EXHIBIT NO. 18
APPLICATION NO.
1-10-032 - HUMBOLDT COUNTY RESOURCE CONSERVATION DISTRICT
GENERALIZED REVEGETATION PLANS (FROM HMMP & FEIR)
(1 of 9)

Salt River Revegetation Area - Williams Creek Confluence Vicinity

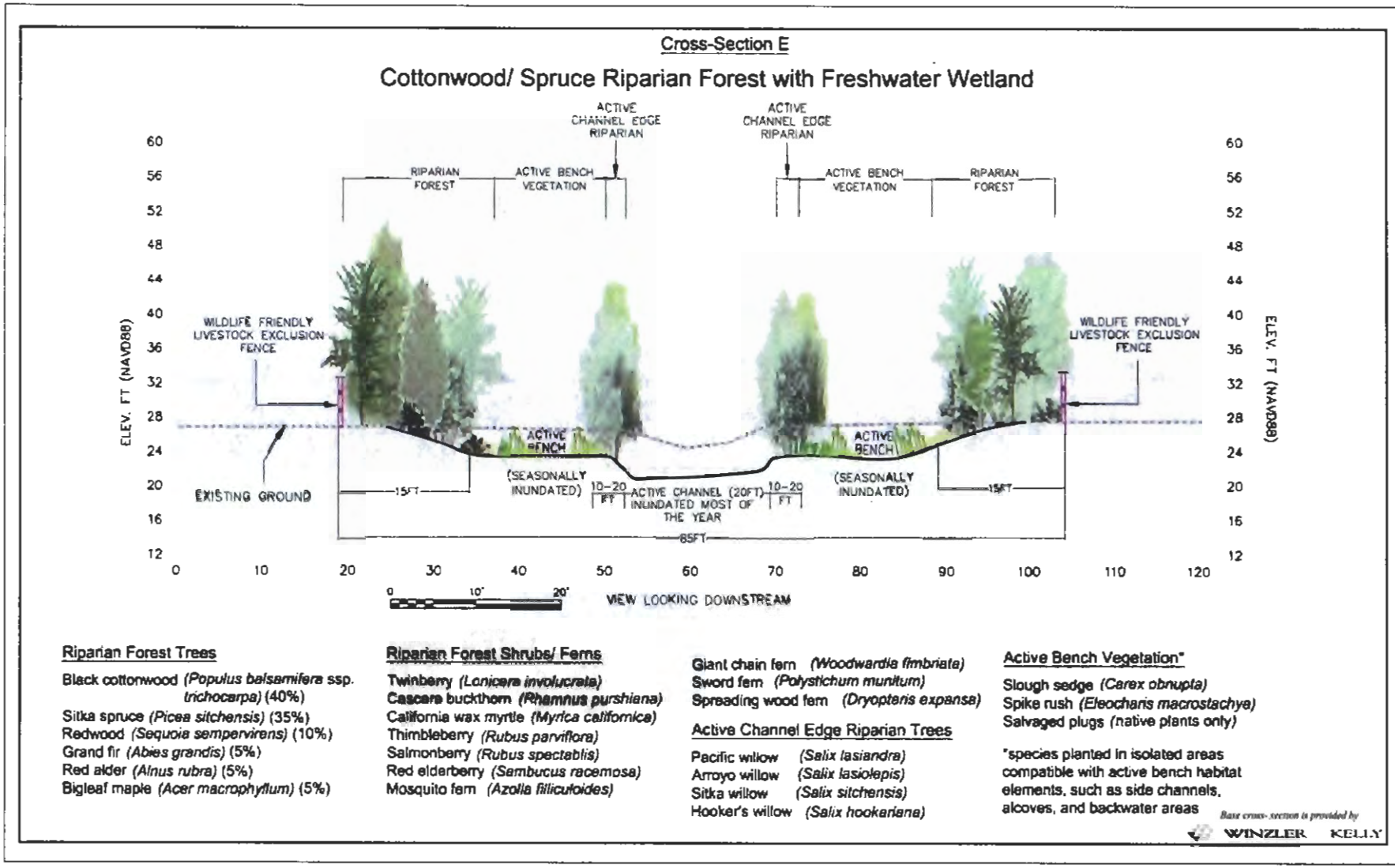


Figure 2-10

Typical Revegetation Section - Williams Creek Confluence Vicinity

