development Permit authorization, an annual Maintenance/Adaptive Management Operations Plan for that year's proposed maintenance/adaptive management work shall be submitted for the review and approval of the Executive Director of the Coastal Commission (CDP No. 1-10-032; Special Condition 14[A]11). The Maintenance/Adaptive Management Operations Plan shall be consistent with the final version of the Adaptive Management Plan approved by the Executive Director of the Coastal Commission pursuant to Special Condition No. 14, and shall be consistent with all terms and conditions of the Coastal Development Permit No 1-10-032, and contain, at a minimum, the following information (CDP No. 1-10-032; Special Condition 16[A]):

1. A site plan depicting the location(s) of proposed annual maintenance and/or adaptive management activities, including applicable Assessor's Parcel Numbers and property owner names for all proposed work sites and associated construction areas;
2. A description of the type(s) of annual maintenance/adaptive management activities proposed;
3. Cross sections, maps, and associated calculations as necessary that accurately depict the proposed annual maintenance/adaptive management work area(s);
4. Copies of any necessary biological and botanical surveys needed for approval of annual maintenance/adaptive management activities;
5. A plan for erosion, run-off, and sedimentation control to avoid significant adverse impacts on coastal resources. The plan shall demonstrate that (a) run-off form the work sites shall not increase sedimentation in or result in pollutants entering coastal water; and

(b) Best Management Practices (BMPs) shall be used to prevent entry of polluted Stormwater runoff into coastal waters during the construction, including the use of relevant BMPs as detailed in the current California Storm Water Quality Best Management Handbooks (http://www.cabmphandbooks.com). The plan shall contain both (a) a narrative report and a site plan describing the locations of all temporary erosion, runoff, and sedimentation control measures to be used during annual maintenance/adaptive management activities; and (b) a schedule for installation and removal of the temporary control measures.

6. If applicable, a debris disposal plan consistent with CDP No. 1-10-032; Special Condition No. 6;
7. If applicable, a creek dewatering and diversion plan consistent with the protection measures outlined in CDP No. 1-10-032; Special Condition No. 7;
8. If applicable, a revegetation plan consistent with restrictions enumerated in CDP No. 1-10-032; Special Condition No. 12;
9. If applicable, a sediment reuse plan consistent with CDP No. 1-10-032; Special Condition No. 13; and
10. A schedule for proposed annual maintenance/adaptive management activities.

4.2.5 Responsible Parties

The HCRCD and the Watershed Council will be the parties responsible for ensuring that all monitoring and adaptive management actions are implemented.

4.2.6 Data Collection, Analysis, and Storage

Data analysis will be conducted as soon as possible following collection of field data. Minimizing delays between data collection and analysis will provide an opportunity to return to the project area to verify any discrepancies encountered during analysis and to conduct further field sampling if necessary. Data analysis will be conducted using standard spreadsheet, database, and statistical software as applicable. Any field notes, photos, datasheets and numerical or statistical data shall be stored in raw data format for 10 years after current monitoring year or until the completion of the project or for such terms as may be required by permits or funders. All electronically stored data shall be kept for at least 10 years after the completion of the project.

4.2.7 Quality Control (QC) / Quality Assurance (QA)

Quality control (QC) is a system of routine checks to ensure the integrity, correctness, and completeness of the project data. This system may include spot-checks on methods, data acquisition, calculations, and appropriate use of any statistical analyses. Quality control is expected to be performed by the entity conducting the monitoring, and will include a careful review by the Program Coordinator of the data input and analysis, project documentation, and data storage.

Quality assurance (QA) provides for a system of review procedures conducted by individuals/entities not directly involved in the collection/compilation of monitoring data. Quality assurance will be performed after the data is finalized and the quality control is performed. The Project Management Team and Technical Advisory Work Group will provide additional QC and QA of data during review of the annual monitoring report.

4.2.8 Review and Assess Monitoring Results

Monitoring results will be assessed in context of the project objectives and will be compared to the success criteria outlined in this AMP, the HMMP, the project's permit requirements, Biological Opinions (BO's), and other documents. This assessment will evaluate the original criteria and objectives given current knowledge to determine if the project is progressing along a trajectory toward meeting the project's success criteria and objectives. This assessment will evaluate whether the system is functioning as designed and whether or not the original criteria and objectives are reasonable and attainable at this point in time.

4.2.9 Reporting and Report Distribution

Monitoring results will be compiled into an annual report and reviewed by the Program Coordinator and the Project Management Team for initial review. Results will then be distributed to the Technical Advisory, Stakeholder, and Regulatory Work Groups for review and comment.

4.2.10 Evaluate Triggers

Monitoring results will be reviewed by the Project Management Team and compared with management triggers to determine whether project objectives are being met. If the management triggers are activated, the Project Management Team will suggest potential management actions that will be discussed during the annual meeting or any necessary follow-up meetings of Adaptive Management Participants.

4.2.11 Annual Meeting/Adaptive Management Decision-Making

Each year, the Adaptive Management Participants group, consisting of the Project Management Team, Program Coordinator, the Technical Advisory Work Group, the Stakeholder Work Group, and the Regulatory Work Group will meet to review the status of the project. The Project Management Team will give a project update and present the results of the annual monitoring. The Adaptive Management Participants Group will compare the monitoring results with the project goals and objectives, the HMMP and the AMP to discuss and recommend any potential required management actions.

5.0 ADAPTIVE MANAGEMENT PLAN

5.1 ADAPTIVE MANAGEMENT SUMMARY TABLES

A series of Adaptive Management Summary tables have been developed to provide descriptions of how the AMP process will be used to evaluate progress toward individual goals and objectives and permitting requirements. Each table is organized in a similar manner, with separate tables provided for the following categories:

- Erosion, Sediment Deposition, and Geomorphic Condition Monitoring and Adaptive Management for the Salt River Corridor
- Erosion, Sediment Deposition, and Geomorphic Condition Monitoring and Adaptive Management for Riverside Ranch
- Water Quality Monitoring and Adaptive Management for Salt River Corridor and Riverside Ranch
- Habitat Development, Vegetation and Invasive Species Monitoring and Adaptive Management for Salt River Corridor and Riverside Ranch

These 4 categories were derived from the Project's goals and objectives, and consolidated to relate to the geographic or technical focus of specific long-term management actions.

A general description of each of the columns in the Adaptive Management Summary tables is provided here. However, it shall be noted that the proposed approach under each of these columns in the 4 tables is also subject to the adaptive management process, and can be modified (or even eliminated) as the implemented project evolves and additional data are gathered.

Adaptive management actions are listed in a supplemental table in Appendix B (Table B-1). This table summarizes potential adaptive management actions that pertain to channel excavation, pre- and post-storm maintenance, riparian forest vegetation removal, sediment removal, disposal and reuse activities, and BMPs. Table B-1 also includes management actions that are required per the mitigation measures included in the project Final Environmental Impact Report.

5.1.1 Management Element

This category describes basic management elements that have been identified per the project goals and objectives and spelled out in the various project permits or supporting documents.

5.1.2 Objective

Individual objectives within each table, linked to specific Management Elements, represent concrete outcomes that can be measured, and help define progress towards the overall project goals.

5.1.3 Monitoring Method

For each management element, a proposed monitoring method has been chosen that is the most effective way to assess change with respect to the monitoring targets. Details of specific monitoring methods may be more fully described in other documents, such as the project's Biological Opinion (BO), the HMMP, and permit documents. This section of the table summarizes the variables to be measured and the general monitoring approach (i.e., cross-sections, qualitative evaluations, etc). The variables and approach were selected to adequately detect change in a timely fashion (see also discussion below of "temporal scale" under Monitoring Frequency).

5.1.4 Monitoring Frequency

The monitoring frequency is based on the temporal scales of the success criteria for each individual management objective. The frequency is determined as the period in which adverse change could realistically be detected and in which management actions could be implemented if the project is not meeting specific goals or to avoid adverse environmental impacts. The monitoring frequency is subject to change, depending upon achievement of project goals and objectives and may vary between project objectives. For example, annual monitoring may be sufficient to determine whether plant survival is within acceptable limits, but more frequent monitoring may be required to ensure that the channel hydrology is functioning as designed while the channel is reaching an equilibrium condition. Some monitoring may be relevant over longer temporal scales (i.e., determining that restoration of the riparian forested community is on a successful trajectory after Year 5 may only require monitoring every 2-3 years).

5.1.5 Management Trigger

Management triggers define the specific point or a range of values where monitoring data indicate that the project may be developing along an unexpected or unfavorable trajectory and where management actions may be necessary to ensure that the project meets habitat and regulatory performance goals. Management triggers may also include emergency maintenance items such as log jams and tree falls that may threaten channel and floodplain conditions or hydraulic functions. Triggers will be analyzed based on effects of the event on overall habitat and channel function and management actions will be determined based on monitoring data, such as the annual channel cross sections and longitudinal profiles. Examples of emergencies requiring immediate action include erosion or deposition that threatens the integrity of public infrastructure such as bridges, culverts, and roads, or a massive treefall that blocks the entire channel, thereby restricting channel function.

Management triggers are activated at a point before a significant adverse environmental impact occurs. The triggers are purposely set at a low threshold to ensure that adaptive management will be triggered before adverse impacts occur. If assessment of monitoring results determines that no management trigger has been activated, then no management action is required.

The first step in evaluating a management trigger is to determine whether it is a result of the project or of outside factors (i.e., climate change, large-scale regional flooding, or adjacent landowner practices). If it is determined that the trigger has been activated as a result of the

project, specific management actions will be applied based on the prescriptions spelled out in this AMP, the HMMP, project permits and documents. Should a management trigger be activated due to outside factors, the prescriptions spelled out in this AMP, the HMMP, project permits and documents will be reviewed for applicability and, if appropriate, specific management actions will be applied. If uncontrollable outside factors result in chronic problems to the restoration, additional actions may be developed and considered by the Adaptive Management Participants group. Proposed management actions will be submitted for review and approval by the Coastal Commission and may require an amendment to the Coastal Development Permit (CDP No. 1-10-032).

5.1.6 Potential Management Actions

Once a management trigger is activated, there are a range of possible management options (Figure 3). For example, 1) it may be determined that no management action is indicated or that additional (or modified) monitoring may be required to make a decision on whether or not remedial action is required, 2) monitoring results indicate that remedial action is required, or 3) careful consideration of monitoring results (likely over several years) indicate that the original goal was unrealistic or unattainable and that the goal may need to be modified. In the case of the latter this is considered a last resort and would require careful consideration and consensus by the Project Management Team with input from the Technical Advisory and Regulatory Work Groups. Any modifications that change the success criteria would require the review and approval of the Executive Director of the Coastal Commission and may require an amendment to the Coastal Development Permit (CDP No. 1-10-032).

Potential management actions listed in the adaptive management tables (Tables 1-4) are not intended to be an exhaustive list. Rather, they represent a likely range of options given the current knowledge of the system and anticipated management actions. Actual actions may deviate from this list given unforeseen monitoring results and/or site performance. Additionally, the details on the timing and degree of each of these actions are equally dependent upon the monitoring results. Final decisions of a course of action will be made annually with the members of the Adaptive Management Participants group. The Project Management Team will make the final decision on the appropriate actions to be taken in a given year, and the proposed activities will be reviewed by the Regulatory Work Group to ensure compliance with existing permits.

5.2 ADAPTIVE MANAGEMENT ELEMENTS

Natural ecosystems are dynamic and subject to change over time. This is especially true in the SRERP area where physical processes such as flow and sediment transport from tributary watersheds will likely influence magnitude and frequency of sediment management area and channel maintenance activities. Adaptive management may be necessary to minimize erosion and/or sedimentation that could adversely affect success of the created and enhanced channel habitats. Goals and objectives for the *Salt River Channel and Riparian Floodplain Corridor Restoration* and *Riverside Ranch Tidal Marsh Restoration* were evaluated on the basis of potential requirements for long term monitoring and adaptive management. Those goals and objectives that could require adaptive management were then consolidated to fit into the following 4 categories so that similar objectives can be described within the same context.

- **Erosion, Sediment Deposition, and Geomorphic Condition for the Salt River Corridor** - The Adaptive management activities for the channel and riparian corridor portion (including the portion of the channel adjacent to Riverside Ranch) are described under Section 5.2.1 *Erosion, Sediment Deposition, and Geomorphic Condition Monitoring and Adaptive Management for the Salt River Corridor* and also summarized in Table 1.

- **Erosion, Sediment Deposition, and Geomorphic Condition for Riverside Ranch** Adaptive management activities for erosion and sediment control within non-channel areas are described below under 5.2.2 *Erosion, Sediment Deposition, and Geomorphic Condition Monitoring and Adaptive Management for Riverside Ranch* and summarized in Table 2.

- **Water Quality Monitoring for Salt River and Riverside Ranch** - Water Quality Monitoring for both the Salt River Corridor and Riverside Ranch are described in 5.2.3 *Water Quality Monitoring and Adaptive Management for the Salt River Corridor and Riverside Ranch* and summarized in Table 3.

- **Habitat Development/Vegetation Maintenance/Invasive Species Control** - Habitat Development and Vegetation Maintenance/Invasive Species Control for both the Salt River Channel and Riverside Ranch are covered under Section 5.2.4 *Habitat Development, Vegetation and Invasive Species Monitoring and Adaptive Management for the Salt River Channel and Riverside Ranch* and summarized in Table 4.

5.2.1 Erosion, Sediment Deposition, and Geomorphic Condition Monitoring and Adaptive Management for the Salt River Corridor

Channel design objectives for the SRERP that relate to erosion and sediment deposition monitoring and adaptive management are to establish and sustain a dynamic river corridor by optimizing flow and sediment conveyance, providing connection with the floodplain, and integrating sediment capture and removal (sediment management). This will help sustain hydraulic conveyance and ecologic function while minimizing cost, frequency and extent of required sediment management maintenance activities. This section of the AMP also includes measures to monitor and adaptively manage erosion and water quality per Mitigation Measures 3.1.1-1 and 3.1.1-3 in the DEIR (Grasetti 2010).

The adaptive management triggers for erosion and sediment deposition control in the Salt River channel that will dictate the necessity and/or scale of adaptive management actions include: threats to public infrastructure, excessive sediment deposition in the channel/floodplain corridor, excessive sediment deposition in an adjacent Sediment Management Area, excessive bank or bed erosion in the channel, large wood/debris dams (e.g., fallen trees), failure to extend the tidal prism upstream in the channel, severely muted tides within the Riverside Ranch portion of the channel, road and stream crossings and culverts that are not functioning due to excessive sedimentation, impeded fish passage at high and/or low flows, and failure or excessive maintenance of sediment management areas.

A degree of erosion and deposition is expected along the channel as it naturally reshapes to reach a state of equilibrium after construction, and some limited erosion is expected at the outfalls of existing tributaries and contributing storm drain pipes. Significant erosion requiring adaptive management would include: erosion that undermines the integrity of the restored channel banks and causes a significant loss of existing and planted stream-side vegetation; excessive erosion at the confluences of the main tributary creek channels; and erosion that threatens infrastructure such as bridge foundations and road beds. In most cases, significant erosion, deposition, or treefalls would be anticipated to take place during the winter rainy season. Unless an emergency situation arose as a result, no action would be taken until the dry season. Management actions will be determined based on an analysis of the effects of the event on overall channel function. This analysis will be based on monitoring data, such as the annual channel cross sections and longitudinal profiles. Examples of an emergency situation requiring immediate action include erosion or deposition that threatens the integrity of public infrastructure such as bridges, culverts, and roads, or a massive treefall that blocks the entire channel, thereby threatening the hydraulic and sediment transport performance of the newly constructed channel.

Table 1. Erosion, Sediment Deposition, and Geomorphic Condition Monitoring and Adaptive Management for Salt River Corridor

MANAGEMENT ELEMENT	PROJECT OBJECTIVE	MONITORING METHODS	MONITORING FREQUENCY	MANAGEMENT TRIGGER	POTENTIAL MANAGEMENT ACTIONS[1]
Erosion and/or Sediment Deposition Monitoring	Minimize areas of excessive sediment deposition in the Salt River channel Minimize bank erosion and/or threats to public infrastructure	Cross-section and longitudinal profile surveys of channel. Physical surveys shall include a minimum of 6 freshwater reach cross-sections, and 4 tidal (fresh, brackish, and saltwater) reach cross-sections. The longitudinal thalweg profile survey along the project reaches shall be completed annually, with thalweg elevations shot at least every 200 ft, at a minimum. Photo-point monitoring (Hall 2001)	Reach-level surveys during summer, Years 1-10. Physical surveys of the river channel will be completed annually for the first 5 years, and then bi-annually through Year 10. Surveys will be performed after Year 10 only if annual qualitative assessments determine that excessive erosion or sedimentation is occurring. Solicit input regarding channel and floodplain conditions from landowners and other stakeholders on a regular basis. Photo-point monitoring during preliminary visual reconnaissance and during winter and summer baseflows concurrent with channel surveys.	Erosion or aggradation that results in a threat or damage to the stability of public infrastructure Any given channel survey indicates that the channel geometry has been reduced or enlarged by 10% or greater as compared to project plans, as-built surveys or previous monitoring surveys. Summer surveys and annual monitoring data indicate that excessive channel or floodplain erosion and/or sediment deposition is affecting the overall channel function or threatens infrastructure such as bridges, culverts and roads. Development of conditions (e.g., log jams, tree falls, bar formation) that block the entire channel and threatens channel and floodplain structure or hydraulic function. Excessive erosion or sediment deposition at the confluence of tributary channels or drainage outfalls, including head-cuts or knick-point formation.	More detailed assessment of rate/causes of erosion or sedimentation and evaluation of effects relating to structure and function of channel. Implement site specific erosion control BMPs such as soil bioengineering and vegetative revetments as need to reduce streambank mass wasting while maintaining channel function and riparian habitat value. Increase monitoring to locate sediment source(s) Selective sediment removal from channel Remove obstructions if deemed necessary (based on results of annual monitoring and channel surveys) to maintain habitat and hydrologic function. Install or modify instream structures such as Engineered Log Jam (ELJ) structures or Large Woody Debris (LWD) to re-direct flow and sediment conveyance to floodplains and SMAs Plan and implement sediment management areas in upslope tributary watersheds. Implement Engineered Sediment Detention Basin/s in existing Active or Passive SMAs.

MANAGEMENT ELEMENT	PROJECT OBJECTIVE	MONITORING METHODS	MONITORING FREQUENCY	MANAGEMENT TRIGGER	POTENTIAL MANAGEMENT ACTIONS[1]
Tidal Exchange Monitoring	Saline, brackish and freshwater marsh habitat created Increased tidal prism helps maintain the channel geomorphology and conveyance	Multi-parameter water level and salinity recorders will be used to determine whether the project has established the desired tidal exchange, functional tidal prism, and healthy salinity structure. To quantify and evaluate tidal and salinity exchange up the Salt River channel, a network of 5 multi-parameter recorders (measuring water level, temperature, dissolved oxygen, and salinity) are proposed in the mainstem Salt River and Eel River Estuary at the following locations: 1) within the Eel River Estuary; 2) immediately downstream of the confluence with the new northern Riverside Ranch connector channel; 3) immediately downstream of the confluence with the new southern (upstream) Riverside Ranch connector channel; 4) at Dillon Road Bridge; and 5) immediately downstream of the confluence of Francis Creek. In order to evaluate the tidal and salinity exchange within Riverside Ranch, 2 additional multi-parameter recorders shall be located inside Riverside Ranch; 1 strategically located in the northern half of the wetland and a second in the southern half of the wetland. As part of data analysis and reporting, all water levels shall be compared to Pacific Ocean tide ranges as reported by NOAA at their Humboldt Bay, North Spit tide gauge. In conjunction with tidal exchange monitoring, dissolved oxygen monitoring shall be performed at least once a year during a 2-week summer (July/August) tidal cycle when DO is expected to be the lowest, and measured near the bottom if possible. Photo-point monitoring (Hall 2001)	Water surface elevation monitoring shall be completed for 4 to 6 months during the dry season (May through October). The duration of monitoring will be weather dependent and instruments shall not be installed until after the threat of high flows but initiated early enough to capture the transition from freshwater to marine conditions in the estuary and project wetlands associated with the seasonal flow recession. If no adverse tidal exchange conditions are identified during the first 3 years of Tidal Exchange Monitoring, tidal monitoring can be reduced to every other year as long as there are not large flood flow events on the Salt or Eel River. Photo-point monitoring during preliminary visual reconnaissance and during winter and summer baseflow periods.	Tidal influence does not extend into upper reaches as per model projections or based on comparison to water levels recorded at other tidal monitoring locations. Severely muted tides within the Riverside Ranch section of the channel. Observed stagnant water areas within Riverside Ranch wetlands. Average dissolved oxygen concentrations below 7.0 mg/L. Excessive channel/floodplain erosion or sediment deposition that reduces channel and SMA function and effectiveness as determined by the Project Management Team professionals. Development of channel obstructions (e.g., log jams, tree falls, bar formation) that reduce flow conveyance. Any given channel survey indicates that the channel geometry has been reduced or enlarged by 10% or greater as compared to project plans, as-built surveys or previous monitoring surveys. Management actions will be based on an analysis of the effects of the event on overall channel function and will include a review of monitoring data, annual channel cross sections and longitudinal profiles. Examples of an emergency situation requiring immediate action include erosion or deposition that threatens the integrity of public infrastructure such as bridges, culverts, and roads, or a massive treefall that blocks the entire channel.	Continue monitoring to see if conditions improve as channel evolves. Channel excavation to remove sediment to improve channel function Additional monitoring to establish temporal and spatial extent of low DO zone(s); compare to available pre-project DO data Determine source of problem (e.g., poor circulation, sedimentation, excess decaying organic matter), and repair/modify (i.e., dredge channel, clean out sediment basin management area) Discontinue monitoring after 5 consecutive years in which DO objectives are met; Monitoring duration will be dependent on flows and DO levels and could take longer than 5 years (see Appendix A; Figure A-1). Additional Riverside Ranch breaches and/or levee lowering Implement site specific erosion control BMPs such as soil bioengineering and vegetative revetments as need to reduce streambank mass wasting while maintaining channel function and riparian habitat value. Remove obstructions. Install or modify instream structures such as Engineered Log Jam (ELJ) structures or Large Woody Debris (LWD) to re-direct flow and sediment deposition.

MANAGEMENT ELEMENT	PROJECT OBJECTIVE	MONITORING METHODS	MONITORING FREQUENCY	MANAGEMENT TRIGGER	POTENTIAL MANAGEMENT ACTIONS[1]
Bridges and Culverts	Maintain channel flow and control flow to minimize erosion	At the completion of construction, survey inverts of bridges and culverts and any other drainage structures. Periodic surveys to ensure that inverts and drainage structure elevations are not substantially changing. Visually inspect bridges and culverts in project area to ensure that flow is not impeded by blockages or sedimentation and that no erosion is occurring around these structures Photo-point monitoring (Hall 2001)	At completion of project construction. Annually for years 1-5, biennially for years 6-10 and after major storm events Photo-point monitoring during preliminary visual reconnaissance and during winter and summer baseflow periods.	Road and drainage structure elevations reflect excess sedimentation or erosion Bridges or culverts are damaged by erosion or are not conveying flows as designed Culverts are plugged or not adequately carrying the channel flow	Conduct pre- or post-storm maintenance to remove excess sediment Repair failed or damaged road-stream crossings and subject to the jurisdiction's discretion. Excavate plugged culverts, or replace or enlarge culverts as needed Remove obstructions Implement site specific erosion control BMPs as deemed necessary to protect bridge and culvert function while minimizing channel and riparian habitat impacts.

MANAGEMENT ELEMENT	PROJECT OBJECTIVE	MONITORING METHODS	MONITORING FREQUENCY	MANAGEMENT TRIGGER	POTENTIAL MANAGEMENT ACTIONS[1]
Sediment Management Areas	Integrate sediment management actions to help sustain hydraulic conveyance and ecological function Minimize cost, frequency, and extent of sediment management maintenance activities Avoid and minimize stranding of fish species in sediment management areas	**<u>Active SMAs</u>** Measure sediment deposition in sediment management areas and compare with projected design depth or previous monitoring survey results. Inspect channel and floodplain design components used to maintain the function and efficiency of sediment capture and retention in sediment management areas Monitor vegetation growth in and around sediment management areas. Riparian vegetation will be used to control desired channel morphology and hydraulics to establish and maintain SMA function Monitor sediment management areas for presence of fish using beach seines or dip nets prior to sediment removal Inspect upstream and channels for sediment accumulation or erosion. Inspect upstream diversion structure for damages, sediment accumulation, erosion or other maintenance needs. Inspect condition of sediment removal access points and haul routes. Photo-point monitoring (Hall 2001) **<u>Passive SMAs</u>** Physical surveys to monitor sediment accumulation thickness and volumes in SMA area. Visual inspection of connection points to mainstem Salt River to evaluate condition and sufficiency for future function. Photo-point monitoring (Hall 2001)	**<u>Active SMAs</u>** Inspect sediment management areas and associated facilities monthly or after storm events during the first year, then annually and after major storm events that exceed a 1-year recurrence interval. Thereafter, inspect SMA annually and after large storm events for life of structure. Monitor for vegetation growth in and around sediment management areas, annually at the end of summer for life of structure. Photo-point monitoring during preliminary visual reconnaissance and during winter and summer baseflow periods. **<u>Passive SMAs</u>** Complete visual reconnaissance annually after wet season. Complete physical surveys annually for first 3 years and biannually through year 10. Photo-point monitoring during preliminary visual reconnaissance and during winter and summer baseflow periods.	Sediment storage capacity is reduced by 25%. Sediment management areas are not collecting sediment Vegetation establishment that hinders function of the sediment management areas and/or adjacent river channels. Observation of excessive sediment deposition, erosion or vegetation in associated conveyance channels, grade controls, diversion structures or other facilities. Obstructions observed hindering SMA performance. Fish species found during beach seine and dip net surveys. Vegetation management in SMA's will be completed pursuant to project design and vegetation management plan.	Excavate sediment management area and deposit excavated sediment at designated reuse areas Re-visit sediment management area design and re-design individual feature as needed to adequately collect sediment Trim or remove undesirable vegetation Collect and relocate fish to appropriate habitat; analyze whether modifications to sediment management areas are necessary to limit potential for fish strandings. Implement site specific erosion control BMPs such as soil bioengineering and vegetative revetments as need to reduce streambank mass wasting while maintaining channel function and riparian habitat value. Install or modify instream structures such as Engineered Log Jam (ELJ) structures or Large Woody Debris (LWD) to re-direct flow and sediment deposition. Remove obstructions. Install or modify instream structures to redirect or concentrate flows.

Table 2. Erosion, Sediment Deposition, and Geomorphic Condition Monitoring and Adaptive Management for Riverside Ranch.

MANAGEMENT ELEMENT	OBJECTIVE	MONITORING METHOD	MONITORING FREQUENCY	MANAGEMENT TRIGGER	POTENTIAL MANAGEMENT ACTIONS[1]
Erosion and Sediment Deposition Monitoring of Riverside Ranch Wetlands	Create a template of a naturally evolving tidal drainage network to benefit target fish and wildlife species. Establish complex tidal channel network Establish diverse marsh habitat Minimal maintenance of new channels or filled areas or ditches	Annual visual inspection of marsh channel development for first 10 years Physical surveys shall include a total of 12 cross-sectional surveys; 6 in each of the southern and northern halves of the marsh along with a longitudinal profile of the main northern and southern slough channels. Cross-sections to extend 200 ft beyond top of channel banks to capture marshplain conditions. The end points of all cross-sections to be tied to monuments pursuant to standard methods in order to replicate surveys during future surveys. The longitudinal profiles shall be completed with thalweg elevations shot at least every 100 ft, at a minimum. Photo-point monitoring (Hall 2001)	Should occur in conjunction with tidal exchange monitoring (Table 1). Annual visual reconnaissance will be conducted during low tide in the early to mid-spring, at the termination of the wet season high flows. Physical surveys within Riverside Ranch will be completed annually for the first 5 years, and then biannually through Year 10. Quarterly review of data during the first 3 years. Photo-point monitoring during preliminary visual reconnaissance and during winter and summer baseflow periods.	Any given channel survey indicates that channel capacity has been reduced or enlarged by 10% or greater as compared to project plans, as-built surveys or previous monitoring surveys. Evidence that former straight line ditches are robbing tidal flows Surveys indicate excessive channel or floodplain erosion or sediment deposition. Development of conditions (e.g., log jams, tree falls, bar formation) that may threaten channel and floodplain conditions or hydraulic function. Erosion or sediment deposition at the confluence of tributary channels or drainage outfalls, including head-cuts or knick-point formation.	Excavation of tidal channels and/or re-fill or plug drainage ditches to improve hydrologic connectivity. Additional management actions as defined by CDFG Resource Management Plan
Culverts/Tide Gates and Perimeter Drainage	Maintain drainage of selected properties around project area.	Culverts or tide gates remaining or installed in Riverside Ranch as part of the restoration design will be inspected annually and regularly maintained to ensure that they are functioning as designed.	Annual reconnaissance of the outboard drainage ditch adjacent to the new Riverside Ranch berm will also be conducted to identify areas of impacted flow conveyance and/or erosion and as needed to make any maintenance recommendations.	Structure elevations reflect excess sedimentation or erosion Culverts are damaged by erosion or are not conveying flows as designed Culverts are plugged or not adequately carrying the channel flow Erosion or sediment deposition around culvert inflow or outflow areas. Outboard drainage ditch is not conveying flows as designed	Conduct pre- or post-storm maintenance to remove excess sediment Remove obstructions Repair failed or damaged culverts Excavate plugged culverts, or replace or enlarge culverts as needed Erosion control measures upstream and along channel (protecting bare soil, stabilizing banks, armoring, geotechnical bank protection, dissipating concentrated flows) Additional management actions as defined by CDFG Resource Management Plan.

MANAGEMENT ELEMENT	OBJECTIVE	MONITORING METHOD	MONITORING FREQUENCY	MANAGEMENT TRIGGER	POTENTIAL MANAGEMENT ACTIONS[1]
Setback Berm	Protect adjacent grazing lands, roads, and structures from flooding Achieve stable berm with minimal erosion and maintenance Wind generated waves do not contribute to shoreline or private property erosion	Visual inspection of berm by biologist/hydrologist or individual qualified to perform such observations for evidence of obvious flooding or erosion Visual inspections to determine level of settling or cracking Periodic visual inspections of adjacent lands, roads, and structures during storm events to ensure that erosion from any flooding or wind generated waves are not compromising berm stability Photo-point monitoring (Hall 2001)	Annually and after storm and extreme high tide events during the first year, then annually and after major (5-year) storm events. Engineering evaluations as needed and in Year-10 to determine ensure the structural integrity of the constructed berm	Evidence of berm erosion or potential failure such as cracking, slumping. If it is determined that cracking or slumping may be causing a problem, then topographic surveys will be performed. Visual observation of active erosion or conditions that would promote erosion (e.g., bare soil).	Repair eroded sections and employ erosion control measures (protecting bare soil, stabilizing banks, dissipating concentrated flows) Raise height of berms Maintain or repair access ramps and road atop berm Additional management actions as defined by CDFG Resource Management Plan and by NRCS Management Plan or other specifications for long-term maintenance.

[1]Details related to the specifics of management actions are dependent upon the monitoring results and the annual adaptive management review process.

Table 3. Water Quality Monitoring and Adaptive Management for the Salt River Corridor and Riverside Ranch.

MANAGEMENT ELEMENT	WATER QUALITY OBJECTIVE	MONITORING METHOD AND LOCATION(S)	MONITORING FREQUENCY	MANAGEMENT TRIGGER	POTENTIAL MANAGEMENT ACTIONS[1]
Dissolved Oxygen	Meets water quality standards for Dissolved Oxygen (DO) as found in the North Coast Regional Water Quality control plan (NCRWQCB 2007) Supports dissolved oxygen levels in an acceptable range for salmonids and tidewater goby.	Continuous water surface elevation monitoring and water quality monitoring at locations indicated under Management Element "Tidal Exchange Monitoring" in Table 1. In lower Salt River and Riverside Ranch: Continuous oxygen monitoring shall be performed during a 2-week tidal cycle during the summer at the same time and at locations where tidal stage is monitored. Sampling locations shall represent a range of DO conditions, e.g., in the Salt River channel as well as up sloughs/in tidewater goby habitats.	Frequency as stipulated under Management Element "Tidal Exchange Monitoring" in Table 1.	For salmonids – average dissolved oxygen is less than 7.0 mg/l (NCRWQCB 2007) Visual observation of stagnant water areas and/or salt pannes. Visual observation of dying vegetation or aquatic organisms in response to poor water quality.	Additional monitoring to establish temporal and spatial extent of low DO zone(s); compare to available pre-project DO data Determine source of problem (e.g., poor circulation, sedimentation, excess decaying organic matter), and repair/modify (i.e., dredge channel, clean out sediment basin management area) Discontinue monitoring after 5 consecutive years in which DO objectives are met; Monitoring duration will be dependent on flows and DO levels and could take longer than 5 years (see Appendix A; Figure A-1).
Temperature	Temperature range supports salmonids and tidewater goby.	Continuous water surface elevation monitoring and water quality monitoring at locations indicated under Management Element "Tidal Exchange Monitoring" in Table 1. In Salt River channel and Riverside Ranch: Continuous temperature monitoring shall be performed at the same time and at locations where tidal stage and DO is monitored. Sampling locations shall represent a range of conditions, e.g., in the Salt River channel as well as up sloughs/in tidewater goby habitats.	Frequency as stipulated under Management Element "Tidal Exchange Monitoring" in Table 1. In Salt River channel and Riverside Ranch: ensure that at least 1 monitoring event occurs in the summer, to coincide with DO and salinity monitoring. Annually in summer for a period of at least 60 days when water temperature is likely to be warmest (July/August).	Water temperatures exceed 22-23ºC (Madej et al. 2006). Visual observation of stagnant water areas and/or salt pannes. Visual observation of dying vegetation or aquatic organisms in response to poor water quality.	Additional monitoring to establish temporal and spatial extent of high temperature zone(s) Determine source of problem (e.g., poor circulation, sedimentation, lack of bank vegetation for shade), and repair or modify conditions. Monitor riparian vegetation until it provides shade over water in Salt River (10+ years) if temperature standards are exceeded. Provide additional and sufficient streamside revegetation to meet habitat objectives Discontinue monitoring after 5 years if thresholds not exceeded
Salinity	Saline, brackish, and freshwater tidal areas are located where projected. Salinity levels to support tidewater goby and salmonid species, including freshwater tidal habitat during the summer in areas of the Salt River channel.	Continuous water surface elevation monitoring and water quality monitoring at locations indicated under Management Element "Tidal Exchange Monitoring" in Table 1. Conduct salinity/conductivity monitoring in Salt River and within Riverside Ranch at locations described above where tidal stage is monitored.	Frequency as stipulated under Management Element "Tidal Exchange Monitoring" in Table 1. In Salt River channel and Riverside Ranch: ensure that at least 1 monitoring event occurs in the summer, to coincide with temperature and DO monitoring.	Increase in salinity levels leading to mortality Visual observation of stagnant water areas and/or salt pannes. Visual observation of dying vegetation or aquatic organisms in response to poor water quality.	Inspect system to determine source of problem (i.e., tidal channels are filling, or sediment management areas have reduced freshwater flows), and repair/modify Discontinue monitoring after 5 years if salinity objectives are attained Continue monitoring beyond 5 years until management triggers are no longer exceeded for at least 5 years.

[1]Details related to the specifics of management actions are dependent upon the monitoring results and the annual adaptive management review process.

Table 4. Habitat Development, Vegetation and Invasive Species Monitoring, and Adaptive Management for Salt River Corridor and Riverside Ranch.

MANAGEMENT ELEMENT	OBJECTIVE	MONITORING METHOD AND LOCATION(S)	MONITORING FREQUENCY	MANAGEMENT TRIGGER	POTENTIAL MANAGEMENT ACTIONS[1]
Salmonid and Tidewater Goby Habitat	Restore and enhance aquatic habitat Create habitat and water quality conditions that support salmonids and tidewater goby	Conduct beach seine or dip net surveys in all habitats created for tidewater gobies and where possible at 3 or more locations within Riverside Ranch and 1-2 locations on the Salt River tidal freshwater ecotone for salmonids Continuous water surface elevation monitoring and water quality monitoring at locations indicated under Management Element "Tidal Exchange Monitoring" in Table 1. In addition to the monitoring described herein, monitoring may also prescribed per the HMMP (H. T. Harvey & Associates 2010) and the project BO (in progress) may include: • Channel geomorphology monitoring (see Table 1) • Vegetation monitoring per the HMMP • Invasive species monitoring (see below) • Fish monitoring • Water quality monitoring (see Table 3)	Frequency as described in the project BA/BO. If not described, use the following frequency: 1 monitoring effort in spring and 1 monitoring effort in summer (after July 1) For gobies, monitor every year for 5 years using USFWS protocol for gobies in habitats specifically created to support gobies; if gobies occur each year for 5 years, then discontinue monitoring. For juvenile salmonids, use baited traps or beach seining as per Wallace and Allen (2009). If juvenile salmonids occur each year for 5 years, then stop monitoring. In Salt River channel and Riverside Ranch: ensure that at least 1 monitoring event occurs in the summer, to coincide with temperature and DO monitoring. Frequency as stipulated under Management Element "Tidal Exchange Monitoring" in Table 1.	Habitat created specifically to support tidewater goby is not used by them sustainably and/or year-round. Habitat that shall support rearing of juvenile salmonids (freshwater tidal ecotone in spring and summer) is not used annually. Temperature thresholds for both species as described in the project's BO are not met.	Continue monitoring If gobies are not present, attempt to determine what is preventing them from using habitat and modify design if feasible. If no salmonids are present at likely habitats within Riverside Ranch and Salt River tidal freshwater ecotone, then Project Management Team confers with the Technical Advisory and Regulatory Work Groups to determine what is preventing them from using habitat and modify design as feasible. Sediment management as described above in Table 1 for Salt River channel if lack of connectivity is restricting species use. Add habitat modifications (e.g., revegetation, channel shading, in-stream habitat features) Discontinue monitoring after 10 years if habitat objectives are met

MANAGEMENT ELEMENT	OBJECTIVE	MONITORING METHOD AND LOCATION(S)	MONITORING FREQUENCY	MANAGEMENT TRIGGER	POTENTIAL MANAGEMENT ACTIONS[1]
Aleutian Cackling Goose Habitat	Work with landowner, California Department of Fish and Game, to implement CDFG/RCD "Protocol for Prescribing Agricultural Activities on lands within North Coast Wildlife Area Complex" (Protocol) on areas of Riverside Ranch retained for ACG habitat enhancement.	Monitoring methods will follow procedures outlined in the established DFG/RCD Protocol and will include; annual pasture management planning, the development of an annual management plan, and annual evaluation of vegetative composition.	Monitoring of agricultural practices and vegetative composition will occur from April through January, depending on conditions and approved management plan.	Annual pasture management planning process indicates need for renovation or improvement of forage to improve habitat conditions for ACG.	Increase or decrease herd size, adjust grazing rotation and/or grazing intervals Use other accepted agricultural practices such as haying or mowing to improve conditions Renovate areas to improve forage conditions for ACG
Salt Marsh to /Riparian Upland Ecotone	Restore and expand transition zone between tidal wetland and riparian/upland habitat by creating a salt marsh/riparian upland ecotone along the constructed setback berm	Riverside Ranch monitoring for percent cover of naturally recruiting native salt marsh vegetation using satellite imagery or aerial photography A passive restoration strategy is planned for the Riverside Ranch marsh plan with no initial planting prescribed for this area. However, if natural recruitment does not occur as expected, active planting may be necessary. The inboard side of the setback berm will be actively planted with high marsh species and with willows on the upper portion to create a riparian/upland transition zone. Transect-based monitoring of both naturally recruiting and planted salt marsh species. Measure percent cover of 0.05% of the planted surface area. Vegetation monitoring per HMMP (H. T. Harvey & Associates 2010) which includes: • Salt marsh percent cover vegetation monitoring based on success criteria using aerial photography or satellite imagery • Percent cover of naturally recruiting native salt marsh species using aerial photography or satellite imagery • Photo-documentation • Percent cover of invasive species based on imagery used for salt marsh vegetation monitoring	Monitoring for naturally recruiting and planted salt marsh species in Years 3,5,7, and 10 Monitoring for salt marsh percent cover in Years 3, 5, 7, and 10. Qualitative vegetation monitoring according to the HMMP (H. T. Harvey & Associates 2010) through Year 10. Any monitoring after Year 10 would be decided by the Adaptive Management Team.	Falling below the success criteria Percent cover of naturally recruiting salt marsh species in Year-10 is <55% or is not progressing along a trajectory of meeting the final success criterion. Percent cover of the planted setback berm is <30% and is not progressing along a trajectory of meeting the final success criterion.	Continue monitoring Active replanting Test soil to determine if soil characteristics are limiting target plant establishment; amend soils if required. Monitor recolonization, replant if necessary Weed management/and or invasive species control to assist in native salt marsh plant establishment

MANAGEMENT ELEMENT	OBJECTIVE	MONITORING METHOD AND LOCATION(S)	MONITORING FREQUENCY	MANAGEMENT TRIGGER	POTENTIAL MANAGEMENT ACTIONS[1]
Woody Vegetation Management	Riparian vegetation establishment goals are covered in the HMMP. Woody vegetation will be managed consistent with the goal to maintain structure and function of the Salt River corridor as designed, and/or to manage situations that impede channel function Vegetation maintenance does not contribute to erosion	Cross-section and longitudinal profile surveys of the channel. These shall include a minimum of 4 freshwater reach sections, and 3 tidal (fresh, brackish and saltwater) reach cross-sections). Vegetation monitoring methods per HMMP (H. T. Harvey & Associates 2010).	Cross-section surveys during summer, Years 1-10. Surveys after Year 10 only if qualitative assessments determine that vegetation establishment in the channel is contributing to excessive sedimentation. Vegetation monitoring per HMMP schedule through Year 10, if project meets vegetation success criteria, then AMP will assume responsibility for vegetation monitoring at a minimum of every 2 years	Any given channel survey indicates that the channel geometry has been reduced or enlarged by 10% or greater as compared to project plans, as-built surveys or previous monitoring surveys. Bank erosion visible in vegetation removal areas Significant woody vegetation establishment in channel that limits structure and function of the Salt River channel and riparian corridor habitat development. Maintain vegetation in channel corridor and Sediment Management Areas in a manner consistent with project design that maintains intended hydraulic and geomorphic function and efficiency.	Continue monitoring to determine if conditions improve as channel evolves More detailed assessment/modeling to determine if excessive vegetation is contributing to excessive channel sedimentation Remove or control unwanted vegetation, and potentially replace with desired vegetation per HMMP (H. T. Harvey & Associates 2010) Selected sediment removal from channel BMPs during maintenance activities and during invasive plant removal or replanting to minimize erosion
Weed Abatement	Maximize riparian habitat extent and complexity by increasing plant species diversity and minimizing invasive species	Annual vegetative monitoring per the HMMP for the first 10 years (H. T. Harvey & Associates 2010). Additional monitoring beyond Year 10 shall weedy vegetation dominate the restoration area or threaten to spread to adjacent landowner properties Qualitative surveys and photo-doc during site visits	Annually through Year 10 per HMMP Annually after the HMMP monitoring period until such time as weedy species do not dominate the project area	Falling below the success criteria Weedy vegetation dominates the restoration area and threatens to spread to adjacent landowner properties.	Continue monitoring to determine if conditions improve Remove unwanted vegetation and/or replant with desirable species BMPs during weed abatement activities to protect against spreading undesirable seeds as well as erosion and diminished water quality.

MANAGEMENT ELEMENT	OBJECTIVE	MONITORING METHOD AND LOCATION(S)	MONITORING FREQUENCY	MANAGEMENT TRIGGER	POTENTIAL MANAGEMENT ACTIONS[1]
Invasive Species Management - Plants	Maximize riparian habitat extent and complexity by increasing plant species diversity and minimizing invasive species. Create riparian, salt marsh and salt marsh/upland ecotone habitat <5% colonization by invasive species, with particularly emphasis on invasive *Spartina*, dwarf eelgrass and reed canary grass.	The HMMP requires annual eradication of *Spartina* (H. T. Harvey & Associates 2010). Monitor for invasive species, particularly for *Spartina*, and reed canary grass during annual vegetation monitoring per HMMP. Visual surveys during years 1-10 in addition to regularly scheduled monitoring, particularly in Riverside Ranch for invasive *Spartina* and dwarf eelgrass.	As described in the HMMP for years 1-10 (H. T. Harvey & Associates 2010).	Falling below the success criteria Significant areas of invasive plant species establishing in project area and limiting density of desired species. Invasive species comprise 10% vegetation cover or greater as a target in Year 10	Continue monitoring Weed management and/or invasive species control to assist in native plant establishment (*Spartina* control to be consistent with *Spartina* Management Plan currently under development by the California Coastal Conservancy). Dwarf eelgrass control to be consistent with best available methods as researched by California Sea Grant. Active replanting of desired vegetation per HMMP (H. T. Harvey & Associates 2010).
Invasive Species Management – Pikeminnow	Occupation of the newly created habitat by native fish species	Monitoring as described in HMMP (H. T. Harvey & Associates 2010) and the project BO (in progress): Determine pikeminnow presence/abundance by surveys using beach seine or dip net surveys at 3 or more locations within Riverside Ranch at 1-2 locations on the Salt River tidal freshwater ecotone. Pithing and monitoring stomach contents of euthanized pikeminnows	Annually for 5 years	Falling below the success criteria Pikeminnows greater than 10 inches with evidence of piscivory become dominant in the project area to the exclusion of native species	Continue monitoring Implement a 3-year pilot pikeminnow control program using annual seining or netting of the main channel with a suitable mesh size to trap, document and euthanize all captured pikeminnow Install or modify instream habitat features to provide additional refugia for salmonids

[1]Details related to the specifics of management actions are dependent upon the monitoring results and the annual adaptive management review process.

Periodic maintenance/sediment removal within the channel and specified project Sediment Management Areas will be required to maintain the channel design width and depth and to maintain the channel water flow and sediment transport capacity and a functional tidal prism. The accumulation of excess sediment in the Sediment Management Areas is due to high sediment loading from tributaries, particularly at the confluence regions of Francis and Williams Creek with the Salt River. Major geomorphic modifications would be deemed necessary only if it is determined that no other procedure could be used to ensure achievement of the target restoration goals. Specific adaptive management actions are included in Table 1.

Sediment capture and removal (sediment management) will be integral to the success of the project to help sustain hydraulic conveyance and ecologic function. A major goal of the channel design effort is to minimize the frequency and need for excavation of the majority of the main channel through strategic design of Sediment Management Areas (SMAs); some SMAs will be located within and immediately adjacent to the main channel corridor. In addition, the project will develop a Regional Landowner Drainage Management planning process focused on establishing a framework for coordination and funding to enhance 'clean water' drainage (flows that are relatively sediment free) from adjoining parcels to the river corridor – a process that will increase the Salt River sediment transport capacity. Because it is not part of the SRERP, a Regional Landowner Drainage Management Plan will need to identify a lead agency for this effort, Drainage Management goals and objectives, an outreach program to coordinate with willing landowner participants, and a compilation of existing technical studies that will inform the drainage planning process. It is likely that the Watershed Council will lead this planning effort.

Upslope sediment reduction activities will also reduce sediment entering the Salt River. These activities will be defined on a project-by-project basis and may include on- and off-channel sediment retention basins, debris dams, stream bank stabilization and road drainage improvements. Adaptive management for these individual activities is not included in this document as these individual activities have not been fully defined at this time. Even with upslope sediment reduction activities, periodic removal of deposited sediments from lower, near-river Sediment Management Areas and possibly the Salt River channel will be required to maintain the restored channel geomorphology.

5.2.1.1 Short-Term Erosion and Sediment Control

Erosion and sediment control during construction will be conducted in accordance with the construction documents and project permits, including a Stormwater Pollution Prevention Plan (SWPPP) administered by the State General Permit for Storm Water Discharges associated with Construction and Land Disturbance Activities (Order No. 2009-0009 DWQ, NPDES No. CAS000002). The SWPPP shall be developed by a Qualified SWPPP Developer (QSD) and implemented by a Qualified SWPPP Practitioner (QSP) to ensure the receiving waterbodies are not impacted as a result of erosion and sedimentation during construction activities and until the disturbed areas are stabilized and sheet and rill erosion potential are minimized and a Notice of Termination of the general permit has been filed with the Regional Board.

The SWPPP will detail the location and type of erosion and sediment control Best Management Practices (BMPs) for the project area. These BMPs may shift and require short-term adaptive

management to find the best solutions to control effects from sediment sources during and immediately following construction. Sediment source control BMPs that may be applicable for this project include, but are not limited to: silt fencing, fiber rolls, rock slope protection, turbidity curtain, controlled dewatering and handling of turbid water, sediment management areas, and check dams. These measures will be implemented prior to and during grading activities and removed once the site has stabilized. Applicable erosion control BMPs including seeding, mulching, erosion control blankets, plastic coverings and geotextiles. Erosion control BMPs describing seed mixes and possible seeding techniques and mulching requirements are covered in the HMMP.

5.2.1.2 Erosion and Sediment Deposition Monitoring of the Salt River Channel

Quantification of the geomorphic and hydrologic functions will allow the PMT to determine whether the objective of sustaining a dynamic river corridor with optimal flow and sediment conveyance is being met. Monitoring to quantify the geomorphic and hydrologic function of the Salt River corridor will include a preliminary visual reconnaissance of the corridor channel to identify potential areas of concern, followed by physical surveys (topographic measurements to include channel cross-sections and a longitudinal thalweg profile) throughout the Salt River corridor. The preliminary visual reconnaissance will be conducted in the early to mid-spring, at the termination of the wet season high flows. The physical surveys will help to quantify the height/depth of erosion or sedimentation within the channel and floodplain as well as quantify any changes in channel flow conveyance area. Prior to the Year 1 monitoring, locations for the cross-sections will be determined once construction is complete and will be focused on areas where erosion or sedimentation events have the greatest potential to occur. Pending findings from the annual visual channel reconnaissance, cross-section locations may be relocated or added to best address altered areas. Physical surveys shall include a minimum of 6 freshwater reach cross-sections, and 4 tidal (fresh, brackish, and saltwater) reach cross-sections. Physical surveys of the river channel will be completed annually for the first 5 years, and then biannually through Year 10. End points of all cross-sections shall be monumented pursuant to standard methods in order to replicate surveys during future surveys. All survey elevations shall be reported in the NAVD88 vertical datum. The longitudinal thalweg profile survey along the entire project reach shall be completed annually, with thalweg elevations shot at least every 200 feet (ft), at a minimum. If there are significant changes in elevations at survey locations or locations identified during the visual reconnaissance as a result of storm damage, fallen trees, or excessive accumulation of vegetation and sedimentation, corrective actions will be evaluated and, if determined appropriate, a solution will be proposed to the regulatory agencies. Frequency of surveys beyond Year 10 will be determined by the Project Management Team in consultation with the Technical Advisory Work Group and Regulatory Work Group. For reporting purposes, all Erosion and Sediment Deposition Monitoring sections shall be referred to with a "ESXS" abbreviation, followed by the river stationing indicated on project plans (e.g., a cross section at the confluence with Reas Creek would be reported as "ESXS-140+00").

Photos will be taken to document channel conditions during the annual visual reconnaissance visits and during winter and summer baseflow conditions at permanently marked photo-documentation points. The number and location of these photo-documentation points will be determined after the construction is complete and will be selected with the long-term monitoring

in mind. The locations and orientations of the photo-documentation points will be included in the Record Drawings for the project. These photos will document any changes occurring along the channel. Additional photos shall be taken during/after 2-year storm events to record any damage from flooding or erosion. Photos will be included in annual reports and also used in conjunction with other long-term monitoring methods to determine whether adaptive management actions are warranted.