Source: H.T. Harvey & Associates, 2011

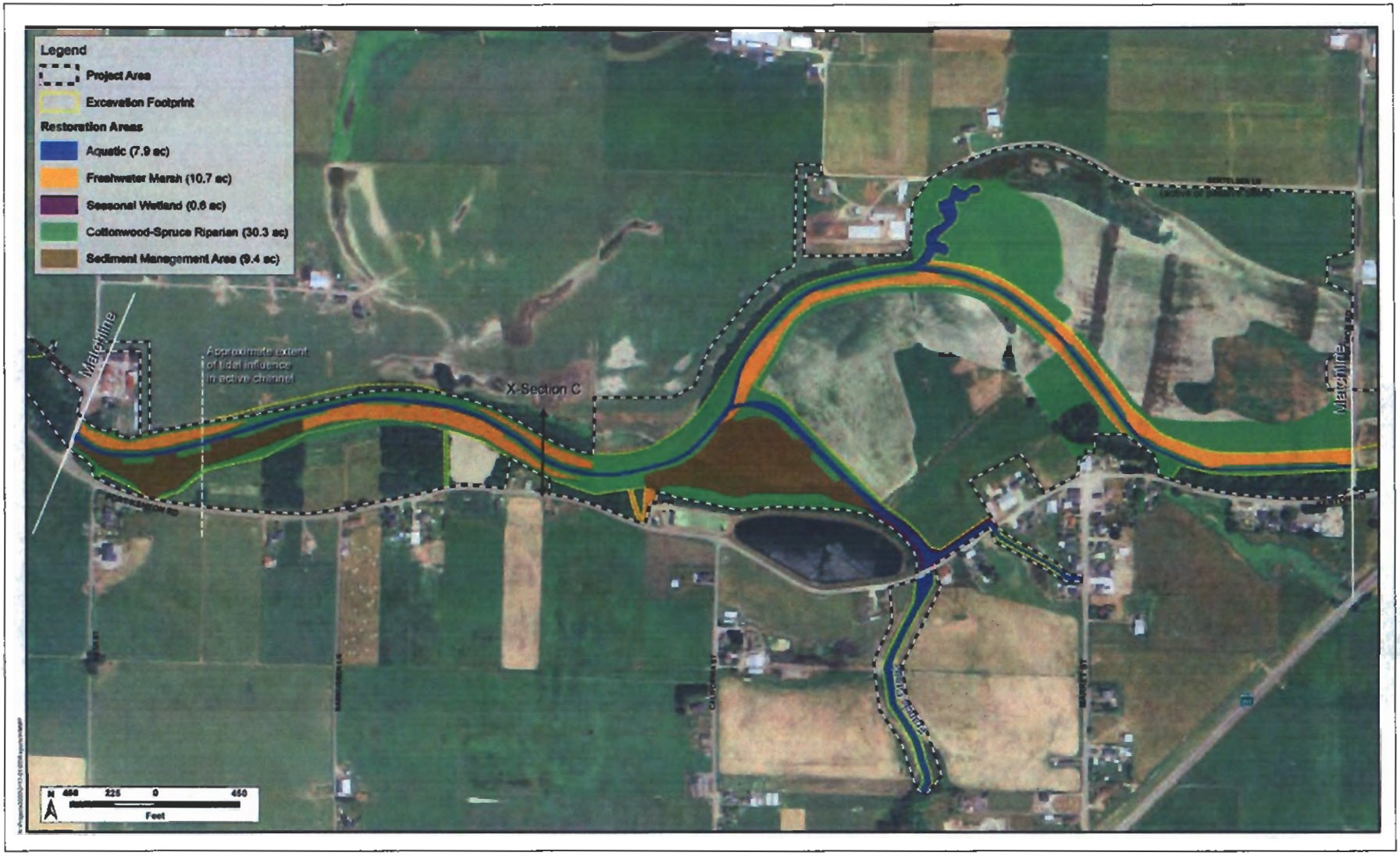


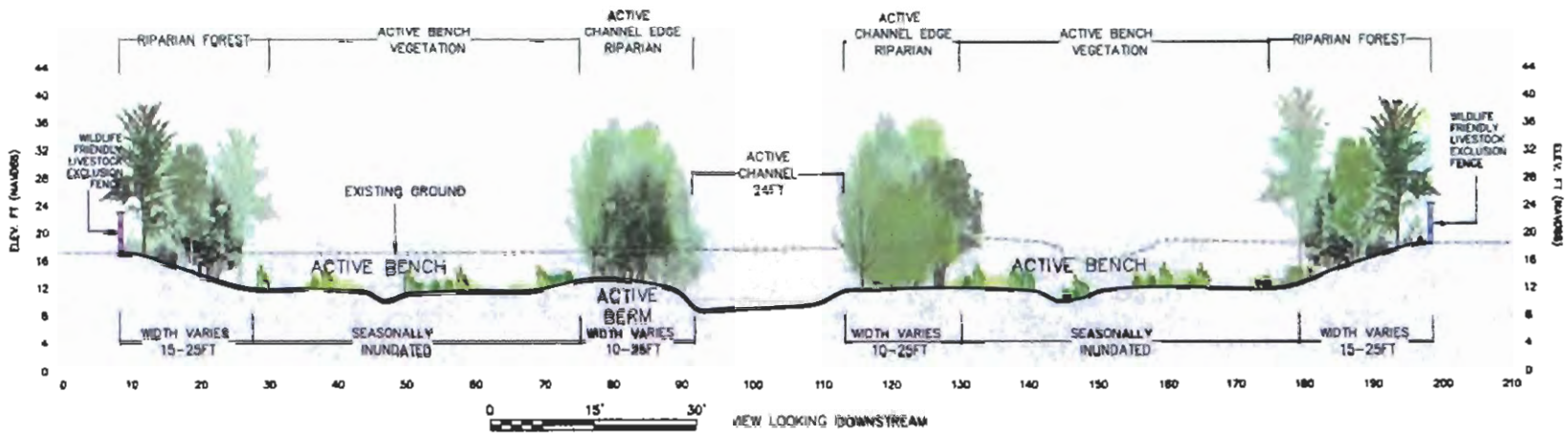
Figure 2-11

Salt River Revegetation Area - Francis Creek Confluence Vicinity

Source: H.T. Harvey & Associates, 2011

Cross-Section C

Spruce/ Cottonwood Riparian Forest with Freshwater Marsh



Riparian Forest Trees

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

Riparian Forest Shrubs/ Ferns

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

Active Bench Vegetation*

Slough sedge *(Carex obnupta)*
Spike rush *(Eleocharis macrostachya)*
Alkali bulrush *(Bolboschoenus maritimus)*
Salvaged plugs *(native plants only)*