5.2.1.3 Tidal Exchange Monitoring

Salinity in the project reaches is primarily controlled by estuary salinity, thus, salinity in the project reach will show more temporal change than lateral change. It is anticipated that the majority of the project area (Riverside Ranch in particular) will have marine salinity in the summer and freshwater salinity in the winter. Multi-parameter water level and salinity recorders will be used to determine seasonal changes in the tidal salinity gradient. In order to quantify and evaluate tidal and salinity exchange up the Salt River channel, a network of 5 multi-parameter recorders (measuring water level, temperature, salinity, and dissolved oxygen) are proposed in the mainstem Salt River and Eel River Estuary at the following locations: 1) within the Eel River Estuary; 2) immediately downstream of the confluence with the new northern Riverside Ranch connector channel; 3) immediately downstream of the confluence with the new southern (upstream) Riverside Ranch connector channel; 4) at Dillon Road Bridge; and 5) immediately downstream of the confluence of Francis Creek. In order to evaluate the tidal and salinity exchange within Riverside Ranch, 2 additional multi-parameter recorders shall be located inside Riverside Ranch; 1 strategically located in the northern half of the wetland and a second in the southern half of the wetland. Water surface elevation monitoring shall be completed for 6 to 7 months to capture the transition from freshwater to marine conditions and through the dry season (e.g., April/May through October). In addition to these measurements, dissolved oxygen monitoring is proposed during July/August when seasonal freshwater flows are low, temperatures are high, and DO levels are anticipated to be at their lowest concentration. Dissolved oxygen monitoring will consist of hourly measurements using a DO probe at each of the recorder sites over a 2-week tidal cycle. Dissolved oxygen measurements shall be collected within and near the bottom of the water column. The initiation of monitoring will be weather dependent and instruments shall not be installed until after the threat of high flows but initiated early enough to capture the transition from freshwater to marine conditions in the estuary and project wetlands associated with the seasonal flow recession. As part of data analysis and reporting, all water levels shall be reported in elevations tied to the NAVD88 datum and compared to Pacific Ocean tide ranges as reported by NOAA at their Humboldt Bay, North Spit tide gauge. If it is determined that adequate tidal exchange has not been established in the wetlands and/or channel (compared to model projections or design capacity), water surface elevation monitoring shall continue in conjunction with any adaptive management required to correct problems with tidal exchange. If no adverse tidal exchange conditions are identified during the first 3 years, then Tidal Exchange Monitoring shall be eliminated unless channel capacity monitoring indicates changes that would likely affect tidal exchange.

5.2.1.4 Bridge and Culvert Monitoring/Inspections

Bridge and culvert crossings will be monitored to ensure that flow pathways are maintained free of blockages or sedimentation and that erosion around these structures is minimal. Cross-section

surveys at these crossings will be conducted annually for the first 5 years, and then biannually through Year 10 to determine if any significant changes are occurring and whether any adaptive management actions may be required. The elevations will be compared to the elevations on the Record Drawings. Qualitative surveys will consist of visual inspections following flood flow events exceeding a 1-year recurrence. Adaptive management may consist of pre- and post-storm maintenance such as clearing or excavating sediment from these locations or may require repair of any failed or damaged road or stream crossings. Frequency of surveys beyond Year 10 will be determined by the Project Management Team in consultation with the Technical Advisory Work Group and Regulatory Work Group.

5.2.1.5 Sediment Management Areas (SMA)

The SRERP is striving to promote as extensive and continuous band of riparian vegetation as possible, but many land-owners will continue to use areas within and adjacent to River corridor for grazing or other agricultural uses. In order to maintain optimal flows, sediment conveyance, riparian forest and associated aquatic and wetland ecosystems along the Salt River corridor, active and passive sediment management practices will be required. The proposed footprint of the Salt River corridor will contain an active channel and associated floodplain. The floodplain will host 2 types of sediment management areas (SMAs) currently under design as part of the 75% channel design configuration (Kamman 2010). SMAs are intended to be integrated along the mainstem Salt River in coordination with floodplain and riparian vegetation enhancements. SMA size will be kept to a minimum in order to maximize habitat enhancement and restoration. SMA's are referred to as Active and Passive, with Active SMAs including areas of annual or periodic sediment removal and Passive SMAs including areas that promote sediment deposition without sediment removal. Specific locations for each of the SMAs will be designated during the final design phase of the project. The long-term management and maintenance practices required varies based on SMA type. The following sections describe the different SMA types and likely long-term management requirements.

Active SMAs will be designed and constructed with the primary purpose to efficiently trap and manage sediment over the full spectrum of winter flows that transport sediment and have led to channel filling in the past. Active SMAs would be constructed in designated areas in a fashion to reduce flow velocity and create conditions that promote fine-sand to silt-sized grains to settle out. They would be constructed to emulate natural floodplains along the mainstem Salt River by separating existing or created floodplain and low-lying areas from the River channel with a low-relief levee and or barrier consisting of native riparian vegetation. Large portions of the SMA would be subject to periodic (every 1 to 5 years) sediment removal to maintain topography and selected riparian vegetation zones that promote sediment deposition. Active SMAs will need to have sediment removed on a regular basis in order to maintain function and a high sediment trapping efficiency. Although they will be disturbed on a regular basis, Active SMAs will focus sediment deposition and management activities in order to protect larger reaches of adjacent and downstream River corridor.

Active SMAs will also provide landowners with areas that can continue to be used for grazing and other agricultural practices. As such, Active SMAs will be designed in close coordination with property owners and land managers in order to promote desired land use practices. Accumulated sediment in these areas could be reworked (leveled or tilled) in order to

accommodate desired dry season land management practices. Once dry, sediment could be excavated and removed and the area could be seeded and used for agricultural production, cattle grazing, etc. Planting riparian or permanent vegetation in Active SMAs would not be sustainable given the annual disturbance associated with sediment removal. There are 3 discrete Active SMAs currently being designed into the corridor and in total will comprise approximately 20 acres.

Passive SMAs are intended to ultimately function as floodplain and riparian habitat areas of net sediment deposition and aggradation through natural fluvial processes. Some limited initial earthwork may be required to restore hydraulic connection between these floodplain and low-lying back-water areas to the mainstem Salt River. No long-term sediment removal or maintenance activities are anticipated in these SMAs. Thus the establishment or enhancement of riparian, wetland, and backwater aquatic habitats will be promoted in these SMAs. However, if excessive sediment deposition occurs in Passive SMAs, sediment removal per this AMP may occur. Alternatively, these areas can also continue to be maintained and managed pursuant to existing landowner land management practices.

In the event that channel transport and SMA performance are not capable of eliminating undesirable sediment accumulation in the mainstem Salt River channel or sediment accumulation poses an undesirable threat, excavation may be performed on a smaller scale within the River corridor (excavating specific areas of the channel). Larger-scale excavation across the entire width of the channel corridor may be necessary at sediment deposition-prone areas such at the confluence with Francis Creek, if designed SMAs and adjacent Salt River corridor are overwhelmed with sediment, which overflows into the adjacent River corridor. Routine vegetation maintenance activities within SMAs will occur during late summer or early fall months when the channel flows are lowest to minimize the potential for erosion and sediment transport and to minimize impacts to salmonid and wildlife species. Vegetation removal methods are described in the project's HMMP and include grazing, manual removal and mechanical removal.

5.2.1.6 Upslope Sediment Reduction

Per the DEIR (Grassetti 2010) upslope sediment management activities will be performed separately from the management actions described for this project. These activities will occur as part of restoration actions within the watershed and will benefit the SRERP by reducing the potential for sediment inputs. Upslope sediment and erosion hazard assessments have been completed for 2 of the Salt River sub-watersheds (Francis Creek and Williams Creek). These assessments mapped and prioritized potential road and stream related sediment sources and have recommended activities to reduce the amount of fine sediments entering the stream. Potential upslope sediment reduction activities may include: additional SMAs; construction of on- and off-stream detention/debris dams; stream/road crossing improvements such as culverts or bridges; livestock exclusion activities and off-site watering facilities; riparian planting; and stream bank stabilization measures. BMPs will be used to minimize erosion and fine sediment delivery to the mainstem of the Salt River from tributary streams during construction and any sediment reduction activities. The planning for the type and nature of activities on individual landowner's parcels is ongoing and has not been identified at this time. Adaptive management for these activities is not covered by this document.

5.2.2 Erosion, Sediment Deposition, and Geomorphic Condition Monitoring and Adaptive Management for Riverside Ranch

The Riverside Ranch portion of the project is designed primarily to restore a healthy tidal and brackish marsh to the 400-ac ranch site. In doing so, this restoration effort provides the opportunity to increase the tidal prism to maintain the Salt River geomorphology downstream of the marsh connector channels and to improve drainage and water quality in the lower Salt River. The increase in tidal prism will also increase channel scour of the Salt River and help to maintain the width and depth of the restored channel and maintain optimal tidal exchange between estuary and restored wetlands. This restored tidal connectivity will also allow for the natural evolution of intertidal mudflat, salt and brackish tidal marshes, and shallow water habitats.

The adaptive management triggers for erosion and sediment deposition within Riverside Ranch include lack of tidal prism establishment, severely muted tides within Riverside Ranch, evidence of erosion on the constructed setback berm, sediment deposition in marsh channels, indications that existing and constructed berms are not functioning as designed or are at risk for failure, and erosion and/or stagnant waters that are contributing to low vegetation establishment. This section of the AMP includes measures to monitor and adaptively manage erosion per Mitigation Measure 3.1.1-1 in the DEIR. In addition, monitoring and adaptive management for wind-generated waves that may contribute to erosion is included here per Mitigation Measure 3.1.1-9.2 of the DEIR (Grasetti 2010). Specific adaptive management actions are included in Table 2.

5.2.2.1 Channel and Marshplain Evolution of Riverside Ranch Wetlands.

Numerous existing drainage ditches will be filled on site and new, more sinuous, tidal channels will be excavated to enhance the habitat function and quality of the restored marshplain. Monitoring of the geomorphic and hydrologic function of the Riverside Ranch wetlands will include an annual preliminary visual reconnaissance of the wetland to identify potential areas of concern, followed by physical surveys (topographic measurements to include combined marshplain/channel cross-sections and longitudinal channel profiles). Surveys will be based on the conditions described in the Record Drawings completed for the project after construction is complete. The preliminary visual reconnaissance will be conducted during low tide in the early to mid-spring, at the termination of the wet season high flows. The physical surveys will help to quantify the height/depth of erosion or sedimentation within the slough channels and marshplain as well as quantify any changes in channel tidal exchange capacity. Pending findings from the annual visual channel reconnaissance, cross-section locations will be sited to best address the project conditions and potential problem areas. Physical surveys shall include a total of 12 cross-sectional surveys; 6 in both the southern and northern halves of the marsh along with a longitudinal profile of the main northern and southern slough channels. Cross-sections will extend 200-ft beyond top of channel banks to capture marshplain conditions.

Physical surveys within Riverside Ranch will be completed annually for the first 5 years, and then biannually through Year 10. The end points of all cross-sections shall be monumented pursuant to standard methods in order to replicate surveys during future surveys. All survey elevations shall be reported in the NAVD88 vertical datum. The longitudinal slough channel profiles shall be completed with thalweg elevations shot at least every 100 ft, at a minimum. If

there are significant changes in elevations at survey locations or locations identified during the visual reconnaissance as a result of tidal scour, fallen trees, or excessive accumulation of vegetation and sediment, corrective actions will be evaluated and, if determined appropriate, a solution will be proposed to the regulatory agencies. Frequency of surveys beyond Year 10 will be determined by the Project Management Team in consultation with the Technical Advisory Work Group and Regulatory Work Group.

Photos will be taken to document channel conditions during the annual visual reconnaissance and during spring and summer at permanently marked photo-documentation points. These photos will document any changes occurring within the tidal marsh, the berms, the filled drainage ditches, the salt marsh/upland ecotone, and along the channel. Additional photos shall be taken during/after large storm events to record any damage from flooding or erosion. Photos will be included in annual monitoring reports and will also be used in conjunction with other long-term monitoring methods to determine whether adaptive management actions are warranted.

5.2.2.2 Culverts/Tide Gates and Perimeter Drainage

Any culverts or tide gates remaining or installed in Riverside Ranch as part of the restoration design will be inspected annually and regularly maintained to ensure that they are functioning as designed. Annual reconnaissance of the outboard drainage ditch adjacent to the new Riverside Ranch berm will also be conducted to identify areas of impacted flow conveyance and/or erosion and any maintenance recommendations. Regular maintenance and monitoring will follow procedures outlined in the project's BO to protect fish species such as salmonids and tidewater goby. In addition, CDFG will be taking ownership of Riverside Ranch and may implement standard management procedures congruent with CDFG management in other wildlife areas.

5.2.2.3 Setback Berm Maintenance

A new setback berm approximately 9,060 ft long will be constructed from sediments excavated from the Salt River channel. The setback berm is designed with a varying interior slope (10H:1V and 4H:1V) to minimize impacts to existing wetlands, minimize wave erosion and create salt marsh/upland ecotone transition habitat. The berm is designed with a crest elevation of 14.75 ft NAVD88 and top width of at least 12 ft; with an outboard slope of approximately 4H:1V. The design includes culverts with radial or tide gates to provide drainage for the outboard ditch, access ramps; and a wide surface for maintenance access, and protection of adjacent grazing lands, roads and structures from tidal flooding. The base of the outboard slope will host cattle exclusion fencing to prohibit erosion from livestock access. All berm slopes will be well vegetated to provide erosion protection.

The setback berm is designed to operate without extensive maintenance. Monitoring will consist of qualitative monitoring including visual inspections performed annually and after major storm and high tide events by an individual qualified to perform these inspections. Monitoring will look for evidence of obvious flooding and erosion or erosion resulting from wind generated waves. If significant erosion or signs of potential failure are observed, engineering evaluations will be performed to determine whether any structural repairs are needed.

5.2.3 Water Quality Monitoring and Adaptive Management for the Salt River Corridor and Riverside Ranch.

Short-term water quality monitoring and adaptive management measures are covered in the Stormwater Pollution Prevention Plan (SWPPP) (to be prepared). The SWPPP identifies potential sources of pollution that may affect the quality of water discharged from the project area during and immediately after construction. The SWPPP proposes best management practices to minimize the effects of pollution on water quality and outlines short-term adaptive management measures should water quality be adversely affected. It is anticipated that the SWPPP adaptive management measures will apply to the project until such time as the soils at the site stabilize and the grasses begin to establish (approximately 6 months after construction).

This section of the AMP includes measures to monitor and adaptively manage erosion and water quality per Mitigation Measures 3.1.1-1 and 3.1.1-3 in the DEIR (Grasetti 2010). Long-term water quality elements that will be adaptively managed include dissolved oxygen, temperature, and salinity (Table 3). The decision-making process for individual water quality parameters is outlined in Table 3 and will follow the example of a conceptual model constructed for dissolved oxygen (Figure A-1) in Appendix A. Additional conceptual models for other monitoring parameters may be developed as appropriate as the project progresses. The objective of the dissolved oxygen monitoring will be to meet the water quality standards as set out in the North Coast Regional Water Quality Control Plan (NCRWQCB 2007) and to achieve dissolved oxygen levels suitable to support salmonids and the tidewater goby. The temperature objective is designed to maintain a temperature range that supports salmonids. The salinity objective is designed to inform whether the saline, brackish, and freshwater tidal areas of the project are located near to where they were predicted.

Dissolved Oxygen. Adequate dissolved oxygen (DO) is a necessary component of good water quality and a healthy biotic system and dissolved oxygen concentrations can determine the suitability for aquatic plant and animal life. For example, relatively high DO is associated with fish reproduction and rearing and low DO levels can cause stress or death for many aquatic organisms. Dissolved oxygen concentration can vary with water depth and with the flow rate of the water. The NCRWQCB standards recommend minimum DO concentrations of 7.0 mg/L. DO is unlikely to be low where there is good tidal circulation; however, in created backwater habitats for tidewater goby, DO could become low. DO is usually lowest in the early morning before aquatic plant photosynthesis begins and in the summer when the temperatures are highest. Continuous monitoring of DO is proposed over a 2-week tidal cycle during the summer (July/ August) at habitats created for tidewater goby. Monitoring shall be performed within and near the bottom of the water column. This monitoring shall provide information on whether conditions in these created habitats are approaching levels of concern for tidewater goby or salmonids.

Temperature. Water temperature may be a concern during the summer, when it is possible that temperatures could become warm enough to affect aquatic species. Water temperature in the Salt River channel will be monitored continuously just below each tributary junction from June 1 to October 1 to ensure that it does not limit or control the aquatic species that will inhabit the channel. Water temperature monitoring can also be used to assess the significance of other water quality parameters, such as the amount of oxygen that can dissolve in water, salinity, and

conductivity. Water temperature monitoring locations and approach are described above under the Section heading, "Tidal Exchange Monitoring".

Salinity. Slight changes in salinity can have substantial effects on aquatic plant and animal life. The project will create saline, brackish, and freshwater tidal areas along the channel accommodating salt and brackish marsh plant species as well as freshwater riparian plant species. These habitats will support wildlife species that depend on specific salinity ranges including tidewater goby and salmonid species. Continuous water surface elevation and salinity monitoring will be conducted as described above under the Section heading, "Tidal Exchange Monitoring" and as described in Table 3 to determine whether or not the salinity objectives are met.

5.2.4 Habitat Development, Vegetation Management, and Invasive Species Monitoring and Adaptive Management for the Salt River Corridor and Riverside Ranch

The project is designed to maximize floodplain habitat complexity by increasing plant species diversity, channel shading, and large woody debris recruitment while minimizing invasive species. Post-construction vegetation monitoring and management for habitat areas along the Salt River channel and in Riverside Ranch (including the mitigation plantings) will be covered under the project's HMMP and Revegetation Plan (H. T. Harvey & Associates 2010a, 2010b) for 10 years to ensure that the desired habitats are establishing. After the mitigation habitats have met the HMMP's success criteria the AMP will govern their long-term management. AMP elements pertaining to habitat development address the broader issues of long-term adequacy and sustainability in attaining project goals and objectives.

The project has also incorporated elements to provide beneficial wildlife habitat where possible and restoration of the channel will facilitate reconnection of the corridor to watershed tributaries which will improve habitat for a number of wildlife species (i.e., fish access to spawning and rearing habitats and wintering habitat for migratory waterfowl and shorebirds, and tidewater goby habitat). The project's permitting documents, particularly the BO, will address monitoring and adaptive management for special-status wildlife species. Adaptive management elements presented here and in Table 4 address long-term adequacy in obtaining goals and objectives to improve habitat for specific plant and wildlife species.

Salmonid and Tidewater Goby *(Eucyclogobius newberryi*) Habitat. The restored Salt River will create Essential Fish Habitat (EFH) and has in part been designed to provide a migration corridor for adult salmonids, and high flow refugia and rearing habitat for juvenile salmonids, especially coho salmon and steelhead. Habitat types will include off-channel habitat, large woody material, and freshwater tidal habitat. Studies in nearby Humboldt Bay indicate the relevance of tidal freshwater habitat for salmonid rearing (Wallace and Allen 2009). Restoration of Riverside Ranch shall provide overwintering rearing habitat for juvenile salmonids as well as habitat important for fish transitioning between the ocean and freshwater stream habitats; e.g., adults moving upstream from the ocean to upstream freshwater spawning habitat and juveniles moving downstream from freshwater rearing habitat to coastal marine habitats (e.g., during smoltification). Tidewater goby habitat creation and enhancement is targeted through the creation of tidal marsh, off-channel and tidal channel habitat in Riverside Ranch. Tidewater

goby require habitat that allows them to complete their annual life cycle (e.g., adult spawning to pelagic larval phase to benthic juveniles/adults). This habitat tends to be at upper ends of bays and estuaries, and generally includes waters that are occasionally connected with, but periodically discontinuous, from the tidal environment (Chamberlain 2006). Tidewater goby have been found to tolerate water quality conditions varying from nearly fresh to hypersaline, and with very low dissolved oxygen; however, conditions that are likely to be more favorable for tidewater goby include well-oxygenated water with salinities <15 ppt (Stillwater Sciences 2006).

Aleutian Cackling Goose (*Branta hutchinsii leucopareia*) Habitat. Portions of the project area may be managed to optimize Aleutian cackling goose (ACG) habitat. For example, the agricultural area retained within Riverside Ranch is designed for agricultural and grazing uses that will provide goose habitat with this objective in mind. Under a Memorandum of Understanding (MOU) between the California Department of Fish and Game (CDFG) and Humboldt County Resource Conservation District (HCRCD), agricultural activities are used on several CDFG-owned wildlife areas to achieve a variety of habitat goals. The document developed by CDFG and HCRCD, *Protocol for Prescribing Agricultural Activities on Lands Within the North Coast Wildlife Area Complex* outlines the process to determine and monitor agricultural activities, such as livestock grazing, haying, mowing, irrigation, fertilizing and seeding. Livestock grazing and/or other agricultural management techniques are used to create, maintain and/or enhance habitat for plants, wetland associated birds such as Canada geese, Aleutian cackling geese, waterfowl, shorebirds, or wading birds and other wildlife. Success of these efforts is monitored on an ongoing basis and agricultural practices are adjusted as needed to achieve goals.

Project elements can be incorporated over time as needed to retain and/or enhance the short grass habitat within the project area to benefit regional ACG management strategies and minimize crop depredation damages on private property. Working with private landowners, management techniques such as grazing, haying, or mowing could be used to enhance the quality of the short grass habitat for ACG, in order to attract and/or retain geese on the project site. In addition, the grassland areas retained as part of the project could provide a refuge for geese hazed from adjacent private lands. Observations of Aleutian cackling geese use of habitat in the project area and vicinity can be qualitatively monitored by project biologists and from information collected from private landowners.

Salt Marsh/Riparian Upland Ecotone. Ecotones are important habitats that serve as transition zones or buffers between terrestrial and aquatic landscapes and provide an important function by trapping nutrients from surrounding upland areas and generating increased species richness and diversity while providing optimal habitat for ecotone species (James 2001; Traut 2005). In addition to the objective of restoring tidal salt marsh habitat, the Riverside Ranch restoration includes expanding and creating a salt marsh/riparian upland ecotone along the intersection of the high marsh with the inboard slope of the constructed setback berm. Naturally recruiting vegetation in the marsh plain will be monitored using satellite imagery or aerial photography. Salt marsh plants will be installed on the lower portion of the inboard side of the constructed setback berm and riparian tree and shrub species will be planted at the upper portion of the berm to create salt marsh/riparian upland ecotone habitat. This area will be monitored per the HMMP

for percent cover of establishing salt marsh species and to ensure that invasive species do not colonize this area.

Woody Vegetation Management (years 5+). Establishment of riparian vegetation is important to project goals and objectives. Success criteria outlined in the HMMP will determine if vegetation establishment is occurring at the anticipated rate. For purposes of the AMP, vegetation management will refer to weed abatement to achieve habitat goals, undesirable woody vegetation control (including willow establishment in the channel) to achieve channel conveyance goals, and invasive species management. All other vegetation management aspects are considered short-term and are addressed in the HMMP and ultimately the agency approval of habitat establishment per the project's mitigation success criteria. Controlled grazing of ditches to remove encroaching woody vegetation will likely be a long-term endeavor to maintain the complexity of habitats.

Weed Abatement (years 3+). Weed abatement shall be performed per the HMMP (H. T. Harvey & Associates 2010) during the 3-year plant establishment period for the project, and monitored per the HMMP for Years 1-10. The AMP guides all weed maintenance activities after Year 3 and weed monitoring activities after Year 10. If the weed abatement procedures have not been successful (see HMMP for assessment standards) at limiting the colonization of weedy species within the restoration area, the Project Management Team will continue to perform weed abatement on a regular basis to ensure that weedy species do not dominate the restoration area or expand from the site onto adjacent private property. This maintenance shall continue until such time as weedy species do not present a detriment toward maintaining a self-sustaining riparian forest or tidal salt marsh (see HMMP for assessment standards). Weed abatement may include mechanical or manual control by paid staff, contractors, or volunteers, or continuance of flash grazing methods as described in the HMMP.

Flash grazing is also described in the HMMP (H. T. Harvey & Associates 2011c) and may be used to control weed cover in active planting areas and natural recruitment areas but will be managed to avoid excessive damage to native plantings and recruits. Flash grazing involves bringing specific levels of grazing animals onsite in the spring for very brief periods when the animals will target new growth of the weeds over the vegetation that has been planted. Grazing will be limited to specific time periods across limited acreages within active bench areas and upland berm areas only. Pre-construction surveys for rare plants shall be conducted in proposed grazing areas within or adjacent to suitable rare plant habitat. Temporary livestock exclusion fencing shall be installed to exclude livestock from channels, riparian areas, and other sensitive habitat areas (CDP No. 1-10-032; Special Condition 14[7] a-c). Grazing will be supervised by someone familiar with weed management and restoration activities to ensure protection of these desired species during grazing activities. In general, grazing will be used relatively less during the first 3-5 years when the plantings are establishing and growing to heights that would put them beyond grazing damage. However, during that period flash grazing can be used for very brief periods, if it is monitored to ensure that damage to plantings is at an acceptable level (e.g., it is not impeding the ability of the site to meet the habitat establishment success criteria). If substantial damage to native plants (or demonstrable introduction of invasive species) occurs as a result of flash grazing, then it will likely be suspended. Temporary fencing will be employed to

allow flash grazing of specific areas in and around the active revegetation and recruitment areas to control expanses of weeds without unduly damaging desirable native plants.

No grazing will occur in the low flow active channel. Grazing by sheep and/or goats would be preferred to cattle grazing to minimize impacts to the restored floodplain areas. Temporary fencing would consist of insulated fence posts and rods supporting multiple strands of electric wire or tape; the wire and posts could be easily be moved depending on grazing needs in a particular area. Depending on the size of the herd and the capacity of the animals, the Salt River channel would be broken up into reaches that would be flash grazed for a set number of days. Electricity for the hot wires would need to come from either an established 110-V connection or a solar charger. Solar chargers may be set up in connection with adjacent landowner's existing operations.

Invasive Species Management. Minimizing invasive species throughout the riparian and salt marsh habitat will contribute to increased plant species diversity and complexity throughout the project area. Several species have been identified as posing potential threats to the ability to meet this objective. Species for which adaptive management may be necessary include dense-flowered cordgrass, reed canarygrass, and Sacramento pikeminnow. Potential adaptive management activities for these species are described below.

Dense-flowered Cordgrass (Spartina densiflora). Dense-flowered cordgrass (*Spartina densiflora*) is a non-native invasive perennial that competes with native salt marsh species and typically invades bare mudflat and pickleweed habitats to replace native salt marsh habitat with dense monospecific stands. Colonization by dense-flowered cordgrass in channel areas can also result in increased sedimentation. Dense-flowered cordgrass is difficult to eradicate and current eradication techniques being used with some success in Humboldt County include mowing and hand-digging. Herbicide use for large-scale eradication has not been approved. A control plan for dense-flowered cordgrass is currently being prepared by the California Coastal Conservancy and its partners for invasive *Spartina* in Humboldt Bay, the Eel River Delta, and the Mad River Estuary. Methods developed in that plan shall be used to eradicate dense-flowered cordgrass before and during construction if the regional plan is developed before restoration occurs. If the regional plan is not developed before implementation of this plan, project proponents shall contact botanists at the Humboldt Bay National Wildlife Refuge and the Invasive *Spartina* Project in San Francisco Bay regarding recent research on cordgrass eradication and methods currently in use to eradicate dense-flowered cordgrass in Humboldt County.

It is anticipated that ongoing long-term maintenance will be required to continue to eradicate *Spartina* unless it is controlled throughout all of Humboldt Bay. During the first 10 years of the project, the project site will be monitored annually per the vegetation monitoring described under the HMMP. If new areas of *Spartina* colonization are mapped within the project footprint they will be flagged for eradication. Eradication of any newly establishing *Spartina* shall be performed at least once a year using the methods currently under development for the Humboldt Bay *Spartina* Management Plan (in process). These methods may include manual, mechanical, and/or any approved chemical methods. After the initial 10-year monitoring period, a funding mechanism shall be set in place by the PMT to provide long-term maintenance and monitoring to ensure that invasive *Spartina* does not re-invade within the project area.

Dwarf Eelgrass (Zostera japonica). Dwarf eelgrass (*Zostera japonica*) is a non-native invasive submerged hydrophyte that has invaded west coast estuaries. It can rapidly colonize intertidal marine and estuarine habitats, particularly unvegetated mudflats. Colonization by dwarf eelgrass can alter physical habitat structure and alter the densities and richness of resident fauna. Early detection of dwarf eelgrass is difficult as it is typically found at tides of 2.0 ft MLLW or lower, the narrow blades of the eelgrass make it difficult to detect, and surveys are difficult to conduct in intertidal mudflat areas. Similar to other invasive species, the best was to ensure that dwarf eelgrass does not successfully colonize requires monitoring to ensure early detection, followed by a rapid response consisting of eradication and follow-up monitoring (CDFG 2010).

Monitoring for colonization by dwarf eelgrass shall be performed during annual vegetation monitoring being performed as part of the requirements of the HMMP. Qualitative monitoring to look for the presence of dwarf eelgrass shall be performed during routine monitoring that occurs in the intertidal areas (i.e., topographic surveys and fish surveys).

If dwarf eelgrass is detected, eradication efforts shall be coordinated with Susan Schlosser at California Sea Grant in Eureka, CA to ensure that the most current eradication methods are being used. Current experimental methods in use by staff from California Sea Grant and CDFG include manual excavation and heat treatments. Manual excavation is performed by digging up individual plants or patches. California Sea Grant is also conducting experiments to control dwarf eelgrass using heat treatments which consist of experimental burn plots and heated water (pers. comm. Schlosser 2010).

Reed Canarygrass (Phalaris arundinacea). Reed canarygrass (*Phalaris arundinacea*) is an aggressive waist high perennial grass which tolerates wet soil conditions and invades and dominates wetland habitats. Reed canarygrass is often one of the first wetland plants to emerge early in the growing season and readily invades bare or disturbed areas. Once established, it reduces plant diversity because it can outcompete seedlings of other establishing plants. It can also modify the hydrology of streams because of its ability to trap sediment, leading to constriction of waterways. Control of reed canarygrass needs to address suppressing above-ground vegetative growth and underground rhizomes as well as the seed bank. In Washington and Oregon, physical methods have included mowing, grazing when stems and leaves are young, use of ground coverings, burning, inundation, herbicide application and using shading to discourage plant establishment (Miller et al. 2008; Antieau 1998). Competitive exclusion is also a potential option to discourage reed canarygrass seedling establishment. Competitive grass species include tufted hairgrass, spike rush, and bentgrass (*Agrostis* sp.).

In the long-term, the planting of riparian vegetation, particularly coniferous forested wetland plant communities, will likely provide adequate shading to limit reed canarygrass growth (Antieau 1998). In the event that coniferous forested wetland plant communities do not provide adequate shading to control reed canary grass in the long-term, a management plan will need to be developed by the Watershed Council to control any remaining populations found within the channel.

Sacramento Pikeminnow (Ptychocheilus grandis). Sacramento pikeminnow (*Ptychocheilus grandis*) are considered ubiquitous within the Eel River watershed and can compete with native species, such as coho salmon, Chinook salmon, steelhead, sculpin, stickleback, etc. Therefore, any attempt to control the pikeminnow population within the project must be considered an interim measure designed to minimize competition during the time that native species colonize the newly created habitat.

Monitoring will be performed to determine whether larger juvenile or adult pikeminnow capable of piscivory are present and/or dominant in the project area, if their presence is harmful to native species, and, if so, whether practicable measures can be taken to control their numbers while native species are recolonizing newly created habitat. The RCD/Watershed Council will conduct annual monitoring for at least 5 years to assess presence/absence, population estimates including relative abundance of pikeminnow, habitat preferences, dietary preferences, movement patterns, and other factors. Monitoring and Sacramento pikeminnow control in the project area will be conducted as proposed in the June 2011 Biological Assessment prepared for the project. Copies of each of the 5 annual monitoring reports shall be sent to the Executive Director of the Coastal Commission by 31 December of each monitoring year (CDP No. 1-10-032; Special Condition 8).

Presence and relative abundance of both pikeminnow and native species will be documented and reported in order to help assess trends in relative abundance and responses to the project. Documentation of both pikeminnow and native species relative abundance will help characterize species use of habitats within the project area. Pikeminnow shall be euthanized with non-toxic methods such as pithing, and stomach contents shall be examined to assess piscivory. Standard monitoring methods shall be used for both assessment and control to ensure the avoidance of take of listed species, and the protection of water quality during sampling. Monitoring shall follow standard protocols to avoid take of state or federally listed species.

In the event that adult, piscivorous pikeminnow (adults greater than 10" with evidence of piscivory, such as stomach contents) become dominant in the project area, to the exclusion of native species, the RCD shall conduct a 3-year, pilot, pikeminnow-control-program subsequent to the 5 year monitoring program. The control program shall be implemented as proposed in the Biological Assessment. The anticipated approach will include annual seining or netting of the main channel with a suitable mesh size in order to trap, document and euthanize pikeminnow. Native species shall be documented and returned unharmed to the channel. The pikeminnow control program shall require an amendment to the Coastal Development Permit unless the Executive Director of the Coastal Commission determines that no amendment is legally required (CDP No. 1-10-032; Special Condition 8).

The program shall be conducted in coordination with the CDFG and the Redwood Sciences Lab over a 3-year period, culminating in a survey report of the Salt River fish assemblage no later than 12 years after project implementation. The reports shall be posted online at Calfish.org, and made available to the DFG and the Redwood Sciences Lab for interpretation. Eradication of the introduced Sacramento pikeminnow is considered infeasible, so no extension of the pilot program is proposed. However, the pilot program would serve as an intermediate measure to promote the occupation of newly created habitat by native species. Moreover, the information

generated in the pilot program would help resource managers determine the effectiveness of the proposed pikeminnow control approach for future projects.

5.3 ATTAINMENT OF VARIOUS PERMIT REQUIREMENTS

Short-term monitoring under the HMMP and long-term monitoring under the AMP has been designed to ensure that the project complies with the various permits and biological documents required for this project. A list of these permits is included here. This is not an exhaustive list and additional permits/biological documentation may be required as the permitting process progresses:

- USACE Section 404
- RWQCB Section 401 Water Quality Certification
- CDFG 1600 Lake and Streambed Alteration Agreement
- CDFG Take Avoidance Measures
- State Lands Commission Lease
- California Coastal Commission Coastal Development Permit
- NMFS, USFWS Section 7 Formal Consultation
- Humboldt County Conditional Use Permit
- Humboldt County Grading and Encroachment Permits
- Caltrans Encroachment Permit

Additional permit requirements beyond the scope of this AMP may be requested by a specific agency and will need to be folded into the adaptive management process as appropriate.

5.4 BEST MANAGEMENT PRACTICES FOR LONG-TERM MANAGEMENT

Short term Best Management Practices (BMPs) during and immediately after construction will be employed per the Excavation Materials Management Plan (Winzler & Kelly 2010), the final project Plans and Specifications, and the SWPPP (to be prepared with 100% design). Long-term BMPs include:

- Time maintenance/monitoring activities such that these activities minimize disturbance to wildlife as outlined in project documents and permits (see *Attainment of Various Permit Requirements* above).
- Minimize potential for invasive species colonization during and after construction. Measures to prevent spread of existing populations of *Spartina* during construction will be addressed in the HMMP.
- Evaluate monitoring results to determine the biological response from short-term BMPs and to use these results to identify whether any short-term BMP measures need to be incorporated into long-term management.

- Continue to identify upstream sediment sources and develop additional measures to reduce sediment supply to the Salt River as opportunities become available.
- Continue to identify any upstream sources that may contribute to decreased water quality and develop measures to reduce the input of any pollutants. These methods may include sediment or infiltration basins, vegetated riparian buffers, mulching of exposed soil surfaces, streambank fencing, road drainage upgrades, low impact development structures, erosion controls, streambank armoring in highly erosive areas, or other methods that could improve water quality.
- Increase public awareness regarding project goals with community education programs to communicate methods to reduce sediment/pollutant inputs to landowners in the Salt River watershed.

5.5 MAINTENANCE MANAGEMENT ACTIONS

Maintenance management actions are included in a supplemental table in Appendix B (Table B-1). This table summarizes potential management actions that pertain to channel excavation, pre- and post-storm maintenance, riparian forest vegetation removal, sediment removal, disposal, and reuse activities, and BMPs. All measures, protocols, standards, limitation, and BMPs listed in CDP No. 1-10-032 Special Condition Nos. 2 through 13 shall be applied as they relate to each specific "potential management action" listed in Table B-1 (CDP No. 1-10-032; Special Condition 14[A]1). All current and potential future management and maintenance activities must ensure that they conform to CDP 1-10-032 and to the CDP Special Conditions. The Special Conditions are attached for reference (Appendix C).

6.0 REFERENCES

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PERSONAL COMMUNICATIONS

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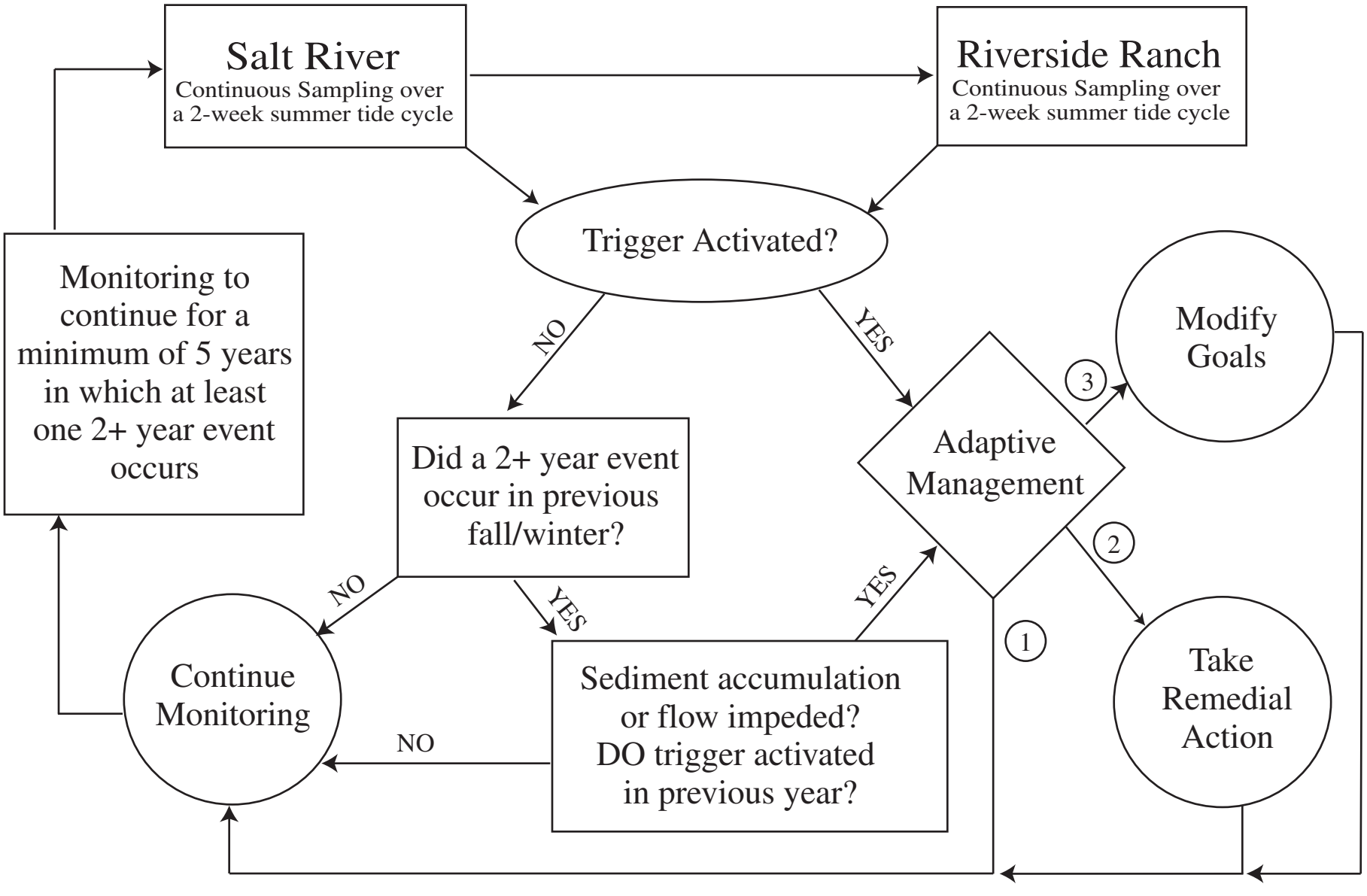
APPENDIX A.
DISSOLVED OXYGEN CONCEPTUAL MODEL

Dissolved Oxygen (DO) Monitoring



APPENDIX B.
POTENTIAL MAINTENANCE MANAGEMENT ACTIONS AND IMPACT AVOIDANCE MEASURES

Table B-1. Potential Management Actions and Impact Avoidance Measures

	POTENTIAL MANAGEMENT ACTIONS[1]	LOCATION	WORK WINDOW[2]	WORK DURATION	ANTICIPATED FREQUENCY[4]	DESCRIPTION OF EQUIPMENT / METHODS	DESCRIPTION OF QUANTITIES[3] / MATERIAL	IMPACT AVOIDANCE MEASURES[5] AND BEST MANAGEMENT PRACTICES[6]
1	Implement site specific erosion control BMPs such as soil bioengineering and vegetative revetments[7]	Project-wide	June 1 – October 15	0-120 days	Frequent	Heavy equipment and hand crews	0-10 Acres of Erosion Control BMPs using vegetation, soil bioengineering	FEIR MM: A-F, H-K, N-S BMP: a, b, k
2	Remove obstructions if deemed necessary to maintain habitat and hydrologic function	Project-wide	June 1 – October 15	0-60 days	Frequent	Heavy equipment and hand crews	0-50 obstructions including debris jams, trees, sediment plugs (0-10,000 CY)	FEIR MM: A-F, H-K, N-S BMP: c, d, k
3	Install or modify instream structures such as Engineered Log Jam (ELJ) structures, Large Woody Debris (LWD) and Boulder Weirs to re-direct flow and sediment conveyance to floodplains and SMAs	Project-wide	June 1 – October 15	0-60 days	Moderate	Heavy equipment and hand crews	Install 0-15 Instream Structures[7] Modify or adjust existing instream structures	FEIR MM: A-F, H-K, N-S BMP: b, e, k
4	Channel excavation to remove sediment to improve channel function	In channel, Project-wide	June 1 – October 15	0-120 days	Moderate	Heavy equipment for excavation	0-25,000 CY of Sediment and 2,000 LF of Sediment Removal	FEIR MM: A-F, H-K, N-S BMP: d, f, k
5	Additional Riverside Ranch breaches and/or levee lowering	Riverside Ranch levees	June 1 – October 15	0-60 days	Infrequent	Heavy equipment for grading and excavation	0-5,000 CY of Excavation	FEIR MM: A-F, H-K, N-S BMP: k
6	Conduct pre- or post-storm maintenance to remove excess sediment	In channel, Project-wide	June 1 – Nov. 30	0-120 days	Moderate	Heavy equipment and hand crews	0-25,000 CY of Sediment	FEIR MM: A-F, H-J, N-S BMP: f, g, k
7	Repair failed or damaged road-stream crossings [7]	Within 100 feet of road-stream crossings	June 1 – October 15	0-60 days	Infrequent	Heavy equipment and hand crews	0-5 Crossings 0-1,000 CY Excavation/Grading/Crossing 0-500 CY Rock Fill/Crossing	FEIR MM: A-F, H-K, N-S BMP: f, g, k
8	Excavate plugged culverts and conduct maintenance on tide gates Replace or enlarge culverts and tides gates as needed[7]	Within 100 feet of existing culverts	June 1 – October 15	0-30 days	Moderate	Heavy equipment and hand crews	0-5 Culverts 0-1,000 CY Excavation/Grading/Crossing 0-500 CY Rock Fill/Crossing	FEIR MM: A-F, H-K, N-S BMP: d, f, g, k
9	Excavate sediment management area and deposit excavated sediment at designated reuse areas including application/placement of excavated sediment on agricultural lands	Sediment Management Areas	June 1 – October 15	0-120 days	Frequent	Heavy equipment for sediment removal and transport to reuse areas	0-50,000 CY of Sediment	FEIR MM: A-F, H-K, N-S BMP: d, h, k

	POTENTIAL MANAGEMENT ACTIONS[1]	LOCATION	WORK WINDOW[2]	WORK DURATION	ANTICIPATED FREQUENCY[4]	DESCRIPTION OF EQUIPMENT / METHODS	DESCRIPTION OF QUANTITIES[3] / MATERIAL	IMPACT AVOIDANCE MEASURES[5] AND BEST MANAGEMENT PRACTICES[6]
10	Trim or remove vegetation and/or invasive vegetation as necessary to maintain stream function and bioengineering design approach per project design plans [7]	Outside of planted areas and outside of existing mature riparian vegetation not older than 10 years. (i.e. SMAs, active channel and active bench)	Year-round, with the exception of the bird breeding and nesting season between 1 March and 1 July.	0-120 days	Frequent	Herbicides, hand pruning tools and possibly chainsaws and brush cutter/mowing or other light equipment	Limited annually to 5 ac or less within SMAs, active bench areas, and active channel areas only. Only trees and shrubs less than 5 years old and no larger than 4" dbh	FEIR MM: A-F, H-K, N-S BMP: c, i, k, m
		For maintenance access and maintenance of active channel vegetation/ bioengineering	Year-round	0-120 days	Frequent		0-5 Acres Trees no larger than 6" dbh	
		Removal of non-native species Project-Wide	Year-round	0-120 days	Frequent		0 – 100 Acres	
11	Excavation of tidal channels and/or re-fill or plugged drainage ditches to improve hydrologic connectivity [7]	Riverside Ranch Tidal Marsh[7]	June 1 – October 15	0-90 days	Infrequent	Heavy equipment and hand crews	0-5,000 LF of tidal channels/ditches	FEIR MM: A-F, H-K, N-S BMP: d, g, k
		Berm outboard ditch network					0 – 10,000 LF of berm outboard ditch	
12	Repair eroded sections and employ erosion control measures (protecting bare soil, stabilizing banks, armoring, geotechnical bank protection, dissipating concentrated flows)[7]	Project-wide	June 1 – October 15	0-120 days	Moderate	Heavy equipment and hand crews	0-1,000 CY of Rock Fill 0-10,000 CY of Grading/Excavation	FEIR MM: A-F, H-K, N-S BMP: k, l
13	Raise height of berms without expanding footprint and/or filling wetlands	Existing berm locations only	June 1 – October 15	0-120 days	Infrequent	Heavy equipment for grading	0-9,000 LF of Berm	FEIR MM: A-F, H-K, N-S BMP: k, l
14	Maintain or repair (as-built) access ramps, access roads and road atop Riverside Ranch berm	Existing berm locations and other access road ramps	June 1 – October 15	0-60 days	Moderate	Heavy equipment for grading and repairs	0-1,000 CY of Road Base 0-1,000 CY of Grading	FEIR MM: A-F, I-K, N, Q-S BMP: d, k, l
15	Provide additional revegetation with native plants	Project-wide	Year-round	0-60 days	Moderate	Hand tools and possibly small augering devices/light equipment	0-1,000 plants	FEIR MM: H, I BMP: k
16	Apply/place excavated sediment on Agricultural Lands	Agricultural Lands	April 1 – Nov. 30	0-120 days	Moderate	Heavy/farm equipment	0-100,000 CY of Sediment	BMP: d
17	Install Exclusion Fence	Project-wide	Year-round	0-120 days	Moderate	Heavy equipment and hand crews	0-7,500 LF	FEIR MM: A-F, H-K, N-S BMP: b, j, k

	POTENTIAL MANAGEMENT ACTIONS[1]	LOCATION	WORK WINDOW[2]	WORK DURATION	ANTICIPATED FREQUENCY[4]	DESCRIPTION OF EQUIPMENT / METHODS	DESCRIPTION OF QUANTITIES[3] / MATERIAL	IMPACT AVOIDANCE MEASURES[5] AND BEST MANAGEMENT PRACTICES[6]
18	Flash Grazing	Limited to active planting areas and areas of naturally recruiting plants	Spring	Limited time periods as needed for weed control	Frequent	Temporary livestock exclusion fence using temporary electrical fencing Sheep/goats	Will depend on the species, extent and density of weed cover in active planting and natural recruitment areas. Number of grazing animals to be determined by the HCRCD and Watershed Council with input from the Program Coordinator.	FEIR MM: M BMP: n

[1] Potential Management Actions considered to be "Development" under the Coastal Act and included in the Project's CDP. Potential Actions considered to not be "Development" under the Coastal Act include but not limited to: Fence Repair, Fence Replacement, Soil Sampling and all Monitoring Methods indentified in the AMP.

[2] Work window to be expanded if necessary for "Emergency" conditions. Out of channel grading, excavation, and other earth-moving activities may be extended from June 1 – October 15 to include the period of April 15 – Nov. 30 if predicted rainfall is less than 40% for Ferndale area, and work shall cease upon precipitation. In-channel grading, excavation, and other earth-moving activities shall be limited to June 1 – Nov. 30 only, and if predicted rainfall is less than 40% for Ferndale area, and work shall cease upon precipitation. More restrictive timeframe may be required by CDF&G, USFWS, or NOAA-Fisheries.

[3] Quantities given and a maximum, not-to-exceed value for any given year. Quantities beyond what is specified here would require additional regulatory review/approval.

[4] Anticipated Frequency categories include: Frequent (every 1-2 years), Moderate (every 2-5 years), Infrequent (every 5-15 years), and Rare (15+ years, or not at all)

[5] FEIR Mitigation Measures (MM) and Description		
A	3.1.1-2.1	Prepare and Implement SWPPP
B	3.1.1-2.2	Implement Dewatering Restrictions
C	3.1.1-2.3	Implement Contractor Training for Protection of Water Quality
D	3.1.1-2.4	Minimize potential pollution caused by inundation
E	3.1.1-2.5	In-Stream Erosion and Water Quality Control Measures during Channel Dredging
F	3.1.1-3	Implement Water Quality Monitoring and Maintenance Plan
G	3.1.1-7	Implement Erosion Monitoring and Maintenance Plan
H	3.3.1-3	Minimizing Construction-Related Disturbance to Sensitive Habitats
I	3.3.1-7	Minimize and Avoid Impact to Nesting Special Status or Migratory Birds
J	3.3.1-12	Limit Construction Access Routes and Equipment Staging Areas and Minimize Excavation in Existing Aquatic Habitat when Eggs and Tadpoles are Expected to be Present and Conduct Preconstruction Surveys for RLF in all Suitable Habitat that would be Disturbed by Construction
K	3.4.1-1.2	Limit Initial Construction to an Extended Dry Weather Season (April – November)
L	3.4.1-1.3	Adhere to Site-Specific Construction Plans
M	3.4.1-1.5	Minimize Removal of and Damage to Native Vegetation
N	3.4.1-1.6	Install Temporary Construction Fencing to Identify Work Areas
0	3.4.1-1.9	Fish Relocation
P	3.4.1-1.10	Tidewater Goby Measures
Q	3.5.1-1.1	Utilize Best Management Practices to Minimize Fugitive Dust Generation and Assure Compliance with North Coast Air Quality Management District Rules for Particulates
R	3.5.1-1.2	Minimize Construction Machinery Emissions
S	3.6.1-1	Noise from Earthmoving and Hauling of Soils

[6] BMP Notes
a - Utilize onsite native soil to the extent practical
b – Design techniques and standards shall be similar to those in project plans
c – Chip debris and utilize for onsite mulch to the extent practical
d - Dispose in uplands outside of Coastal Zone or designated sediment reuse areas on agricultural uplands in accordance to the Sediment Reuse Plan Template
e – Under the direction of the CA Department of Fish & Game and a qualified individual
f – Avoid removal of mature (>10 year) riparian vegetation
g – Avoid permanent placement of fill in wetlands
h – Removal of vegetation will be limited to excavation areas within SMAs and necessary to achieve design capacity
i - Per local invasive removal plans (e.g. Spartina Eradication Plan)
j – Shall not block public access
k – Conduct pre-construction surveys performed by a qualified biologist per the Sensitive Bird Nesting Habitat Protection Plan (CDP No. 1-10-032; Special Condition No. 10).
l - Upon completion of ground disturbance activities and prior to the onset of the rainy season, all bare soil areas shall be seeded in compliance with the seed mix specified in the HMMP.
m- Survey results must indicate that no willow flycatchers are present in the area and that no nesting habitat for any bird species is present in the area (CDP No. 1-10-032; Special Condition No. 14[A]5(b).
n – Pre-construction rare plant surveys shall be conducted in suitable rare plant habitat.

[7] May require amendment to Coastal Development Permit and additional consultation as deemed necessary by the Coastal Commission Executive Director.