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

Active Channel Edge Riparian Trees

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

Base cross-section is provided by WINZLER KELLY

6 of 9

Figure 2-12

Typical Revegetation Section - Francis Creek Confluence Vicinity

Source: H.T. Harvey & Associates, 2011

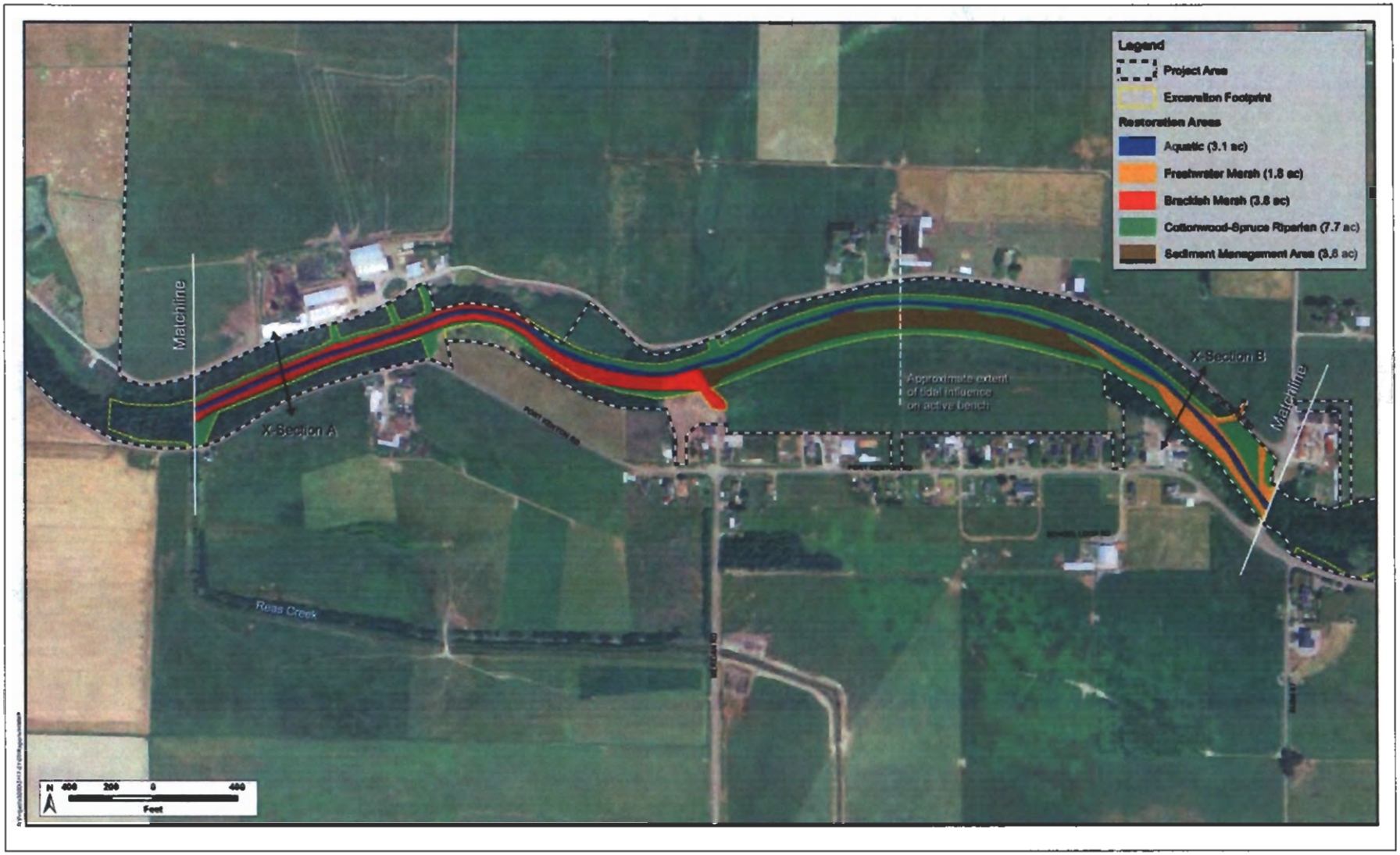


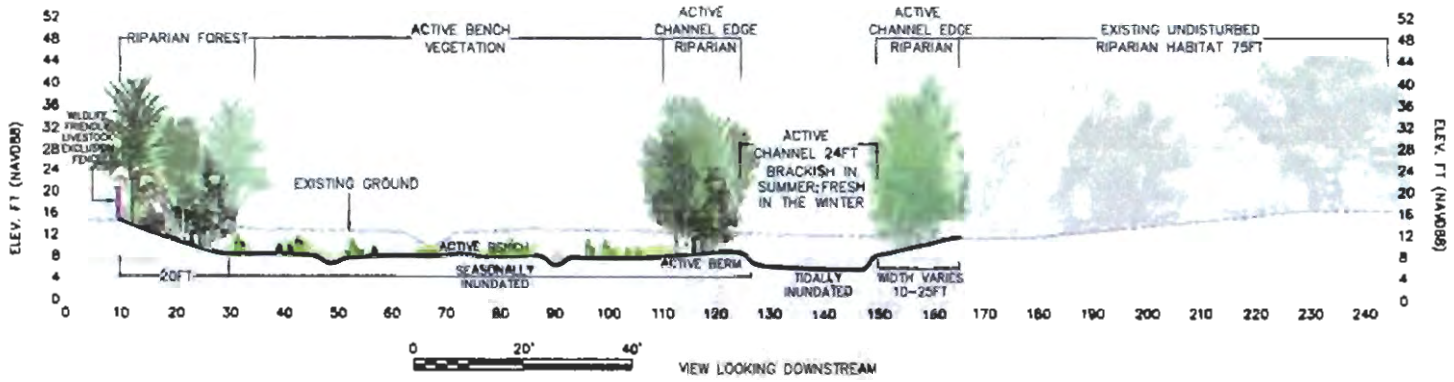
Figure 2-13

Salt River Revegetation Area - Reas Creek Confluence Vicinity

Source: H.T. Harvey & Associates, 2011

Cross-Section B

Spruce/ Cottonwood Riparian Forest with Tidal Freshwater Marsh



Riparian Forest Trees

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

Active Channel Edge Riparian Trees

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

Riparian Forest Shrubs/ Ferns

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

Active Bench Vegetation*

Slough sedge *(Carex obnupta)*
Spike rush *(Eleocharis macrostachya)*
Tufted hairgrass*(Deschampsia caespitosa)*
Common rush *(Juncus patens)*
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 WINZLER KELLY