APPENDIX C.
COASTAL COMMISSION CDP NOI

CALIFORNIA COASTAL COMMISSION
NORTH COAST DISTRICT OFFICE
710 E STREET, SUITE 200
EUREKA, CA 95501
(707) 445-7833 FAX (707) 445-7877

Date: October 6, 2011
Permit Application No.: 1-10-032

NOTICE OF INTENT TO ISSUE PERMIT

(Upon satisfaction of special conditions)

THIS IS NOT A COASTAL DEVELOPMENT PERMIT

THE SOLE PURPOSE OF THIS NOTICE IS TO INFORM THE APPLICANT OF THE STEPS NECESSARY TO OBTAIN A VALID AND EFFECTIVE COASTAL DEVELOPMENT PERMIT ("CDP"). A Coastal Development Permit for the development described below has been approved but is not yet effective. Development on the site cannot commence until the CDP is effective. In order for the CDP to be effective, Commission staff must issue the CDP to the applicant, and the applicant must sign and return the CDP. Commission staff cannot issue the CDP until the applicant has fulfilled each of the "prior to issuance" Special Conditions. A list of all of the Special Conditions for this permit is attached.

The Commission's approval of the CDP is valid for two years from the date of approval. To prevent expiration of the CDP, you must fulfill the "prior to issuance" Special Conditions, obtain and sign the CDP, and commence development within two years of the approval date specified below. You may apply for an extension of the permit pursuant to the Commission's regulations at Cal. Code Regs. title 14, section 13169.

On **October 5, 2011,** the California Coastal Commission approved Coastal Development Permit No. **1-10-032,** requested by **Humboldt County Resource Conservation District** subject to the attached conditions, for development consisting of: **Implementation of the Salt River Ecosystem Restoration Project, a multi-year, region-wide, collaborative restoration and flood alleviation project comprised of three major components: (1) Phase 1 involves restoring approximately 400 acres of estuarine marsh, estuarine aquatic, riparian, and freshwater wetland habitats on the lower 2.5 miles of the Salt River and on the 440-acre Riverside Ranch former dairy farm property owned by the Department of Fish & Game; (2) Phase 2 involves restoring hydraulic capacity, in-stream fish habitat, riparian vegetation, and improved water quality along an additional approximately 5 miles of the Salt River, ~2,900 feet of lower Francis Creek, and**

~500 feet of lower Eastside Drainage; and (3) long-term maintenance and adaptive management activities to ensure the project meets its goals and objectives to be performed over multiple years.. More specifically described in the application file in the Commission offices. **Commission staff will not issue the CDP until the "prior to issuance" special conditions have been satisfied.**

The development is within the coastal zone **across ~808 acres of mostly agricultural properties under a variety of different ownerships, including the 440-acre Riverside Ranch owned by the Department of Fish & Game, along ~7.5 miles of the Salt River near Ferndale, Humboldt County.**

If you have any questions regarding how to fulfill the "prior to issuance" Special Conditions for CDP No. 1-10-032, please contact the Coastal Program Analyst identified below.

Sincerely,

CHARLES LESTER
Executive Director

By: Melissa Kraemer
Coastal Program Analyst
Date: October 6, 2011

ACKNOWLEDGMENT

The undersigned permittee acknowledges receipt of this Notice and fully understands its contents, including all conditions imposed.

_____ _____
Date Permittee

Please sign and return one copy of this form to the Commission office at the above address.

STANDARD CONDITIONS

1. **Notice of Receipt and Acknowledgment**. The permit is not valid and development shall not commence until a copy of the permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and

acceptance of the terms and conditions, is returned to the Commission office.

2. **Expiration.** If development has not commenced, the permit will expire two years from the date on which the Commission voted on the application. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.

3. **Interpretation**. Any questions of intent or interpretation of any condition will be resolved by the Executive Director or the Commission.

4. **Assignment**. The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

5. **Terms and Conditions Run with the Land**. These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.

SPECIAL CONDITIONS:

NOTE: IF THE **SPECIAL CONDITIONS** REQUIRE THAT DOCUMENT(S) BE RECORDED WITH THE COUNTY RECORDER, YOU WILL RECEIVE THE LEGAL FORMS TO COMPLETE (WITH INSTRUCTIONS). IF YOU HAVE ANY QUESTIONS, PLEASE CALL THE DISTRICT OFFICE.

1. Demonstration of Adequate Property Rights

PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the applicant shall submit, for the review and written approval of the Executive Director, copies of all landowner access agreements for all properties involved in all aspects of both Phase 1 and Phase 2 project activities and for properties proposed to receive Phase 2 excavated sediments for agronomic reuse. All landowner access agreements shall clearly demonstrate that the property owner grants permission to the applicant to undertake development on the property as conditioned by the Commission.

2. Final Revised Habitat Monitoring & Reporting Program

(A) **PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT**, the applicant shall submit, for the review and written approval of the Executive Director, a final revised habitat monitoring and reporting program that substantially conforms with the plan prepared by H.T. Harvey & Associates titled "Salt River Ecosystem Restoration Project Habitat Mitigation and Monitoring Plan" dated May 4, 2011, except that the plan shall be revised to include provisions for all of the following:

1. The grading, filling, and dredging within each restoration area (both phases) shall not be considered complete until it has been documented in the field that the physical restoration has been built-to-plan. This documentation shall be particularly focused on the attained elevations within each restoration area and shall be completed by an independent qualified surveyor, engineer, or landscape architect. Field documentation that the physical restoration has been built-to-plan shall be submitted for the review and approval of the Executive Director within three months of the completion of grading, filling, and dredging within each restoration area (both phases).

2. The restoration planting within each restoration area (both phases) shall not be considered complete until it has been documented in the field that the proposed planting has been built-to-plan. This documentation shall be completed by an independent restoration ecologist. Field documentation that the planting plan has been built-to-plan with regard to location, spacing, and species diversity shall be submitted for the review and approval of the Executive Director within three months following the completion of planting within each restoration area (both phases).

3. The installation of livestock-exclusion fencing within each restoration area (both phases) shall not be considered

complete until it has been documented in the field that the proposed fencing has been built-to-plan. Field documentation that the exclusion fencing has been built-to-plan shall be submitted for the review and approval of the Executive Director within three months of completion of fencing within each restoration area (both phases).

4. Verification that all wetlands, agricultural lands, and other sensitive habitats temporarily impacted by construction activities (estimated ~535 acres) have been returned to pre-project conditions as proposed shall be submitted for the review and approval of the Executive Director within 180 days of completion of each phase of construction.

5. A map of the Riverside Ranch tidal restoration areas with 1-foot elevation contours shall be submitted for the review and approval of the Executive Director within six months following completion of all restoration grading, filling, and dredging within the tidal restoration areas.

6. Continuous monitoring of water level and salinity at one location in the Eel River Estuary near the mouth of the Salt River and at two locations within the Riverside Ranch tidal restoration areas shall be performed from July 1 through October 31 during the first summer following completion of restoration grading and dredging. Within the restoration area, one instrument site shall be located in the most northern portion of the restoration area within the internal slough channel most distant from the Salt River, and one site shall similarly be located in the most southern portion of the restoration area.

7. Spot salinity measurements shall be collected in the Salt River channel within one hour of each higher high tide from July 1 through October 31 during the first summer following completion of restoration dredging in order to create a depth profile of salinity at several locations and thereby to determine the upstream limit and approximate shape of the tidal salt water wedge.

8. Quantitative monitoring of the Riverside Ranch tidal restoration area shall be conducted, including mapping and estimating the total cover of broad community types, which may be based on the analysis of aerial or satellite imagery. Field sampling shall include spatially stratified, random samples with visual estimates of cover by species within elevational strata in both the north and south restoration areas. Elevational strata shall each be spatially stratified to ensure roughly uniform sampling of the entire restoration area. Sampling shall take place during the period June 1 through August 31 during the 3rd, 5th, and 10th years (at a minimum) following the completion of restoration activities.
9. Quantitative monitoring of the riparian restoration areas shall be conducted, including boundary mapping and cover and diversity estimates based on spatially stratified, random samples within each habitat reach (e.g., "spruce dominated riparian forest with brackish marsh") and within each habitat type (i.e., active channel edge riparian vegetation, active berm shrub and herbaceous vegetation, and riparian forest). Total cover within each habitat type may be estimated from aerial or satellite imagery. Field sampling shall include visual estimates of the proportional representation and average diameter-at-breast-height (DBH) of each tree species and visual estimates of cover of each shrub and herbaceous species within the active bench. Sampling and boundary mapping shall take place during the period of June 1 through August 31 during the 3rd, 5th, and 10th years (at a minimum) following the completion of restoration activities. In addition, the boundaries and estimated cover of riparian areas shall be estimated from aerial photographs or from on-the-ground GPS surveys in the 15th and 20th years following completion of restoration activities. The riparian boundaries from each survey shall be overlain on all previous boundary determinations in order to determine the spatial stability of the riparian restoration.

10. Monitoring criteria for each habitat type shall be provided, including criteria for species diversity and composition.

11. An eelgrass mitigation and monitoring plan shall be prepared and implemented pursuant to Special Condition No. 11 to

ensure that eelgrass is sufficiently restored in the area to compensate for anticipated direct impacts to approximately 1.2 acres of eelgrass.

12. Tidewater goby surveys shall be conducted in suitable habitats of the project restoration areas at a minimum in the 3rd, 5th, and 10th years following the completion of restoration activities.

13. Salmonid surveys shall be conducted in the project restoration areas at a minimum in the 3rd, 5th, and 10th years following completion of restoration activities.

14. Avian surveys shall be conducted in the project restoration areas at a minimum in the 3rd, 5th, and 10th years following completion of restoration activities.

15. A wetland delineation shall be completed in the 5th-year following completion of restoration activities. The delineation within the Riverside Ranch tidal restoration area may be based on the results of the mapping, measurement, and sampling required in condition subsections 1, 2 & 5 above, with spot checks of the estimated wetland boundary.

16. Periodic documentation of channel profiles of the Salt River and of tidal creeks in the Riverside Ranch tidal restoration area shall be conducted to determine channel stability and to measure changes that may need to be addressed by adaptive management.

17. Only native and/or non-persistent, non-invasive and/or pasture mix plants shall be used in all proposed plantings and seed mixes to be used in the project consistent with the requirements of Special Condition No. 12.

18. A reporting schedule shall be submitted to the Executive Director, which includes, but is not necessarily limited to, all of the following: (a) a report documenting that all temporary impact areas have been restored to pre-project conditions within 180 days of each phase of construction consistent with subsection (4) above; (b) a map of the Riverside Ranch tidal restoration areas consistent with subsection (5) above within six

months following completion of Phase 1 construction; (c) a report documenting the results of hydrological monitoring required by subsections (6) and (7) above by November 30 of the first year following completion of each phase of construction documenting that the physical restoration was built-to-plan; (d) reports documenting that the biological/habitat restoration based on seeding and container planting was built-to-plan within four months of completion of restoration activities for each Phase 1 and Phase 2 construction; (e) the results of biological monitoring (including fish, bird, eelgrass, and other rare plant survey results) in the 3rd, 5th, and 10th years following completion of Phase 2 restoration activities, including an assessment of success relative to the established criteria, within one year of completion of each year of field sampling; (f) the results of the wetland delineation required by subsection (15) above documenting a minimum of 757 acres of wetlands within the project area footprint; (g) the results of the riparian habitat restoration required by subsection (9) above documenting a minimum of 128 acres of riparian habitat within the project area footprint; and (h) the revised or supplemental restoration and monitoring program described in subsection (B) below.

(B) If the 10th-year biological monitoring report indicates that the project has been unsuccessful, in part, or in whole, based on the approved goals and objectives set forth in the approved coastal development permit application, the permittee shall submit an application of an amendment to CDP No. 1-10-032 proposing a revised or supplemental restoration and monitoring program to compensate for those portions of the original program which did not meet the approved goals and objectives within six months of submittal of the 10th-year biological monitoring report.

(C) The permittee shall monitor the project site in accordance with the approved final habitat restoration and monitoring program. Any proposed changes to the approved final monitoring program shall be reported to the Executive Director. No changes to the approved final monitoring program shall occur without a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

3. Construction Responsibilities & Standards

The authorized work shall comply with the following construction responsibilities and standards:

(A) **Prior to the commencement of any development authorized under this CDP**, the permittee shall ensure that all on-site workers and contractors understand and agree to observe the standards for work outlined in this permit and in the detailed project description included as part of the application submittal and as revised by these conditions.

(B) **Prior to commencement of ground-disturbing activities** associated with both Phase 1 and Phase 2 construction, appropriate erosion, sediment, and runoff control measures shall be deployed in accordance with the final Storm Water Pollution Prevention Plan approved pursuant to Special Condition No. 4, and all measures shall be properly maintained throughout the duration of construction activities.

(C) **Prior to the commencement of construction**, the limits of the work areas and staging areas shall be delineated in cooperation with a qualified biologist, limiting the potential area affected by construction and ensuring that all agricultural lands, wetlands, and other environmentally sensitive habitats adjacent to construction areas are avoided during construction. All vehicles and equipment shall be restricted to pre-established work areas and haul routes and to established or designated staging areas;

(D) During construction, all trash shall be properly contained, removed from the work site, and disposed of on a regular basis to avoid contamination of habitat during construction activities. Any debris inadvertently discharged into coastal waters shall be recovered immediately and disposed of consistent with the requirements of this coastal development permit;

(E) All construction debris, including demolished fencing materials, gating, water lines, agricultural structures, and other related debris, shall be removed from the project site and disposed of in an upland location outside of the coastal zone or at an approved disposal facility pursuant to the final debris disposal plans approved pursuant to Special Condition No. 6;

(F) Channels shall be dewatered prior to excavation under the supervision of a qualified aquatic biologist in accordance with the fish and aquatic resources protection measures required by Special Condition No. 7.

(G) Prior to commencement of channel excavation, coffer dams or other temporary fish barriers shall be placed in the river channel during periods of low tide only. Dams and barriers shall be removed following completion of construction during periods of low tide;

(H) The following seasonal restrictions shall apply to the authorized construction work:

1. Out-of-channel grading, excavation, and other earth-moving activities shall only be conducted during the dry season period of June 1 through October 15 except as provided below. If rainfall is forecast during the time construction activities are being performed, BMPs shall be implemented in conformance with the final SWPPP approved pursuant to Special Condition No. 4. Any grading excavation, and other earth-moving activities that cannot feasibly be conducted within the June 1 through October 15 time period may be conducted between April 15 and May 31 and/or between October 16 and November 30 subject to the following conditions:

   a. All work shall cease upon the onset of precipitation at the project site and shall not recommence until the predicted chance of rain is less than 40 percent for the Ferndale area;

   b. The work site(s) shall be winterized between work cessation periods by installing stormwater runoff and erosion control barriers around the perimeter of each

construction site to prevent the entrainment of sediment into coastal waters;

c. Adequate stocks of stormwater runoff and erosion control barrier materials shall be kept onsite and made available for immediate use.

2. In-channel construction and maintenance activities shall be limited to (a) the dry season period of June 1 through November 30 only, subject to subsections 1.a-c above; and (b) any more restrictive time period within the June 1-November 30 timeframe if required by NOAA-Fisheries, Fish & Wildlife Service, or the Department of Fish & Game.

(I) Excess excavated sediments not proposed for reuse on site in accordance with the approved final construction plans shall be disposed of either off-site in a confirmed upland area outside of the coastal zone in conformance with the approved final debris disposal plans required by Special Condition No. 6 or placed in an upland area of an agricultural property in the coastal zone in conformance with an approved final sediment reuse plan approved pursuant to Special Condition No. 13;

(J) Excess ground water shall not be pumped or discharged into wetland areas on surrounding fields outside of the project area footprint to prevent sediment-laden water from entering coastal waters or wetlands;

(K) In-stream erosion and turbidity control measures shall be implemented during channel dredging activities;

(L) Equipment staging and materials stockpiling areas shall be limited to the locations and sizes specified in the approved final plans. Construction vehicles shall be restricted to designated haul routes. Construction equipment and materials shall be stored only in designated staging and stockpiling areas as depicted on the final plans approved pursuant to Special Condition No. 5;

(M) Any fueling and maintenance of construction equipment shall occur within upland areas outside of environmentally sensitive habitat areas

or within designated staging areas. Mechanized heavy equipment and other vehicles used during the construction process shall not be refueled or washed within 100 feet of coastal waters;

(N) Fuels, lubricants, and solvents shall not be allowed to enter the coastal waters or wetlands. Hazardous materials management equipment including oil containment booms and absorbent pads shall be available immediately on-hand at the project site, and a registered first-response, professional hazardous materials clean-up/remediation service shall be locally available on call. Any accidental spill shall be rapidly contained and cleaned up; and

(O) Upon completion of construction activities and prior to the onset of the rainy season, all bare soil areas shall be seeded in compliance with Special Condition No. 12 and mulched with weed-free rice straw.

4. Final Storm Water Pollution Prevention Plan

(A) **PRIOR TO COMMENCEMENT OF DEVELOPMENT OTHER THAN AUTHORIZED VEGETATION REMOVAL**, the applicant shall submit, for the review and approval of the Executive Director, a final Storm Water Pollution Prevention Plan (SWPPP) for Phase 1 construction activities. **PRIOR TO COMMENCEMENT OF PHASE TWO (2) DEVELOPMENT**, the applicant shall submit, for the review and approval of the Executive Director, a final SWPPP for Phase 2 construction activities. The final SWPPPs shall include provisions for all of the following:

1. Runoff from the project site shall not increase sedimentation in coastal waters or wetlands post-construction. During construction runoff from the project site shall not increase sedimentation in coastal waters beyond what's allowable under the final Water Quality Certification approved for the project by the North Coast Regional Water Quality Control Board;

2. Runoff from the project site shall not result in other pollutants entering coastal waters or wetlands during construction or post-construction;

3. Best Management Practices (BMPs) shall be used to prevent the entry of polluted stormwater runoff into coastal waters and wetlands during construction and post-construction, including use of relevant BMPs as detailed in the current California Storm Water Quality Best Management Handbooks (http://www.cabmphandbooks.com);

4. An on-site spill prevention and control response program, consisting of best management practices (BMPs) for the storage of clean-up materials, training, designation of responsible individuals, and reporting protocols to the appropriate public and emergency services agencies in the event of a spill, shall be implemented at the project to capture and clean-up any accidental releases of oil, grease, fuels, lubricants, or other hazardous materials from entering coastal waters or wetlands;

5. A schedule for installation and maintenance of appropriate construction source-control BMPs to prevent entry of stormwater runoff into the construction site and the entrainment of excavated materials into runoff leaving the construction site; and

6. The SWPPPs shall be consistent with the provisions of all other terms and conditions of Coastal Development Permit No. 1-10-032.

(B) The permittee shall undertake development in accordance with the approved final storm water pollution prevention plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

5. Final Construction Plans

(A) **PRIOR TO COMMENCEMENT OF DEVELOPMENT OTHER THAN AUTHORIZED VEGETATION REMOVAL,** the applicant shall submit, for the review and approval of the Executive Director, final plans for Phase

One (1) construction that substantially conform with the Phase 1 construction 75 percent plans prepared by Kamman Hydrology & Engineering, Inc. dated May 2011 and which are consistent with all Special Conditions of Coastal Development Permit No. 1-10-032;

(B) **PRIOR TO COMMENCEMENT OF PHASE TWO (2) DEVELOPMENT OTHER THAN AUTHORIZED VEGETATION REMOVAL,** the applicant shall submit, for the review and approval of the Executive Director, both of the following:

1. Final plans for Phase Two (2) construction that substantially conform with the Phase 2 construction 50 percent plans prepared by Winzler & Kelly and Michael Love & Associates dated May 2011 and which are consistent with all Special Conditions of Coastal Development Permit No. 1-10-032; and

2. Final project plans for the construction of the Francis Creek culvert replacement at Port Kenyon Road that substantially conform with the preliminary plans prepared by Humboldt County dated January 7, 2011.

(C) The permittee shall undertake development in accordance with the approved final construction plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

6. Final Debris Disposal Plans

(A) **PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT**, the applicant shall submit, for the review and written approval of the Executive Director, final plans for the disposal of all construction debris, excess sediments, vegetative spoils, and any other debris and waste expected to be generated by the authorized Phase One (1) work. In addition, **PRIOR TO COMMENCEMENT OF PHASE TWO (2) DEVELOPMENT**, the applicant shall submit, for the review and approval of the Executive Director, final plans for the disposal of all construction

debris, excess sediments, vegetative spoils, and any other debris and waste expected to be generated by the authorized Phase 2 work.

1. The plans shall demonstrate that:

   a. All temporary stockpiles of construction debris, excess sediments not approved for reuse on surrounding agricultural uplands pursuant to Special Condition No. 13, vegetative spoils, and any other debris and waste associated with the authorized work shall be minimized and limited to areas within the proposed project footprint as depicted on the final approved construction plans required by Special Condition No. 5 and where they can feasibly be contained with appropriate BMPs to prevent any discharge of contaminants to coastal waters and wetlands;

   b. All construction debris, excess sediments not approved for reuse on surrounding agricultural uplands pursuant to Special Condition No. 13, vegetative spoils, and any other debris and waste generated by the authorized work shall be disposed of at an authorized disposal site(s) capable of receiving such materials;

   c. Side casting or placement of any construction debris, excess sediments not approved for reuse on surrounding agricultural uplands pursuant to Special Condition No. 13, vegetative spoils, and any other debris and waste generated by the authorized work within the Salt River, any slough, creek, or drainage, or any other wetland area, including grazed seasonal wetlands, is prohibited; and

   d. Disposal of excavated sediments on surrounding agricultural uplands in the coastal zone for agronomic reuse purposes shall occur only on properties for which final sediment reuse plans have been approved pursuant to Special Condition No. 13.

2. The plans shall include, at a minimum, the following:

a. A site plan showing all proposed locations for the temporary stockpiling of construction debris, excess sediments, vegetative spoils, and any other debris and waste associated with the authorized work during construction operations;

b. A description of the manner by which the stockpiled materials will be removed from the construction site and identification of all debris disposal sites that will be used; and

c. A schedule for the removal of all construction debris, excess sediments, vegetative spoils, and any other debris and waste associated with the authorized work.

(B) The permittee shall undertake development in accordance with the approved final debris disposal plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

7. Protection of Sensitive Fish and Aquatic Resources

The permittee shall undertake all development authorized by CDP No. 1-10-032 in accordance with the fish and aquatic resources protection measures and protocols detailed in the application and included within the February 2011 Final Environmental Impact Report (Mitigation Monitoring and Reporting Program) and the two Biological Assessments (May 25, 2011 and June 2011) prepared for the project to ensure minimization of impacts to sensitive fish species and sensitive fish critical habitat within and around the project area. Fish and aquatic resources protection measures shall include, but shall not necessarily be limited to, the following:

(A) Coffer dams shall be erected prior to dewatering;

(B) Channels shall be dewatered prior to excavation under the supervision of a qualified aquatic biologist;

(C) Fish screens shall be installed upstream of coffer dams to prevent aquatic organisms from transfer into bypass piping;

(D) A qualified biologist shall appropriately use seining, dip nets, electrofishing, or other trapping procedures to transfer aquatic organisms out of the work area;

(E) Any captured Sacramento pikeminnow shall be euthanized rather than relocated;

(F) Coffer dam construction, channel dewatering, and relocation of aquatic organisms shall be performed in consultation with staff from NOAA-Fisheries, DFG, and Fish & Wildlife Service;

(G) The various avoidance and minimization measures for tidewater goby shall be implemented as proposed in the May 25, 2011 Biological Assessment; and

(H) The various water quality protection measures required by Special Condition Nos. 3, 4, and 6 shall be implemented.

8. Sacramento Pikeminnow Mitigation Measures

The permittee shall undertake monitoring and control of Sacramento pikeminnow in the project area as proposed in the June 2011 Biological Assessment prepared for the project including, but not necessarily limited to, conducting annual monitoring for and documentation of pikeminnow for at least five years following completion of Phase 2 development to assess presence/absence, population estimates, habitat preferences, dietary preferences, movement patterns, and other factors. Annual reports shall be submitted to the Executive Director by December 31 of each year. In the event that adult pikeminnow greater than 10 inches in size become dominant in the project area, a control program shall be implemented as proposed in the Biological Assessment. The pikeminnow control program shall require an amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

9. Riparian Vegetation Removal Restrictions

Authorized riparian vegetation removal is prohibited during the portion of the bird breeding/nesting seasons between March 1 and July 1. During the remaining portion of the bird breeding and nesting season between July 1 and August 15, riparian vegetation removal may only occur if (a) a qualified biologist has surveyed the area according to the approved Sensitive Bird Nesting Habitat Protection Plan required by Special Condition No. 10, and (b) the survey results indicate that no willow flycatchers are present in the area and no nesting habitat for any bird species is present in the area. Authorized vegetation removal may occur without these restrictions between August 15 and March 1.

10. Protection of Bird Breeding & Nesting Habitat

(A) **PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT**, the permittee shall submit, for the review and written approval of the Executive Director, a Sensitive Bird Nesting Habitat Protection Plan, prepared by a qualified biologist, for conducting seasonally appropriate pre-construction surveys for sensitive bird nesting habitat in the project area and protecting such habitat from construction impacts. The plan shall include, at a minimum, the following:

1. Provisions for surveying the project area each year by a qualified biologist according to current Department of Fish and Game protocols no more than one week prior to commencement of construction activities proposed to occur that year during the bird breeding and nesting season (March 1 through August 15) for the presence of active nesting habitat;

2. Provisions for avoiding construction activities other than vehicular use of roads during the nesting season(s) within 100 feet of an occupied nest of any native migratory bird species; within 300 feet of an occupied nest of any special-status bird species; and within 500 feet of an occupied nest of any raptor species. No-disturbance buffers around active nests shall be maintained until completion of nesting.

3. Provisions for submittal of the surveys required above for the review and approval of the Executive Director prior to the commencement of authorized work each year during the bird breeding and nesting season that includes a map that locates

any sensitive nesting habitat identified by the surveys and a narrative that describes sensitive habitat avoidance measures proposed.

(B) The permittee shall undertake development in accordance with the approved final sensitive bird nesting habitat protection plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

11. Final Revised Rare Plant Mitigation and Monitoring Plan

(A) **PRIOR TO COMMENCEMENT OF DEVELOPMENT OTHER THAN AUTHORIZED VEGETATION REMOVAL**, the applicant shall submit, for the review and approval of the Executive Director, a final revised rare plant mitigation and monitoring plan prepared by a qualified botanist or ecologist that substantially conforms with the plan prepared by H.T. Harvey & Associates titled "Salt River Ecosystem Restoration Project Rare Plant Mitigation and Monitoring Plan" dated January 27, 2011, except that the plan shall be revised to include various additional provisions for eelgrass mitigation and monitoring, as follows:

1. A pre-construction eelgrass survey shall be completed during the months of May through August. The pre-construction survey shall be completed prior to the beginning of construction and shall be valid until the next period of active growth.

2. A post-construction eelgrass survey shall be completed in the same month as the pre-construction survey during the next growing season immediately following the completion of construction.

3. If post-construction eelgrass surveys indicate any decrease in eelgrass density or cover, then the site shall be monitored consistent with the approved final mitigation and monitoring plan until the performance criteria in subsection (6) have been met. If post-construction survey results demonstrate to the satisfaction of the Executive Director that eelgrass densities

have not decreased at all and there has been no loss of extent of vegetated cover, then no further monitoring or mitigation is required.

4. Adverse impacts to eelgrass shall be measured as the difference between the pre-construction and post-construction estimates of eelgrass cover and density. The extent of vegetated cover is defined as that area where eelgrass is present and where gaps in coverage are less than one meter between individual turion clusters. Density is defined as the average number of turions per unit area.

5. Density and extent of vegetative cover shall be estimated at control areas during pre-construction surveys, post-construction surveys, and during annual monitoring. Changes in density and extent of vegetated cover of the control areas shall be used to account for natural variability. Selection of an appropriate control site shall be performed in consultation with the Department of Fish and Game and NOAA-Fisheries staff.

6. Within three years of completion of the project (both phases), the entire pre-construction eelgrass area plus the restored areas suitable for eelgrass recruitment shall have an extent of vegetative cover equal to at least 1.2 times the impacted area and have an average density equal to the pre-construction average density.

7. Monitoring methods shall include mapping and random sampling of the eelgrass areas using a sampling size adequate to obtain representative qualitative data for the entire project site to determine percent cover and shoot density as defined in subsection (4) above.

8. A detailed monitoring schedule shall be provided that indicates when each of the required monitoring events will be completed. Monitoring reports shall be provided to the Executive Director, DFG, and NOAA-Fisheries within 30 days of completion of each required monitoring period;

9. If the impacted eelgrass areas have not met the recovery standard in subsection (6) in three years, the areas shall be remediated within one year of a determination by the permittee or the Executive Director that monitoring results indicate that recovery has not taken place;

10. A detailed remediation plan shall be included that provides for mitigation site identification, planting methods, monitoring methods, and schedule. Specific success and monitoring criteria are as follows:

    a. A minimum of 70 percent aerial coverage and 30 percent density in the mitigation area after the first year;

    b. A minimum of 85 percent aerial coverage and 70 percent density in the mitigation area after the second year;

    c. A minimum of 100 percent aerial coverage and 85 percent density in the mitigation area after the third year.

(B) If the performance criteria in subsection (A)-10 above have not been met at the end of the three-year remediation period, the permittee shall submit an application for an amendment to Coastal Development Permit No. 1-10-032 proposing additional mitigation to ensure all performance criteria are satisfied consistent with all terms and conditions of this permit.

(C) The permittee shall undertake development in accordance with the approved final rare plant mitigation and monitoring plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

12. Revegetation Standards & Limitations

(A) Only native plant species shall be planted in the proposed restoration areas. All proposed plantings shall be obtained from local genetic

stocks within Humboldt County. If documentation is provided to the Executive Director that demonstrates that native vegetation from local genetic stock is not available, native vegetation obtained from genetic stock outside of the local area may be used. No plant species listed as problematic and/or invasive by the California Native Plant Society, the California Invasive Plant Council, or as may be identified from time to time by the State of California shall be employed or allowed to naturalize or persist on the site. No plant species listed as a "noxious weed" by the governments of the State of California or the United States shall be utilized within the project area.

(B) For the proposed soil stabilization and erosion control applications, regionally appropriate native plants shall be used if feasible. If infeasible (e.g., on privately owned pasturelands disturbed by temporary construction impacts proposed to be restored to agricultural production), the use of nonnative species or varieties may be used [e.g., sterile, short-lived, non-persistent cereal grasses such as barley (*Hordeum vulgare*), buckwheat (*Fagopyron esculentum*), rye (*Secale cereale*), and wheat (*Triticum aestivum*)] only if the proposed species or varieties are known not to persist or spread in the ecosystem. Alternatively, the pasture mix proposed in the May 4, 2011 Habitat Mitigation and Monitoring Plan may be used in areas proposed to be restored to pasture grazing use.

(C) All proposed planting shall be completed by the end of the first full optimal planting season that occurs after completion of construction;

(D) All required plantings shall be maintained in good growing condition throughout the life of the project and whenever necessary shall be replaced with new plant materials to ensure continued compliance with the restoration goals and objectives.

(E) The use of rodenticides containing any anticoagulant compounds including, but not limited to, Bromadiolone, Brodifacoum or Diphacinone is prohibited.

13. Final Sediment Reuse Plans

(A) **PRIOR TO COMMENCEMENT OF PHASE TWO (2) CONSTRUCTION AND PRIOR TO THE PLACEMENT OF EXCAVATED SEDIMENTS ON ANY**

AGRICULTURAL PROPERTY, the applicant shall submit, for the review and approval of the Executive Director, a final sediment reuse plan for the agricultural property proposed to receive excavated sediments. Each sediment reuse plan shall provide that no excavated sediments shall be placed either within any wetlands located on or immediately adjacent to the subject property or within wetland buffer areas as proposed in the example sediment reuse plan included as Appendix E of the document titled "Wetland Buffer Assessment for Sediment Reuse Areas on Agricultural Lands" prepared by Winzler & Kelly dated August 2011. The final sediment reuse plans shall substantially conform to the example sediment reuse plan, except that each plan shall be made site-specific for each property and shall include the following additional provisions:

1. A narrative description of (a) property owner name, site location, and APN(s); (b) the upland acreage available on the subject property for receiving excavated sediments for sediment reuse; (c) the amount of excavated sediments proposed to be placed on the subject property for sediment reuse; (d) generally when, how, and where the excavated sediments will be applied on the subject property, whether the material will be temporarily windrowed and if so for how long, and any other relevant details; (e) the work window for sediment application on agricultural uplands, with the restriction that sediments shall be applied only during the generally dryer period of April through November; (f) specific best management practices to be used to ensure that no wind- or rain-induced erosion results from the stockpiling and application of material on the subject site; (g) the applicable setback distances from the sediment windrowing and application areas that shall be established on the subject property; (h) limitations and restrictions imposed on established buffer areas during the reestablishment of vegetation following sediment application on the sediment reuse area (e.g., vegetation maintenance, allowable depth of overland flow through the area, etc.); and (i) the upland and/or wetland delineation reference applicable to the specific property.

2. A clear, appropriately-scaled graphic depiction of (a) all areas of the subject property proposed to receive excavated

material for sediment reuse; (b) all wetlands on and immediately adjacent to the subject property; (c) all applicable setback buffers (from delineated wetlands, fence lines with wetlands on adjacent properties, etc.) for the subject property as proposed in the August 2011 example sediment reuse plan; (d) proposed windrow/stockpiling areas; (e) locations of specified BMPs; and (f) any upland or wetland delineation data points recorded on the subject property.

3. Addition of a sediment reuse note that explains that the placement of the excavated sediments on the property for temporary stockpiling and subsequent sediment reuse is regulated as a form of development under Coastal Development Permit No. 1-10-032 subject to the applicable terms and conditions of the CDP.

(B) The permittee shall ensure that excavated sediment disposal/reuse is undertaken in accordance with the approved final plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

14. Final Revised Adaptive Management Plan

(A) **PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT**, the applicant shall submit, for the review and written approval of the Executive Director, a final revised adaptive management plan that substantially conforms to the Adaptive Management Plan (AMP) prepared by H.T. Harvey & Associates dated January 28, 2011 and the AMP Supplement Update Table A-1 dated September 7, 2011, except that the plan shall be revised to include provisions for all of the following:

1. All measures, protocols, standards, limitations, and BMPs listed in Special Condition Nos. 2 through 13 of CDP No. 1-10-032 shall be applied as they relate to each specific "potential management action" listed in AMP Supplement Update Table A-1.

2. Channel excavation to remove sediment to improve channel function (row #4 of Supplement Update Table A-1) shall be limited annually to an area not to exceed 25,000 cubic yards of sediment and 2,000 linear feet of sediment removal.

3. Pre- and post-storm maintenance activities in the channel (row #6 of Supplement Update Table A-1) shall be restricted annually to the period of June 1 through November 30 only;

4. The removal of any native vegetation in riparian forest restoration areas and existing riparian areas (row #10 of Supplement Update Table A-1) shall be prohibited without an amendment to this coastal development permit.

5. The removal of riparian vegetation (row #10 of Supplement Update Table A-1) shall be limited annually to areas of five (5) acres or less within Sediment Management Areas, active bench areas, and active channel areas only, and within these areas only young (i.e., less than 5-year-old) trees and shrubs no larger than 4 inches in diameter are permitted to be removed. Such vegetation removal shall be prohibited during the portion of the bird breeding/nesting season between March 1 and July 1. During the remaining portion of the bird breeding and nesting season between July 1 and August 15, riparian vegetation removal may only be performed if (a) a qualified biologist has surveyed the area according to the approved Sensitive Bird Nesting Habitat Protection Plan required by Special Condition No. 10, and (b) the survey results indicate that no willow flycatchers are present in the area and no nesting habitat for any bird species is present in the area.

6. The work window for applying/placing excavated sediments on agricultural uplands (row #16 of Supplement Update Table A-1) shall be restricted to the dry season period of April through November only.

7. Criteria for flash grazing shall be provided, which (a) restricts grazing to limited time periods across limited acreages within active bench areas and upland berm areas only; (b) requires that pre-construction rare plant surveys be conducted in proposed grazing areas within or adjacent to rare plant suitable

habitat; and (c) requires that temporary livestock exclusion fencing be installed to exclude livestock from channels, riparian areas, and other sensitive habitat areas.

8. Those potential management actions listed in Table A-1 that include (a) repairing failed or damaged road-stream crossings where the crossing would be enlarged, (b) implementing site-specific erosion control BMPs such as soil bioengineering and vegetative revetments, (c) replacing or enlarging culverts and tide gates as needed, (d) excavating tidal channels and/or re-filling or drainage ditches to improve hydrologic connectivity, and (e) certain erosion control measures (e.g., armoring and geotechnical bank protection) shall not occur without an amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

9. The September 7, 2011 version of Table A-1, as modified herein, shall be incorporated into the final approved AMP.

10. The period of AMP authorization shall be limited consistent with Special Condition No. 15.

11. An annual maintenance/adaptive management operations plan shall be submitted each year pursuant to Special Condition No. 16 for the Executive Director's review and approval prior to commencement of annual maintenance and/or adaptive management operations.

(B) The permittee shall undertake maintenance and adaptive management development in accordance with the approved final adaptive management plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

15. Length of Development Authorization for Ongoing Maintenance and Adaptive Management Activities Authorized by CDP 1-10-032

Development authorized by this permit is valid for five (5) years from the date of Commission approval (until October 5, 2016). One request for an additional five-year period of development authorization may be accepted, reviewed and approved by the Executive Director for a maximum total of ten (10) years of development authorization, provided the request would not alter the project description and/or require modifications of conditions due to new information or technology or other changed circumstances. The request for an additional five-year period of development authorization shall be made at least 120 days prior to October 5, 2016. If the request for an additional five-year authorization period would alter the project description and/or require modifications of conditions due to new information or technology or other changed circumstances, an amendment to CDP No. 1-10-032 shall be necessary to authorize development beyond October 5, 2016.

16. Submittal of Annual Maintenance/Adaptive Management Operations Plan

(A) **PRIOR TO COMMENCEMENT OF ANNUAL MAINTENANCE AND/OR ADAPTIVE MANAGEMENT OPERATIONS IN ANY YEAR IN WHICH MAINTENANCE AND/OR ADAPTIVE MANAGEMENT OPERATIONS ARE CONDUCTED PURSUANT TO THIS COASTAL DEVELOPMENT PERMIT AUTHORIZATION,** the permittee shall submit, for the review and approval of the Executive Director, an annual Maintenance/Adaptive Management Operations Plan for that year's proposed maintenance/adaptive management work that (a) is consistent with the final revised Adaptive Management Plan approved by the Executive Director pursuant to Special Condition No. 14, (b) is consistent with all terms and conditions of Coastal Development Permit No. 1-10-032, and (c) contains, at a minimum, the following information:

1. A site plan depicting the location(s) of proposed annual maintenance and/or adaptive management activities, including applicable Assessor's Parcel Numbers and property owner names for all proposed work sites and associated construction areas;

2. A description of the type(s) of annual maintenance/adaptive management activities proposed;

3. Cross sections, maps, and associated calculations as necessary that accurately depict the proposed annual maintenance/adaptive management work area(s);

4. Copies of any necessary biological and botanical surveys needed for approval of annual maintenance/adaptive management activities;

5. A plan for erosion, run-off, and sedimentation control to avoid significant adverse impacts on coastal resources. The plan shall demonstrate that (a) run-off from the work sites shall not increase sedimentation in or result in pollutants entering coastal waters; and (b) Best Management Practices (BMPs) shall be used to prevent entry of polluted stormwater runoff into coastal waters during the construction, including the use of relevant BMPs as detailed in the current California Storm Water Quality Best Management Handbooks (http://www.cabmphandbooks.com). The plan shall contain both (a) a narrative report and a site plan describing the locations of all temporary erosion, runoff, and sedimentation control measures to be used during annual maintenance/adaptive management activities; and (b) a schedule for installation and removal of the temporary control measures.

6. If applicable, a debris disposal plan consistent with Special Condition No. 6;

7. If applicable, a creek dewatering and diversion plan consistent with the protection measures outlined in Special Condition No. 7.

8. If applicable, a revegetation plan consistent with restrictions enumerated in Special Condition No. 12;

9. If applicable, a sediment reuse plan consistent with Special Condition No. 13; and

10. A schedule for proposed annual maintenance/adaptive management activities.

(B) The permittee shall undertake development in accordance with the approved final plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

17. Final Revised Agricultural Enhancement Monitoring Plan

(A) **PRIOR TO COMMENCEMENT OF DEVELOPMENT OTHER THAN AUTHORIZED VEGETATION REMOVAL,** the permittee shall submit, for the review and approval of the Executive Director, a final Agricultural Enhancement Monitoring Plan designed to monitor changes in agricultural productivity within and around the project area resulting from implementation of the proposed project. The plan shall substantially conform to the Agricultural Enhancement Monitoring Plan submitted with the coastal development permit application, except that it shall contain the following additional provisions:

1. Provisions for ensuring that agricultural productivity shall be increased by at least 4,270 Animal Unit Months (AUMs) per year (or an equivalent agricultural productivity value) on the 750 acres of prime agricultural lands within and around the project area footprint within five years of completion of Phase 2 construction;

2. Details on the proposed methods for measuring changes in agricultural productivity within and around the project area over a minimum five-year period following completion of Phase 2 construction;

3. A map depicting all agricultural lands proposed to be included in the agricultural enhancement monitoring area, including a calculation of the total acreage of lands to be included within and surrounding the project area). The map shall depict all "prime agricultural land" (as defined in Section 51201(c) of the California Government Code) within the agricultural enhancement monitoring area;

4. Provisions for submittal of documentation to the Executive Director at the end of the 5-year monitoring period demonstrating that agricultural productivity on the 750 acres of prime agricultural lands within and around the project area has been increased by at least 4,270 AUMs per year or an equivalent measure of agricultural productivity; and

5. A detailed monitoring and reporting schedule that indicates when the agricultural productivity monitoring events will be completed throughout the proposed monitoring program and when annual reports will be submitted to the Executive Director. Monitoring reports shall be provided to the Executive Director annually beginning the first year following completion of Phase 2 construction and continuing each year for at least five years.

(B) If the 5th-year monitoring report indicates that the project has been unsuccessful, in part or in whole, the permittee shall submit an application for an amendment to CDP No. 1-10-032 proposing revisions to the project authorized by CDP No. 1-10-032 to achieve the increase in agricultural productivity required by Section (A)-4 above.

(C) The permittee shall undertake development in accordance with the approved final plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

18. Restoration of Prime Agricultural Land on Riverside Ranch

(A) **PRIOR TO COMMENCEMENT OF DEVELOPMENT OTHER THAN AUTHORIZED VEGETATION REMOVAL,** the permittee shall submit, for the review and approval of the Executive Director, a plan to transform at least fifty-two (52) acres of currently non-prime agricultural land on Riverside Ranch to "prime agricultural land" as defined in Section 51201(c) of the California Government Code within five (5) years of completion of Phase 1 construction. The plan shall include provisions for all of the following:

1. Within five years of completion of Phase 1 construction, at least 52 acres of the retained agricultural land on Riverside Ranch shall qualify as prime based on any one of the four paragraphs of Section 51201(c) of the California Government Code;

2. A description of the agricultural management activities that will be undertaken to restore the agricultural land to prime conditions and the type of documentation that will be submitted as evidence that the land has been transformed to prime.

3. A site plan depicting the property's agricultural features such as proposed fences and/or livestock fencing maintenance areas, grazing and/or pasturing areas, agricultural structures, water lines, and other infrastructure, etc.;

4. Provisions for submittal of a report to the Executive Director at the end of the 5th-year following completion of Phase 1 construction documenting how much of the retained agricultural land on Riverside Ranch qualifies at that time as prime based on any one of the four paragraphs of Section 51201(c) of the California Government Code.

(B) If the 5th-year monitoring report indicates that less than 52 acres of the retained agricultural land on Riverside Ranch qualifies as prime agricultural land, the permittee shall submit an application for an amendment to CDP No. 1-10-032 proposing either (i) corrective measures to ensure that at least 52 acres of the retained agricultural land on Riverside Ranch will qualify as prime agricultural land within one year of approval of the permit amendment, or (ii) to transform other non-prime agricultural land elsewhere within the coastal zone in the Eel River Delta to prime agricultural land in an amount equal to or greater than the number of acres less than 52 that have been transformed to prime agricultural land on Riverside Ranch.

(C) The permittee shall undertake development in accordance with the approved final plan. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment

to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

19. Submittal of Upslope Sediment Reduction Program Annual Progress Reports

The Upslope Sediment Reduction Program as described in the Final Environmental Impact Report for the Salt River Ecosystem Restoration Project shall be implemented as proposed, and annual progress reports on the program shall be submitted for the review and approval of the Executive Director by December 31 of each calendar year for the duration of the five-year monitoring period required by Special Condition No. 17. The annual reports shall (a) document the progress made during the reporting period in planning, coordinating, and implementing specific erosion control and sediment reduction projects under the program, (b) summarize the total number of sites treated under the program to date, (c) identify the high-priority sites to be addressed in the coming year of the program and discuss the steps needed to implement an erosion control or sediment reduction project at each site, (d) identify funding that has been secured to date and the amount of new funding that was secured over the reporting period, and (e) identify steps to be followed to secure additional needed funding over the next year.

20. Assumption of Risk, Waiver of Liability and Indemnity Agreement

By acceptance of this permit the applicant acknowledges and agrees (i) that the site may be subject to hazards from flooding, tsunami wave run-up, erosion, and earth movement; (ii) to assume the risks to the applicant and the property that is the subject of this permit of injury and damage from such hazards in connection with this permitted development; (iii) to unconditionally waive any claim of damage or liability against the Commission, its officers, agents, and employees for injury or damage from such hazards; and (iv) to indemnify and hold harmless the Commission, its officers, agents, and employees with respect to the Commission's approval of the project against any and all liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such hazards.

21. Protection of Archaeological Resources

(A) **PRIOR TO COMMENCEMENT OF PHASE 2 DEVELOPMENT,** the additional pre-project survey recommended by the archaeological report in the location between Port Kenyon and the Salt River be conducted and a qualified cultural resource specialist analyze the significance of any resources discovered. If an area of historic or prehistoric cultural resources or human remains are discovered during the course of the project or pre-construction testing, all construction within twenty (20) meters of the discovery shall cease and shall not recommence except as provided in subsection (B) hereof, and a qualified cultural resources specialist shall analyze the significance of the find.

(B) A permittee seeking to recommence construction following discovery of the cultural deposits shall submit an archaeological plan for the review and approval of the Executive Director.

1. If the Executive Director approves the Archaeological Plan and determines that the Archaeological Plan's recommended changes to the proposed development or mitigation measures are *de minimis* in nature and scope, construction may recommence after this determination is made by the Executive Director.

2. If the Executive Director approves the Archaeological Plan but determines that the changes therein are not *de minimis*, construction may not recommence until after an amendment to this permit is approved by the Commission.

22. Final Public Access Plan

(A) **WITHIN TWO (2) YEARS OF COMPLETION OF PHASE ONE (1) CONSTRUCTION**, the permittee shall submit, for the review and approval of the Executive Director, a final public access plan providing for public access at the Department of Fish and Game-owned property known as Riverside Ranch.

(1) The plan shall demonstrate all of the following:

a. A boating put-in and/or take-out access point for at least non-motorized boating use shall be developed on the

Riverside Ranch Property to provide boating access to the property for the public.

b. Vehicular access to the Riverside Ranch property shall be provided either via (i) Riverside Road unless the permittee demonstrates to the satisfaction of the Executive Director that the portions of Riverside Road needed to gain access to the Riverside Ranch property are not publically owned, (ii) Camp Weott Road, Dillon Road, or Port Kenyon Road with a vehicular or footbridge over the Salt River to the Riverside Ranch property if the selected alternative is demonstrated to be feasible to the satisfaction of the Executive Director, or (iii) another public vehicular access alternative approved by a Commission amendment to this coastal development permit.

c. Public access amenities shall be provided at the subject property within one year of approval of the approved final public access plan.

d. Public access amenities shall include, at a minimum all of the following:

(i) Public vehicular parking;

(ii) A trail suitable for foot traffic on top of and along at least half the length of the new setback berm unless the permittee: (a) demonstrates that access along half of the setback berm cannot be provided consistent with the protection of fragile coastal resources and agricultural resources on the subject property, and (b) obtains a Commission amendment to this coastal development permit to reduce the amount or change the location of the required public access; and

(iii) Signage delineating the public access areas to facilitate public use.

e. All public access areas and amenities shall be available to the general public free of charge at a minimum during daylight hours (i.e., one hour before sunrise to one hour after sunset) and for a minimum of 39 weekends of the year unless the permittee (i) demonstrates that access during those hours or number of weekends cannot be provided consistent with the protection of fragile coastal resources and agricultural resources on the subject property, and (ii) obtains a Commission amendment to this coastal development permit to change the required availability of public access.

(2) The plan shall include, at a minimum, the following components:

a. A narrative and site plan showing how public vehicular access will be provided to the property and which demonstrates that (i) the route of the access alternative is legally available for use by the public and (ii) all necessary permit authorizations from public agencies for improvement of the access alternative can be obtained for the alternative;

b. An analysis, based on applicable monitoring results reported pursuant to Special Condition No. 2 and/or other property-specific scientific data and/or factors, explaining which portions of the property are suitable for public access and recreational uses consistent with the protection of fragile coastal resources and agricultural uses on the subject property;

c. An analysis, based on applicable monitoring results reported pursuant to Special Condition No. 2 and/or other property-specific scientific data and/or factors, explaining what intensity of use (e.g., frequency and timing of use in terms of hours per day or days per week or months per year) and what types of uses are appropriate for public access and recreational uses at the property consistent with the protection of fragile

coastal resources and agricultural uses on the subject property;

d. Discussions of the regulations and management that will be used to facilitate, manage, and provide public access to the approved project.

e. A clear depiction of all proposed public access areas and amenities, including, but not limited to, all parking areas, trails, walkways, boating access points, restrooms, bench seating, trash and recycling receptacles, bicycle racks, and/or other public access amenities as proposed;

f. Clear identification of all parameters for use of the site by the public, including hours and days of admittance, compatible types of public access use, and other applicable parameters; and

g. A signage plan identifying all signs and any other project elements that will be used to facilitate, manage, and provide public access to the approved project, including, if applicable, identification of all public education/interpretation features that will be provided on the site (educational displays, interpretive signage, etc.). Sign details showing the location, materials, design, and text of all public access signs shall be provided. Signs shall be designed so as to provide clear information without impacting public views and site character. Public access signage shall acknowledge the participants in the design and provision of the public access components, including the California Coastal Commission.

(B) The permittee shall undertake development in accordance with the approved final plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

23. State Lands Commission Review

PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the applicant shall provide to the Executive Director a written determination from the State Lands Commission that:

(A) No State or public trust lands are involved in the development; or

(B) State or public trust lands are involved in the development and all permits required by the State Lands Commission have been obtained; or

(C) State or public trust lands may be involved in the development, but pending a final determination an agreement has been made with the State Lands Commission for the approved project as conditioned by the Commission to proceed without prejudice to that determination.

24. Department of Fish & Game Consistency Determination

PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the applicant shall provide, for the review and written approval of the Executive Director, a copy of a Consistency Determination (CD) and/or Incidental Take Permit issued by the Department of Fish and Game pursuant to the California Endangered Species Act, or evidence that no CD or ITP is required. The applicant shall inform the Executive Director of any changes to the project required by the Department. Such changes shall not be incorporated into the project until the applicant obtains a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

25. Department of Fish & Game SAA Approval

PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the applicant shall provide, for the review and written approval of the Executive Director, a copy of a Streambed Alteration Agreement (SAA) issued by the Department of Fish and Game, or evidence that no SAA is required. The applicant shall inform the Executive Director of any changes to the project required by the Department. Such changes shall not be incorporated into the project until the applicant obtains a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

26. Regional Water Quality Control Board Approval

PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the applicant shall provide, for the review and written approval of the Executive Director, a copy of a permit issued by the North Coast Regional Water Quality Control Board, or evidence that no permit is required. The applicant shall inform the Executive Director of any changes to the project required by the Board. Such changes shall not be incorporated into the project until the applicant obtains a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

27. U.S. Army Corps of Engineers Approval

PRIOR TO COMMENCEMENT OF PHASE ONE (1) CONSTRUCTION, the permittee shall provide to the Executive Director a copy of a permit or permit amendment issued by the Army Corps of Engineers, or letter of permission, or evidence that no permit or permission is required. The applicant shall inform the Executive Director of any changes to the project required by the Army Corps of Engineers. Such changes shall not be incorporated into the project until the applicant obtains a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

28. Submittal of Final Federal Biological Opinions

PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the applicant shall submit evidence, for the review and written approval of the Executive Director, that the National Marine Fisheries Service (NOAA-Fisheries) and the U.S. Fish and Wildlife Service have issued final Biological Opinions, and, if necessary, Incidental Take Permits, in support of the project authorized by this permit and that are consistent with all terms and conditions of this permit. The applicant shall inform the Executive Director of any changes to the project required by the federal agencies. Such changes shall not be incorporated into the project until the applicant obtains a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

29. Caltrans Encroachment Permit

PRIOR TO COMMENCEMENT OF PHASE TWO (2) CONSTRUCTION, the applicant shall provide to the Executive Director a copy of an encroachment permit issued by Caltrans for project activities located around Highway 211, or evidence that no permit is required. The applicant shall inform the Executive Director of any changes to the project required by Caltrans. Such changes shall not be incorporated into the project until the applicant obtains a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

30. Humboldt County Encroachment Permit

PRIOR TO COMMENCEMENT OF PHASE ONE (1) CONSTRUCTION, the applicant shall submit for the review and approval of the Executive Director a copy of an encroachment permit issued by Humboldt County, or evidence that no permit is required. The applicant shall inform the Executive Director of any changes to the project required by the County. Such changes shall not be incorporated into the project until the applicant obtains a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

APPENDIX D.
SENSITIVE BIRD NESTING HABITAT PROTECTION PLAN

Memorandum

February 15, 2012

To:	Melissa Kraemer, California Coastal Commission		
Cc:	Donna Chambers, Humboldt County RCD Michael Van Hattem, CDFG		
From:	Ken Mierzwa, Senior Biologist Jeremy Svehla, Project Manager	Tel:	707-443-8326
Subject:	**Salt River Ecosystem Restoration Project** **Sensitive Bird Nesting Habitat Protection Plan**	Job no.:	10653-10-001

Purpose

This document is intended to identify methods to be used for pre-construction surveys of sensitive bird nesting habitat in the Salt River Ecosystem Restoration Project area as well as avoidance measures to protect such habitat from construction-related impacts.

Location

The Salt River Ecosystem Restoration Project (Project) consists of two phases, Riverside Ranch Tidal Marsh Restoration (Phase 1) and the Salt River Riparian Floodplain Corridor Restoration (Phase 2). The phases are proposed to be constructed in separate construction seasons. Phase 1 consists of excavation of the Salt River channel downstream of the Reas Creek confluence in addition to excavation of new tidal slough channels on Riverside Ranch. Riverside Ranch borders the lower segment of Salt River, and includes areas of tidal channel, salt marsh, seasonal wetland, riparian, and agricultural grassland habitat. The material excavated during Phase 1 will be reused for construction of the new set-back berm.

Phase 2 consists of excavation of the Salt River channel from the Reas Creek confluence to approximately 1,500 feet upstream from the Williams Creek confluence. Additionally, Phase 2 includes the excavation and restoration of the lower Francis Creek and Eastside Drainage. The excavated material from Phase 2 will be spread in thin layers (3-4 inch depth) on designated agricultural uplands in the Eel River Valley. Placement of excavated sediment on agricultural uplands is consistent with the definition of General Agriculture (Humboldt County Zoning Regulations: 314-170.1 – General Agriculture) and is a principally permitted use of agriculturally zoned parcels, and therefore this plan does not apply to the sediment reuse areas.

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Methods

Surveys are intended to identify confirmed or probable nesting activity by native migrant birds; sensitive bird species including those listed as endangered, threatened, or state special concern; and raptors. An initial habitat assessment shall be performed to determine which areas must be surveyed for nesting birds. Because much of the existing habitat within the construction area is to be converted, some suitable nesting habitat near construction areas may be removed prior to the onset of nesting activity. All remaining habitat within 500 feet of anticipated construction limits will be surveyed. Survey methods for native landbirds will generally follow methods outlined in Ralph et al (1993). Locations of nests or nesting behavior will be flagged and either mapped in the field on large-scale maps or GPS'd depending on the nest location. In order to locate nesting birds a combination of strategies will be utilized. Specific strategies will depend primarily on two factors – timing and habitat characteristics.

Timing

The project includes removal and conversion of various existing habitat types including tidal marsh, riparian, scrub-shrub and native grasslands. In areas where these habitat types will be converted, to the extent practical, the existing vegetation will be removed during the non-nesting season (mid August through February). Where existing vegetation needs to be removed during the nesting season, nest surveys will commence during the nest-building stage for most species, as this is the earliest time of the nesting season and when nesting birds are relatively conspicuous. During this stage the surveyor can watch for birds carrying nest material and track them to their nests. Once a nest is located it can be monitored and a completion (fledging) date can be projected with a reasonably high level of accuracy. During the egg-laying and incubation stages nesting birds are less conspicuous, making nest finding more difficult, requiring different strategies. Subtle behavioral cues (e.g., specific call types) are particularly helpful during these stages. Surveys conducted during the nestling stage make it relatively easy to find nests as both parents actively feed young and can be observed carrying food throughout the day. However, waiting until this stage to perform surveys can result in time lost for construction activities. In other words, there might be segments of potential nesting habitat that do not support nesting birds, but this would not be approved for construction until surveyed.

Habitat

Where the habitat being surveyed allows the surveyor to walk through without risk of damaging nests and surrounding vegetation, then the survey may include a physical search of the area in addition to behavioral observations. Where habitat is dense or otherwise impenetrable it may be possible to infer the locations of nests through behavioral observations of adult birds from the edge of the habitat. For example, singing positions of parent males can be mapped to determine the general nesting area and this can be further refined with additional behavioral observations.

Schedule

Recon-level surveys may commence in the spring, with the exact dates at the discretion of the biologist. Detailed pre-construction surveys would begin one week prior to the onset of construction activities (anticipated to be approximately May 1), and may be phased as construction activities begin on different portions of the project site. Establishment of initial

buffer zones (described below) would be based upon the pre-construction surveys. Depending on the exact date of construction, follow-up surveys may be required in some areas to identify late nesting species, or determine when nestlings have fledged and would be permissible to allow construction crews into selected areas; these would be conducted based on the judgment of the biologist and in consultation with CDFG.

Avoidance Measures

The FEIR and CDP identify buffer zone requirements for each category of observation:

- 100 feet for native migratory birds,
- 300 feet for sensitive species, or
- 500 feet for raptors

Setbacks will be maintained around nests or probable nesting behavior within or adjacent to construction areas (exclusive of vehicle use of roads), and will be flagged for identification. Buffer distances may be modified by the biologist, after consultation with CDFG and California Coastal Commission Staff and based upon site-specific factors; different species may be more or less sensitive to disturbance, and the type and duration of impact may also influence the amount of buffer needed. Nests would be identified and protected from direct construction impacts consistent with California Department of Fish & Game Code 3503 and the Migratory Bird Act.

Mapping

As surveys are completed, locations of nests or birds exhibiting nesting behavior will be identified and mapped. The map will identify the observations by category (native migratory, sensitive species, or raptor). The maps are intended to be working maps that will be utilized by the construction manager throughout the construction season and will be periodically updated as the nesting season progresses. The initial and final nesting bird maps and a brief written commentary describing the results will be provided to CDFG and the California Coastal Commission.

Deliverables

A map of confirmed nests and probable nesting areas (based on bird behavioral observations) would be provided to CDFG and California Coastal Commission for review and approval prior to the start of construction, and will include a brief written summary describing results. At the end of the construction season, the map and written summary would be updated with results of follow-up surveys.

Literature Cited

Ralph, C.J.; Geupel, G.R.; Pyle, P.; Martin, T.E.; DeSante, D.F. 1993. Handbook of field methods for monitoring landbirds. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. Gen. Tech. Rep. PSW-GTR-144. 41 p.

Appendix B.
Tidewater Goby Survey Protocol (USFWS 2005)

Appendix B. Tidewater Goby Survey Protocol

1. Introduction

The tidewater goby (*Eucyclogobius newberryi*), a species of fish endemic to California, has undergone substantial reduction in population size and distribution within its range in recent years. Surveys for the species have been conducted using a variety of methods over the past 2 to 4 decades. We, the U.S. Fish and Wildlife Service, seek to increase the scientific information available upon which to base future management and conservation of the species, including efforts for recovery. Through the survey protocol recommended in this document, we intend to promote survey methods and intensities that ensure sound and supportable presence/absence determinations of species locations, leading to better management decisions based on the best available scientific data.

We provide the following guidance to facilitate the determination of presence or absence of the species in habitats with potential to support it. We anticipate that the primary use for this protocol will be for project-level surveys in support of requests for consultation under section 7 of the Endangered Species Act of 1973, as amended. Additionally, this protocol may also be used for section 10(a)(1)(B) permit applications, and to determine general presence-absence for other management purposes.

In general, surveys for wildlife and fish species may be done to meet a variety of management objectives, including but not limited to: 1) confirming the presence or absence of a species at a particular location, 2) identifying habitats potentially occupied, 3) estimating population size, and 4) determining population trends. For the purposes of this protocol, we have focused primarily on the first objective, determining presence/absence of a species at particular sites. The protocol is also likely to provide supporting information in identifying locations and habitat types currently occupied by the species. It is not the intent of this protocol to estimate population size or determine population trends.

Section 9 of the Endangered Species Act of 1973, as amended, and Federal regulations pursuant to Section 4(d) prohibit the take[1] of endangered and threatened species fish and wildlife species without special exemption. Virtually all methods to survey for gobies require the surveyor to enter the species' habitat,

1 **Take** is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct." [ESA §3(19)] **Harm** is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. **Harass** is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. [50 CFR §17.3]

resulting in an unavoidable risk of take of the species should it occur there. Therefore, a final objective of this survey protocol is to minimize the incidental take of gobies by implementing survey methods and intensities that are likely to minimize the take of gobies through the survey methodology itself.

2. Background

Habitat Affinity

The tidewater goby inhabits primarily waters of coastal lagoons, estuaries, and marshes. The species is benthic in nature as an adult (Swift 1980). Its habitat is characterized by brackish shallow lagoons and lower stream reaches where the water is fairly still, but not stagnant (Miller and Lea 1972; Moyle 2002; Swift *et al*.1989; Wang 1982; Irwin and Soltz 1984). Tidewater gobies exhibit a preference for a sand substrate component for breeding, but they are also found on rocky, mud, and silt substrates as well. Tidewater gobies have been documented in waters with salinity levels from 0 to 42 parts per thousand, temperature levels from 8 to 25 degrees Celsius (46 to 77 degrees Fahrenheit), and water depths from 25 to 200 centimeters (10 to 79 inches) (Irwin and Soltz 1984; Swift *et al*. 1989; Worcester 1992; Lafferty 1997; Smith 1998).

In their study, Trihey and Associates (1996) report tidewater gobies concentrated within 30 meters of the shore and in waters between 0.5 and 1.0 meter deep. In addition, higher densities of tidewater gobies were found in areas containing submerged aquatic vegetation than those containing only emergent vegetation or no vegetation.

Tidewater gobies have been reported from estuaries in California ranging from Tillas Slough at the mouth of the Smith River (northern Del Norte County) to Agua Hedionda Lagoon (northern San Diego County). The distribution of the tidewater goby corresponds to the distribution of sand deposition within the littoral cells along the California coast (Capelli 1997). Apparently, none have ever been found in Mexico or Oregon, based on extensive surveys outside of California.

The tidewater goby appears to spend all life stages in lagoons, in tidally influenced portions of coastal waters, or in freshwater habitats adjacent to these water bodies. Tidewater gobies may enter marine environments when flushed out of the estuary/lagoon by breaching of the sandbars following storm events or human manipulation. The tidewater goby generally lives to about 1 year of age, although some variation has been observed (Swift *et al*. 1989; Wang 1982; Irwin and Soltz 1984). During this single year, it is able to complete its life cycle.

Reproduction occurs year-round, although a distinct peak in spawning occurs in April and May (Moyle *et al*. 1989). Detailed information regarding the biology of the tidewater goby can be found in Wang (1982), Irwin and Soltz (1984), Swift *et*

al. (1989), Worcester (1992), Swenson (1995), Lafferty *et al*. (1999), and Swenson (1999).

Swenson (1995) reported that field studies of tidewater gobies in central California revealed different patterns in population ecology among different habitats. Feeding ecology differed for gobies in lagoon, creek and marsh habitats. Tidewater gobies in the marsh were significantly larger, more fecund and potentially longer-lived than tidewater gobies in the lagoon or creek. However, sandy lagoons may be more important than muddy marshes as spawning habitat because males in lab studies preferred to dig spawning burrows in sand rather than mud. Although lagoons are considered the typical habitat of tidewater gobies, brackish marshes can also be important, perhaps due to better food resources or reduced disturbance regimes. Marshes may serve as refugia, providing a source population for recolonization of the creek and lagoon habitats after high-flow events.

Developing monitoring programs to assess abundance patterns can be difficult because tidewater gobies can be patchily distributed within habitats.

2.1 Legal Status

On March 7, 1994, we listed the tidewater goby as endangered throughout its range under the Act (U.S. Fish and Wildlife Service 1994). We designated critical habitat on November 20, 2000, for the southern California populations (U.S. Fish and Wildlife Service 2000). On June 24, 1999, we published a proposed rule to remove the northern populations of the tidewater goby from the endangered species list (U.S. Fish and Wildlife Service 1999). The proposed rule to delist was withdrawn on November 7, 2002 (U.S. Fish and Wildlife Service 2002), following significant public and species expert comments. Therefore, the current status of the species remains listed as endangered throughout its range, and critical habitat remains as designated in 2000. A recovery plan is in development.

The tidewater goby was listed as a species of special concern by the California Department of Fish and Game in 1980, and was elevated to fully protected status in 1987 (Swift *et al*. 1997).

2.3 Methods Applied to Prior Surveys

This section provides a brief summary of survey methods used in the past, their success, and the recommendations for improvement by those who used them. This information is provided to assist the reader in understanding the effectiveness of those methods, and the relative efficiency of each. In addition, this information assists the reader in understanding why we recommend the methods in the protocol, described later in this document, rather than other methods that to the uninitiated might seem better or more cost effective. We

believe that this information adequately supports our proposed protocol, thus promoting consistency among all surveyors. However, any and all methods proposed to conduct surveys for tidewater goby should receive our consideration, as appropriate.

Tidewater goby abundance and distribution can be affected by habitat characteristics such as vegetation, substrate and depth (Swift *et al*. 1989, Worcester 1992, Swenson 1995). These factors can also influence the efficiency of sampling methods. Tidewater gobies have been successfully collected with both seines (Swift *et al.* 1989, Swenson 1995) and meter-square throw traps (Worcester 1992, Swenson 1995). Other reported methods include dip nets, minnow traps, ichthyoplankton net, snorkeling/direct observation, and plastic tubes. Each is described in more detail below.

2.3.1 Seine Netting

Seine netting is one of the most common methods utilized in tidewater goby surveys (Wang 1984; Holland 1992; Swift 1994; Swenson 1994; Swenson 1996a, 1996b; Lafferty *et al*. 1997; Fong 1997; Swift 1997) throughout the species range. The technique can be applied over a variety of habitats, but does have limitations in areas with dense emergent vegetation (Trihey and Associates 1996). Seining is a commonly used collecting method, well suited for near-shore areas with smooth bottoms and little vegetation.

Seine nets used for goby surveys ranged in length from as short as 1.2 meter (Wang 1984; Swenson 1996b; Swift 1997; Wang and Keegan 1998) to 7.3 meter (Swenson 1994; Swenson 1995). Other commonly used lengths include 1.8 meter (Holland 1992; Swift 1997), 2.1 meters (Swenson *et al*. 1996a), 3 meters (Lafferty *et al.* 1997; Wang 1984), and 5 meters (Swift 1997). The nets ranged in height from 1.0 meter to 1.8 meter. Equivalent ¼ inch mesh seine nets sold in the U.S. range sizes from 6 feet by 4 feet, 10 feet by 4 feet, 6 feet by 10 feet, and 6 feet by seventeen feet.

Various mesh sizes have been used. Reported mesh sizes ranged from 0.5 millimeter to greater than 6 millimeters. Commonly used mesh sizes included those near 3 millimeters [1/4 inch](Wang 1982; Wang 1984; Fong 1997, Lafferty *et al*. 1997; Swift 1997; Wang and Keegan 1998), 4 millimeters (Swenson 1995; Swenson 1996b), 3.1 millimeters (Swift *et al*. 1994), 4.8 millimeters (Fong 1997), and greater than 6 millimeters (Holland 1992; Trihey and Associates 1996; Fong 1997). Due to their small size, especially when in the larval or subadult form, tidewater gobies can easily escape from the seine if the mesh size is too large. Fong (1997) selected a 3.1-millimeter delta mesh because gobies were observed squeezing through the 6.4-millimeter mesh and 4.8-millimeter mesh.

Swift (1997) used 28.5-gram (1-ounce) weights centered 15.2 centimeters (6 inches) apart on the lead line, to ensure the bottom of the seine remain in close contact with the subsurface, preventing gobies from escaping.

Wang (1982, 1984) used 1.2 x 1.0 meter beach seine with 1.0 millimeter mesh to larvae, and juveniles in the inshore zones with vegetation. Wang and Keegan (1998) collected specimens with a beach seine with 500 micron (0.5 millimeter) mesh to sample juvenile and adult tidewater goby and other fish species.

Swenson (1994) used a seine (7.3 meters x 1.2 meter, 4 millimeter-square mesh) in shallow water (5 to 80 centimeters deep) to sample adults and juveniles. Swenson (1995) sampled in water 20 to 120 centimeters deep to capture adults and juveniles.

The distance of each seine haul varied with researcher and application. Holland (1992) used a minimum of three stations to be sampled within the available aquatic habitat. Each station consisted of five sweeps, each sweep was 10 meters in length, and all sweeps were 2 to 3 meters apart. Wang and Keegan (1998) hauled their seines from 3 to 10 meters along the shoreline, depending on the size of the station. Trihey and Associates (1996) hauled the seine perpendicular to the shoreline and landed the net on shore, where possible. Swenson (1995) reported a total linear distance sampled as approximately 150 meters, but did not report the length of each haul. Trihey and Associates (1996) recommended shortening the seine's width to approximately 3 meters to reduce total catch and time for net clearing and to minimize stress to captured fish.

2.3.2 Drop or Throw Traps

Drop or throw trapping is an effective method for sampling small fishes in vegetated areas or in open water sites that are difficult to seine (Kushlan 1981; Rozas and Odum 1988; Chick *et al*. 1992; Swenson 1996a). Tidewater gobies have been successfully collected with meter-square throw traps (Worcester 1992, Swenson 1995).

Trihey and Associates (1996) sampled with throw trap consisting of two l meter square plastic frames (polyvinyl chloride pipe, 1.27 centimeter diameter) connected with net sides (1.6 millimeter Delta mesh) (Worcester 1992). The lower frame is weighted with water and metal reinforcing bars, and a skirt of netting enclosing a chain is attached to the lower frame to seal the bottom over uneven substrate. Swenson (1995) constructed the drop net with one frame's corners closed to trap air (the floating top frame) and the other frame's comers left open to fill with water when in use (the heavy bottom frame). These frames were attached to the top and bottom edges of 1.2 meter wide fine netting (1.6 millimeter Delta mesh) to form a square tube.

Setting the drop trap is a two-person task. The two polyvinyl chloride pipe frames are held together and tossed approximately 1 meter away. The two people then moved quickly to the trap to help secure the lower frame to the bottom with their feet. After estimating vegetative cover, fish are cleared from the trap with fine-meshed dipnets. The trap is swept until five consecutive passes of the dipnet yield no additional fish (Trihey and Associates 1996). Worcester (1992) constructed drop nets entirely of 1/16 inch mesh knotless nylon netting or fiberglass screening to prevent larval fish from being lost.

Throw traps are easier to use in vegetated areas than the beach seine and are capable of capturing smaller fish due to the finer mesh size. A seine with finer mesh could capture smaller fish, although the smaller mesh would increase water resistance, which could affect seine effectiveness (Trihey and Associates 1996).

Drop nets and traps have been used to sample nursery habitats (Kahl 1963; Kjelson and Johnson 1973; Kushland 1974; Turner and Johnson 1974; Kjelson 1977). Kushlan (1974) discussed the difficulties and advantages of various drop trap designs with respect to size, portability, and effectiveness. Chamberlain (1988) designed and constructed 2 m x 2 m traps with wood frames and transparent plastic panels to avoid attracting or frightening fish by shadow casting. Trihey and Associates (1996) reported results indicating higher variability among drop trap samples than among seines. Worcester (1992) reported 1/8 inch Delta mesh style knotless nylon netting as too large to contain larval fish. The entire trap was lined with fiberglass window screening to ensure that no fish would be lost through the netting.

Fong (1997) recommended a sample area of roughly 10 square meters seemed as optimal; it balanced the variability associated with small sample area that plagued the drop traps against greater than 1 hour processing times needed for sample areas much greater than 10 square meters.

2.3.3 Dip Net

Worcester (1992) used dip nets to remove fish from within the drop traps, both by visual observation and by blind sweeps of the net. Irwin *et al.* (1984) employed dip nets where the use of seines was impractical. Swift *et al*. (1997) used fine-meshed dip nets on occasion. Goldsmith (pers. comm.) found dip nets to be effective where submergent and emergent vegetation or the small size of the water body makes the use of seine nets difficult.

2.3.4 Hand-towed ichthyoplankton net

Wang (1982) and Wang and Keegan (1998) report successful use of a hand-towed ichthyoplankton net with 0.5-meter mouth and 0.5-millimeter mesh to collect larvae, and juveniles. Planktonic larvae were captured in the shallow areas with an ichthyoplankton net and a fine-meshed beach seine. Juvenile and adult

tidewater goby inhabit the benthic level. Wang and Keegan (1998) attached the net to a bridle 2 meters in length and hand-towed it along an approximate 10 meter course at each station.

2.3.5 Minnow Traps

Lafferty *et al.* (1997) sampled using Gee's minnow traps. Six minnow traps (6millimeter mesh), baited with dry dog-food, were set in the evening in 0.5-2 meter water and inspected the following morning. Swift (1997) occasionally collecting with Gee's minnow traps with either 1/4 inch (6 millimeters) or 1/8 inch (3 millimeters) mesh and fine-meshed dip nets. Although tidewater gobies sometimes occur in unbaited traps with 3 millimeters mesh, it is extremely unusual to find them in the baited traps with 6 millimeters mesh, even in areas where they are extremely abundant Swift (1997), suggesting that gobies escape easily from the larger mesh.

2.3.6 Snorkeling and Direct Observation

Worcester (1992) concluded snorkeling is not feasible for the tidewater goby due to its small size, schooling tendencies, and cryptic nature. The variable nature of the habitat, often with very murky or heavily vegetated water, also precludes direct observational techniques (Worcester 1992). Swenson (1995) reported some success in observing gobies from the shore in shallow water (40 to 100 centimeters) or while snorkeling, but turbidity prevented extensive field studies using these methods. Holland (1992) conducted snorkeling surveys to qualitatively assess the numbers and distribution of gobies in standing water ranging from a maximum depth of 0.9 to 1.0 meter in 1990 to a maximum of 0.75 meter in 1991. Water turbidity was high in 1990 and effectively precluded snorkeling, but visibility was greater than 0.6 meters in 1991 and a snorkeling survey was successful (Holland 1992). However, Worcester (1992) observed at least 100 tidewater gobies in water approximately 3 inches deep on top of a concrete bridge abutment during a snorkeling survey in February, 1990.

Swift *et al*. (1994) examined some areas by swimming transects about 1.0 meter wide with mask and snorkel. A snorkeled transect 270 meters long and 1.0 meter wide recorded 2 tidewater gobies. However, the resulting density of 0.0074 tidewater gobies per square meter and an estimate of 126 fish in the sampled lagoon was much lower than documented with seine hauls. They also report other localities as too turbid for snorkeling. Estimates based on snorkeling were found to be much lower than those based on seining. All population estimates in their repot are based on seine collections.

2.3.7 Plastic tubes

Swenson (1995, 1996b) collected adult tidewater gobies in artificial burrows made of polyvinyl chloride pipe tubes (13 millimeter inner diameter, 13

centimeters long). Plastic Duraleen (available at art supply stores) or other thin plastic sheet, 13.0 centimeter by 5.5 centimeters, was rolled up inside the tube as a liner to collect the adhesive eggs. McGehee (1989) and Bechler *et al*. (1990) report gobies readily adopt plastic tubes as artificial burrows, both in lab aquaria and in the field. "Tube trapping" is a useful method to collect breeding fish, to quantify reproductive output, and to determine the timing and intensity of spawning. The open-ended tubes are shoved into the sediment at an angle of approximately 30 degrees until the lower lip rested at the surface of the substrate (Swenson 1995). Sets of 10 tubes are placed in the sediment in shallow water (less than 1 meter deep, preferably 20 to 50 centimeters deep) at each habitat site (Swenson 1995). Tubes are spaced up to 1 meter apart to minimize territorial interactions by males. Tubes are left in the substrate 14 to 28 days to allow colonization by nesting males.

2.3.8 Sample Size

Fong (1997) estimated 48 and 33 beach seine hauls would be required for two sample regions to obtain density estimates within 20 percent of the mean with 90 percent confidence, based on data reported in Trihey and Associates (1996). Assuming that each seine haul would take an average of 45 minutes, a total of 61 sampling hours would be required for just two regions. In addition to the amount of time involved, this heavy sampling intensity would result in impacts to the tidewater goby habitat. For their purposes, the sampling effort was generally less than 5 seine hauls per region. Trihey and Associates (1996) recommended that sampling effort should consist of 3 to 5 seine hauls per site and 5 to 10 drop trap samples. Swift *et al*. (1997) recommended that to detect seasonal changes in populations, collections in lagoons be repeated bimonthly.

2.3.9 Sampling Season and Timing

Fong (1997) reported that October sampling indicates higher fish abundance occurs in the fall rather than the winter sampling period. Overall, mean densities of gobies increased from 1.7 per square meter to 35 per square meter.

Swenson (1995) conducted sampling in the morning at high tide (plus 4.7 feet). Because the water was too deep to effectively sample the main creek, a second survey was conducted in the morning during low tide (plus1.8 feet), using a bag seine.

To detect seasonal changes in populations, Swift (1997) collected in lagoons bimonthly. Upstream tributaries were sampled for gobies intermittently to assess the degree to which tidewater gobies utilized these areas.

2.3.10 Density

Trihey and Associates (1996) reported tidewater goby density as extremely variable both across and within most sampling factors: method, location, vegetation and substrate. Mean density was 12.5 tidewater gobies per square meter for throw traps (standard deviation = 22.6, range 0 to 91, n = 70) and 2.0 tidewater gobies per square meter for seine samples (standard deviation = 3.6, range = 0 to 14.2, n = 26). Although the capture method alone did not significantly affect tidewater goby densities, the project's main objective was to test sampling methods and therefore the authors decided to treat trap and seine data separately for further analyses. Location within the lagoon significantly affected tidewater goby density for both methods. Substrate type and vegetation significantly affected densities of tidewater gobies caught with the throw traps but not with seine. Depth and distance from the shoreline also affected tidewater goby density. Tidewater gobies were more abundant in waters 50 to 100 centimeters deep and within 30 meters of the shore. Tidewater gobies were not collected in waters less than 20 centimeters deep or from nearshore sites. Swenson (1995) reported tidewater goby density varied tremendously among the five drop net samples (0 to 198 tidewater gobies per square decimeter). Density was greater in vegetated areas; the difference was not significant but the small sample size may have been too low to reject the null hypothesis (Swenson 1995).

2.3.11 Salinity

Swenson (1994) reported on the use of an Atago hand refractometer to measure salinity. Water temperature (degrees Celsius) and salinity (parts per thousand) were measured at the surface and on the bottom (approximately 50 to 70 centimeters deep).

2.4 Suitability of Habitat

Lafferty *et al*. (1999) reported known locations where apparent extirpations were followed by evidence of recolonization (Lafferty *et al*. 1999). Based on this information, we assume that all sites known to be previously occupied by gobies will be considered suitable and occupied without clear evidence that the site has been modified to the point where recolonization is highly unlikely, barring habitat restoration that successfully restores habitat conditions and ecosystem functions to conditions similar to a time of known tidewater goby occupancy.

3. Application of the Recommended Protocol

3.1 General Intent of the Protocol

The general intent of the protocol described in section 4 of this document is to provide a methodology of surveying for tidewater gobies in likely natural and human-made habitats at an intensity and effectiveness that ensures a high level of

confidence in finding gobies should they currently exist at the site. A secondary intent of the protocol is to prescribe a sampling regime or methodology that avoids placing an onerous and unreasonable burden on any project proponent who seeks to work in habitats likely to be suitable to the species.

The methodology described below is intended to document the presence or absence of tidewater gobies to a reasonable level of certainty, and to provide basic information on habitat affinity of the species. This methodology is not intended to be of sufficient intensity to estimate population levels, recruitment rates, or survival rates; habitat affinities more appropriate for research studies; population viability analyses; or other parameters associated with research-level activities. The parameter of interest in these surveys is a high likelihood of detecting gobies should they exist at the site.

We believe the following protocol will provide consistent results with a reasonable amount of effort. However, while we strongly recommend that potential surveyors adopt and implement our proposed protocol, we may consider other methods, on a case by case basis. The action agency or project proponent has the discretion to use any appropriate survey methodology to determine the presence or absence of tidewater gobies, provided they meet three conditions. First, any proposed protocol must meet or exceed the intended level of survey intensity and effectiveness of the protocol described herein. Second, surveyors proposing methods or intensities other than as prescribed here should seek concurrence on the proposed changes from our field office having jurisdiction over the proposed survey area. The proponent should seek this concurrence as early in the survey design as possible, and definitely prior to beginning actual field surveys. Finally, the surveyors must obtain any and all applicable Federal (described below) and State permits in advance of conducting the surveys.

3.2 Application of the protocol to projects

These guidelines are not intended for long-term monitoring or research projects or for determining the overall status of populations; guidelines for such monitoring and research efforts should be developed with our assistance on a case-by-case basis. We have worked with, and will continue to work with Federal, State, and local biologists; scientific and academic institutions; commercial organizations; and other interested parties to collect additional data on the distribution, ecology, and biology of the tidewater goby. We will revise this survey protocol as needed, using the best available data.

This protocol should fulfill the needs of landowners and managers to complete pre-disturbance surveys for tidewater gobies that provide a reasonable basis upon which to make effects determinations. Projects resulting in direct or indirect effects to tidewater gobies or their habitats should conduct surveys consistent with this protocol to document the presence or absence of tidewater gobies at their proposed project site. In addition, surveys conducted under this protocol may

provide useful information on the overall distribution of tidewater gobies within their range.

Extreme care must be taken when conducting surveys to avoid inadvertently injuring or killing tidewater gobies, or damaging their habitat (see Appendix F-3).

3.3 Peer Review of the Recommended Protocol

This protocol has been developed in conjunction with and reviewed by the Tidewater Goby Science Team, a group of agency and independent experts in tidewater goby biology and research. The protocol includes their comments. Any survey that uses a different methodology from this protocol should include a detailed description of the procedures used and an evaluation as to whether the conclusions drawn constitute the best available scientific and commercial information.

4. Recommended Protocol

We recommend the following survey guidelines be used to determine, with some reasonably high level of confidence, the presence or absence of tidewater gobies in habitat deemed suitable for the species.

4.1 Section 10(a)(1)(A) Recovery Permit Requirements

The survey methods prescribed in the following protocol require work within habitat likely to be occupied by tidewater gobies, and involves the handling of individuals for identification purposes. Although there is no requirement to preserve voucher specimens or otherwise directly kill individuals, the capture and handling of individuals has some risk of incidental mortality. Also, the methods proposed here require the surveyors to enter suitable habitat, and an unavoidable consequence of such activity is the trampling or other damaging of occupied burrows and mortality of eggs and possibly individuals. Therefore, all surveyors must obtain a recovery permit issued by us under section 10(a)(1)(A) of the Endangered Species Act of 1973, as amended. The permit application form and instructions for completion are available at the website http://forms.fws.gov/3-20055.pdf.

4.2 Survey Equipment

Surveys should be conducted using appropriate equipment. If other equipment is to be used, surveyors should contact our appropriate field office to determine if the other equipment is suitable for use under this protocol. The following equipment is the minimum necessary for conducting tidewater goby surveys under this protocol:

- U.S. Geological Survey quadrangle 7.5 minute series (topographic)

map(s);

- global positioning system unit or other method to identify latitude/longitude of tidewater goby and sampling locations to within 10 meters of actual location on topographic maps or aerial photos;
- refractometer or electronic salinity meter;
- a fish identification guidebook or field-ready identification card with pictures of similar species;
- long handled dipnet with a frame opening greater than 0.1 square meter and mesh size less than 3 millimeters;
- 3 meters length by 1 meter deep seine (approximately 3 millimeters mesh), recommended for small habitats (described below);
- 5 meters length by 1 meter deep seine (approximately 3 millimeters mesh), recommended for medium to large habitat areas;
- minnow traps with approximately 3 millimeters mesh, unbaited;
- field notebook;
- camera;
- thermometer;
- meter stick; and
- a goby viewing device (*e.g.*, clear plastic bag or small jar).

In order to prevent the unintentional introduction of nonnative organisms or disease, sampling gear should be thoroughly cleaned, and dried if possible, prior to use in different watersheds.

4.3 Site Assessment

The area to be sampled for tidewater gobies should include appropriate habitat consisting of slow moving water bodies, generally less than 3 meters (10 feet) in depth, with suitable substrate and appropriate water quality parameters. The size of the discrete water body (lagoon, pond, stream, ditch) under investigation will be used to determine the corresponding sampling effort to be carried out.

For the purpose of selecting appropriate equipment, and determining sampling effort, water bodies are categorized by size as large, medium, and small. Large water bodies are those meeting at least one of the following general physical parameters: streams with channel bankful widths in excess of 20 meters (66 feet) at any point and/or with estuarine (areas with salt water intrusion) habitats exceeding 1 kilometer (0.6 mile) in length; or lagoons and ponds larger than 2 hectares (5 acres) surface area. Medium sized water bodies include smaller streams less than 20 meters bankful width and/or estuaries longer than 100 meters (328 feet) but less than 1 kilometer in length. Medium sized lagoons and ponds are those with a surface area less than 2 hectare, but larger than 0.4 hectare (1 acre). Small water bodies are the remaining streams, ditches, sloughs, lagoons, and ponds of lesser dimension than as described for the medium size range.

Immediately prior to conducting in-water goby sampling activities, surveyors should complete the following actions:

1. Take one or more overview photos from a vantage point that provides an oblique view of the sampled habitat (when possible). The location(s) should be consistent from year to year if future surveys are anticipated.
2. Record the percent cover of aquatic vegetation and identify common plant species present in the area actually surveyed.
3. Categorize the water body, including size (as defined above).
4. Measure the average depth of the water using the meter stick for each sampling effort.
5. Record water temperature at a depth of half the average water depth in the survey area.
6. Take salinity measurements at both surface and bottom depths with the salinity meter or refractometer.
7. Note any unusual characteristics of the environment.
8. Record all other pertinent information describing date, time, location, names of surveyors, *etc*.

4.4 In-water Sampling for Tidewater Gobies

Before sampling, we recommend the surveyors review the literature and agency records for historical information and other available resources, and including communication with species experts. This review should determine whether populations have been previously identified at or near the site to be sampled, or whether suitable habitat for tidewater goby exists at the site. This information should be summarized in the survey report (see section 5, below).

In the absence of recent survey data, any site known historically to have been populated with tidewater goby should be assumed to be currently occupied by the species, unless clear evidence indicates that the habitat has been so modified as to be uninhabitable.

For the purpose of this protocol, the presence of one individual tidewater goby resulting from surveys constitutes evidence of an extant population. This determination is based on the annual life cycle of the species, the difficulty in detecting tidewater gobies, and the low likelihood of only one individual to be present in a watershed.

4.5 Survey Methods

Several methods can be effective in identifying, or capturing tidewater gobies. The following methods are recommended for conducting surveys, and each one is best suited to particular types of water bodies.

To maximize the probability of capture, and to ensure that the highest quality habitat within the area of interest is surveyed, sampling should be segmented into multiple locations within any water body. For purposes of this protocol, the "area of interest" is defined as that portion of the water body wherein the presence or absence of gobies is to be documented. For general surveys, the area of interest is likely to be the entire water body. For water bodies proposed to be altered by a project or other action, the area of interest is that portion of the water body likely to be affected (adversely or beneficially) by habitat loss, alteration, disturbance, sedimentation, or any other physical or biological factor directly or indirectly affecting suitable habitat of the species.

When surveying large water bodies, surveys should adequately cover all suitable habitat within the area of interest. We recommend surveying in a minimum of five distinct separate areas throughout the suitable habitat in large water bodies. When surveying small and medium water bodies, at least three distinct areas within suitable habitat should be sampled. In all water bodies, the saltwater/freshwater interface should be included in sampling locations, because gobies are often located in this zone. The following information should be used as a guide to complete the required amount of sampling effort. The effort categorized in the table below represents minimum acceptable numbers. In all size categories of water bodies, it is important to sample in the area where the impacts from the proposed project would be significant, and especially important in the large water bodies, where only a small percentage of the water body is surveyed. If the water body supports fishes, surveyors may begin sampling with the dip net if and where appropriate. Surveyors should record the presence of other identifiable fish and invertebrate taxa captured or observed, as part of general comments for each water body surveyed. Dip nets are especially important in those portions of suitable habitat where emergent and submergent vegetation or substrate limits or precludes the use of seine nets. For those habitats where seine nets cannot be used effectively, dip nets may be the only method that can be effectively employed. The table above indicates the amount of time that should be dedicated to the use of dip nets. Where seine nets can be used effectively, the amount of dip netting required is identified in the column labeled "Supplemental." In those water bodies where seine nets cannot be used, the dip netting may be the sole method that can be used effectively. The minimum time allocated to dip netting for sole method sampling is identified in the table below. For instructions in minimizing effects to gobies from sampling see Appendix F-3.

Water Body Size	**Number of Minnow Traps per 24 hour sampling period/ number of sampling periods**	**Seine hauls (minimum effort required)**	**Dip Netting (minutes of effort)**	
			Supplemental	**Sole Method**
Large	12/2 (minimum)	25 per 10 hectares	20	120 per 10 hectares
Medium	Not required	15 per water body	10	90 per water body
Small	Not required	15 per water body	5	60 per water body

Where site conditions allow effective use of a seine, surveyors should attempt to cover a minimum of 30 square meters per seine haul, with a recommended average of 50 square meters per seine haul. The number of seine hauls may be limited by suitable sites, and is dependent on the size of the water body.

For small and medium water bodies, conduct enough seine hauls to adequately cover suitable habitat. A minimum of 15 seine hauls is suggested to adequately cover these areas. Although some overlap between seine hauls is effective, they should have no more than 20 percent overlap in area. For any size water body, once tidewater gobies are detected, sampling may cease. In cases where the amount of suitable habitat within a water body can be covered completely by fewer than the prescribed number of seine hauls, sampling may cease when the water body is essentially 100 percent covered, or when tidewater gobies are first captured.

For large water bodies (as defined above), the number of seine hauls completed should be adequate to effectively sample the suitable habitat of interest. Since large water bodies may range from two to several hundred or more hectares, these water bodies only need to be sampled in the area of interest (as described above). Within the area of interest, the water body should be generally delineated into 10 hectare blocks of suitable habitat. The following survey recommendations apply within each 10 hectare block. We recommend a minimum of 25 seine hauls throughout a minimum of five sampling areas in each block. These 25 seine hauls should be distributed approximately uniformly across the five sampling areas (*i.e.*, five or more seine hauls across each of five or more sampling areas), or otherwise distributed among the five sampling areas to optimize the likelihood of detecting gobies within the suitable habitat of interest. For example, if two sampling areas are high quality habitat and three are lesser habitat, it may be best to complete eight seine hauls in each of the two best habitat areas, and three seine hauls in each of the three lesser habitat areas. Since conducting additional seine hauls in a sampling area represents relatively little additional work above that already necessary to do the minimum, additional seine hauls are encouraged whenever a question remains as to the possibility of tidewater gobies occupying the habitat.

If small fishes suspected to be tidewater gobies are found, surveyors should place them in viewing device and confirm the identification of tidewater goby (or other species) by looking for the clear tip of the first dorsal fin. If surveyors are in doubt, they should confirm fish identification by using a fish identification guidebook, and if possible, take photographs. Surveyors should record the location where gobies were sampled and the sampling effort expended to find them, to the nearest 10 meters. Surveyors should release the gobies promptly at site of capture and discontinue sampling (vouching new records or collections for other scientific purposes are appropriate if in accordance with the biologist's permits). Surveyors should also record the location of positive and negative survey results.

4.6 Sampling Period

Tidewater goby abundance fluctuates spatially and seasonally (Swenson 1999), due in part to their predominantly annual life cycle (see Background). Surveys must be conducted in two sampling periods between July 1 and October 31, due to this period being the time of highest abundance for the species in general, and therefore, the period of highest detection. The two sampling periods must be separated by at least 30 days to accommodate situations where changes in water level, seasonal movements, or other functions result in movement of gobies within the survey area. All surveys should be recorded and reported, including surveys that do not detect tidewater gobies. Surveyors should return to the same sites in sampling period 2 where tidewater gobies were not found in sampling period 1, but also include any suitable habitat that may have not been suitable during the first survey period due to changes in water level, *etc*. If tidewater gobies are found during the first visit, sites do not need to be sampled during the second period.

For surveys conducted as part of a project clearance, additional sampling may be needed prior to initiation of those project activities that may affect the tidewater goby. If gobies are not found within the two survey periods, and the project will not be completed within 60 days of the last survey, a pre-project survey may be required for any part of the proposed project area that may affect the tidewater goby. The need for this survey will be evaluated on a case-by-case basis between the applicant and our field office that has jurisdiction over the area of interest.

4.7 Area to Which Survey Protocol is Applicable

The survey protocol may be applied throughout the species range. Survey results are specifically applicable only to the actual body of water to which the survey is applied, but may be generally applied to similar water bodies contiguous to or immediately adjacent to the sampled habitats, provided a reasonable likelihood of connectivity between the sampled site and the sites to which the information is being extrapolated.

4.8 Effective Duration of Survey Results

Survey results are valid for 1 year. Based on input from several tidewater goby research scientists, due to the annual life cycle of the tidewater goby, documented population fluctuations, and their recolonizing ability, survey results are valid for a maximum of 1 year from the date surveys end.

Five consecutive years of negative survey results are needed to establish a history of absence. Proposed actions that span more than 1 year must be surveyed for each year of activity. Contact our appropriate field office (see Appendix F-1, below) for additional information before conducting surveys.

Surveys are not needed if surveys completed during the prior 10 years have confirmed the presence of gobies in waters with habitat contiguous to the habitat identified for survey AND the habitat where gobies were earlier found have not been substantially modified or impacted by human activities or natural events. That is, we presume that habitat previously occupied by gobies continues to be occupied unless clear evidence indicates that gobies have been extirpated.

The converse is not necessarily true. Habitats that have undergone sampling in the past, regardless of intensity, and been shown to be absent of gobies does not necessarily mean those habitats are currently devoid of the species. We will, however, consider the merits of scientific analyses on a case-by-case basis to analyze presumed absence of the species in otherwise suitable habitat. Those analyses should consider any past surveys done in that habitat, the intensity and coverage of those surveys, any modifications to the habitat since last known occupancy by the species, and the potential for the habitat to be recolonized by adjacent populations.

4.9 Other Permits and Permissions

Because this protocol (and tidewater goby surveys in general) involves capture, surveyors must have "take" authorization pursuant to section 7 or 10(a) of the Act to be exempt from the take prohibitions under section 9 of the Act. Surveys must be conducted by individuals possessing a 10(a)1(A) recovery permit from the Fish and Wildlife Service, specific to the tidewater goby. In addition, there may be permit requirements from the California Department of Fish and Game as well as other agencies to conduct surveys for gobies. Finally, surveyors should seek appropriate permissions from landowners or their managers to access or cross properties for their goby survey work, as needed. Nothing within this protocol should be construed as permission to enter, access, or cross any lands or waters not under the immediate control of the surveyor without specific permission from the affected landowner(s).

5. Reporting Requirements

Any permitted biologist observing a tidewater goby under this protocol is to notify our appropriate field office by phone (see Appendix F-1 for contact numbers) within 24 hours of such observation. Within 5 business days, the surveyor should fax or e-mail a copy of a U.S. Geological Survey quadrangle 7.5 minute series (topographic) map to the recovery permit coordinator in our appropriate field office, with the observation site clearly marked. Include a detailed description of the precise location of the tidewater goby(ies).

The permittee shall notify our appropriate field office in writing, at least 10 working days prior to the anticipated start date of survey work and receive approval prior to beginning work. Surveyors also should prepare a final report within 45 days that includes the following:

- Recovery permit number(s)
- Names of surveyors
- Location information, including county, watershed, GPS coordinates in either Latitude/Longitude or UTM NAD27 or indicated on a copy of a U.S. Geological Survey 7.5 minute topographic quadrangle map
- Photographs of the project site (photo points [locations and general direction] should be indicated on a map)
- A typed summary providing survey dates and times (both begin and end times)
- Habitat description (amount and quality of suitable habitat)
- The area sampled by a particular method (indicated on a map)
- Justification for areas not surveyed
- Effectiveness of seine hauls
- Number of tidewater gobies captured
- Photographs of tidewater gobies detected on site to verify species identification, (collection is not permitted without prior authorization)
- Other species detected
- Water temperature
- Salinity
- Whether area is currently tidally influenced
- A description of possible threats to tidewater gobies observed at the site including nonnative and native predators.

The report should be provided to our appropriate field office (see Appendix F-1).

Based on the results of surveys, we will provide guidance on how tidewater gobies should be addressed. If tidewater gobies are found, we will work with the project proponent through the section 7 (for Federal actions) or section 10 (for non-Federal actions) process. If tidewater gobies are observed but not identified to species, additional survey efforts may be recommended. If tidewater gobies are not found during the field surveys (conducted according to this protocol), we will consider the tidewater goby not likely to be currently present on the project site.

We may not accept the results of field surveys conducted under this protocol for any of the following reasons: 1) if our appropriate field office was not contacted prior to field surveys being conducted; 2) if field surveys were incomplete, or conducted in a manner that was inadequate for the area to be surveyed; or 3) if the reporting requirements were not fulfilled**.**

We encourage all surveyors to send any information on tidewater goby distribution resulting from surveys to the California Natural Diversity Data Base administered by the California Department of Fish and Game. Information about how to submit information to the California Natural Diversity Data Base is provided in Appendix F-2. Copies of the California Natural Diversity Data Base

form should mailed in a timely manner to the California Department of Fish and Game, as well as our appropriate field office.

These individual survey reporting results are separate from, and do not replace or supersede, the annual report required of each endangered species recovery [section 10(a)(1)(A)] permit holder to report activities conducted each year under his/her permit.

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Appendix B-1. USFWS Field Office and Regional Office Contacts

Please contact the appropriate Fish and Wildlife Service field office, for the counties indicated below, to obtain local information about the tidewater goby or application of this survey protocol:

For San Diego or Orange County, or Los Angeles County south of the Santa Monica Pier, contact:

Carlsbad Fish and Wildlife Office
Attn: Recovery Permit Coordinator
6010 Hidden Valley Road
Carlsbad, California 92009
Phone: (760) 431-9440
Fax: (760) 930-0846

For Sonoma, Marin, Solano, Contra Costa, Alameda, Santa Clara, San Mateo, or San Francisco County, contact:

Sacramento Fish and Wildlife Office
Attn: Recovery Permit Coordinator
2800 Cottage Way, Suite W-2605
Sacramento, California 95825
Phone: (916) 414-6600
Fax: (916) 414-6713

For Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, or Ventura County, or Los Angeles County northwest of the Santa Monica Pier, contact:

Ventura Fish and Wildlife Office
Attn: Recovery Permit Coordinator
2493 Portola Road, Suite B
Ventura, California 93003
Phone: (805) 644-1766
Fax: (805) 644-3958

For Del Norte, Humboldt, or Mendocino County, contact:

Arcata Fish and Wildlife Office
Attn: Recovery Permit Coordinator
1655 Heindon Road
Arcata, California 95521
Phone: (707) 822-7201
Fax: (707) 822-8411

For information on ESA section 10(a)(1)(A) recovery permits, please contact:

Region 1, USFWS
Attn: Recovery Permit Coordinator
Eastside Federal Complex
911 N.E. 11th Avenue
Portland, OR 97232-4181
Phone: (503) 231-6241
Fax: (503) 231-6243

Appendix B-2. General instructions for filling out California Natural Diversity Data Base field survey forms

The California Natural Diversity Data Base is the largest, most comprehensive database of its type in the world. It presently contains more than 33,000 site specific records on California's rarest plants, animals, and natural communities. The majority of the data collection effort for this has been provided by an exceptional assemblage of biologists throughout the state and the west. The backbone of this effort is the field survey form. We are enclosing copies of California Natural Diversity Data Base field survey forms for species and natural communities. We would greatly appreciate you recording your field observations of rare, threatened, endangered, or sensitive species and natural communities (elements) and sending them to us on these forms.

We are interested in receiving forms on elements of concern to us; refer to our free publications: *Special Plants Lis*t, *Special Animals List,* and *Natural Communities List* for lists of which elements these include. Reports on multiple visits to sites that already exist in the California Natural Diversity Data Base are as important as new site information as it helps us track trends in population/stand size and condition. Naturally, we also want information on new sites. We have enclosed an example of a field survey form that includes the information we like to see. It is especially important to include a photo copied portion of a U.S. Geological Survey topographic quad with the population/stand outlined or marked. Without the map, your information will be mapped less accurately, as written descriptions of locations are frequently hard to interpret. Do not worry about filling in every box on the form; only fill out what seems most relevant to your site visit. Remember that your name and telephone number are very important in case we have any questions about the form. If you are concerned about the sensitivity of the site, remember that the California Natural Diversity Data Base can label your element occurrence "Sensitive" in the computer, thus restricting access to that information.

The California Natural Diversity Data Base is only as good as the information in it, and we depend on people like you as the source of that information. Thank you for your help in improving the California Natural Diversity Data Base.

Appendix B-3. Techniques to Minimize Effects to Tidewater Goby from Surveys

General Guidelines

When conducting sampling for tidewater gobies, particular care should be taken when walking in suitable habitat to minimize disturbance to the area, especially during breeding periods, when gobies in burrows could be crushed as a result of being stepped on. Entry to the water should be slow, and where possible, visually scan for gobies before entry. This precaution should also be taken when launching and retrieving of boats as part of sampling efforts. When captured, tidewater gobies should never be completely removed from water, and should remain completely wetted at all times. All individuals captured should be released immediately after identification at the point of capture. Any tidewater gobies exhibiting signs of physiological stress shall be immediately released. As part of the presence/absence survey, measuring gobies is neither required nor recommended. Tidewater gobies shall not be anaesthetized, stained, dyed, or otherwise marked at any time. Electrofishing is not an authorized sampling method for tidewater gobies.

Seining

Disturbance and damage to burrows, eggs, and young should be minimized through use of the smallest and lightest weight seines practicable that meet protocol guidelines. It is important to avoid accidental injury or mortality to tidewater gobies, which may be caught and suffocated in vegetation such as algal mats or other debris when using seines. Rocks should be removed from seines immediately, otherwise tidewater gobies may be crushed by rocks tumbling and rolling in the seine. Bagged portions of seines must remain in the water until all tidewater gobies are removed. Temporary holding containers, if used, should be shallow, filled with clean water, and be placed in a location that will not result in exposure to extreme temperatures.

Dip Netting

When using dip nets, a container of water collected from the immediate vicinity of the tidewater goby capture should be available to immediately transfer gobies into when captured.

T**raps**

When setting minnow traps, place them in areas where anticipated tidal or upstream water volume fluctuations will not dewater the trap, or expose it to poor water conditions as a result of location. When checking traps, all contents should immediately be transferred to a container of water from the immediate vicinity before identifying fish species.