Figure 2-14a

Typical Revegetation Section - Reas Creek Confluence Vicinity

Source: H.T. Harvey & Associates, 2011

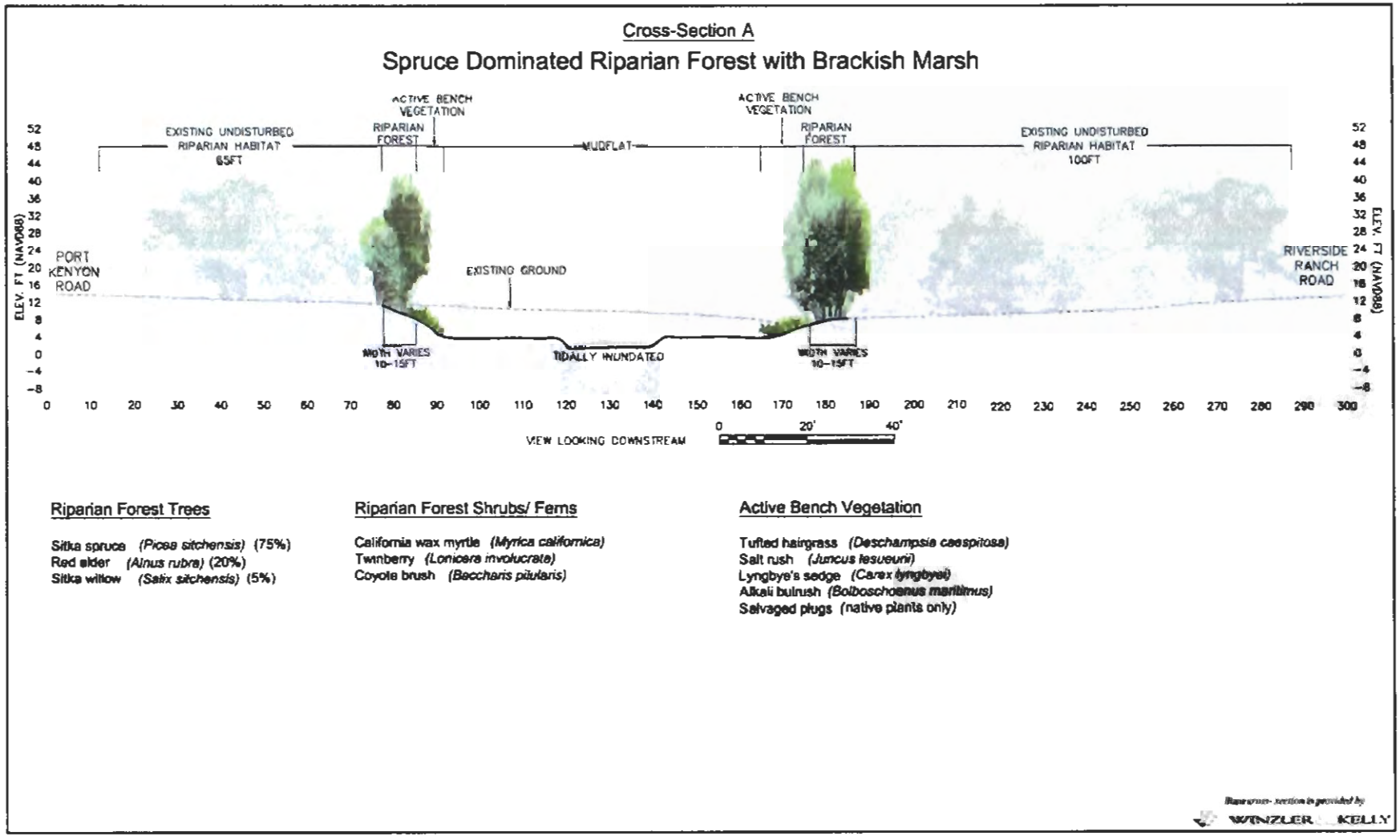


Figure 2-14b

Typical Revegetation Section - Reas Creek Confluence Vicinity

Source: H.T. Harvey & Associates, 2011

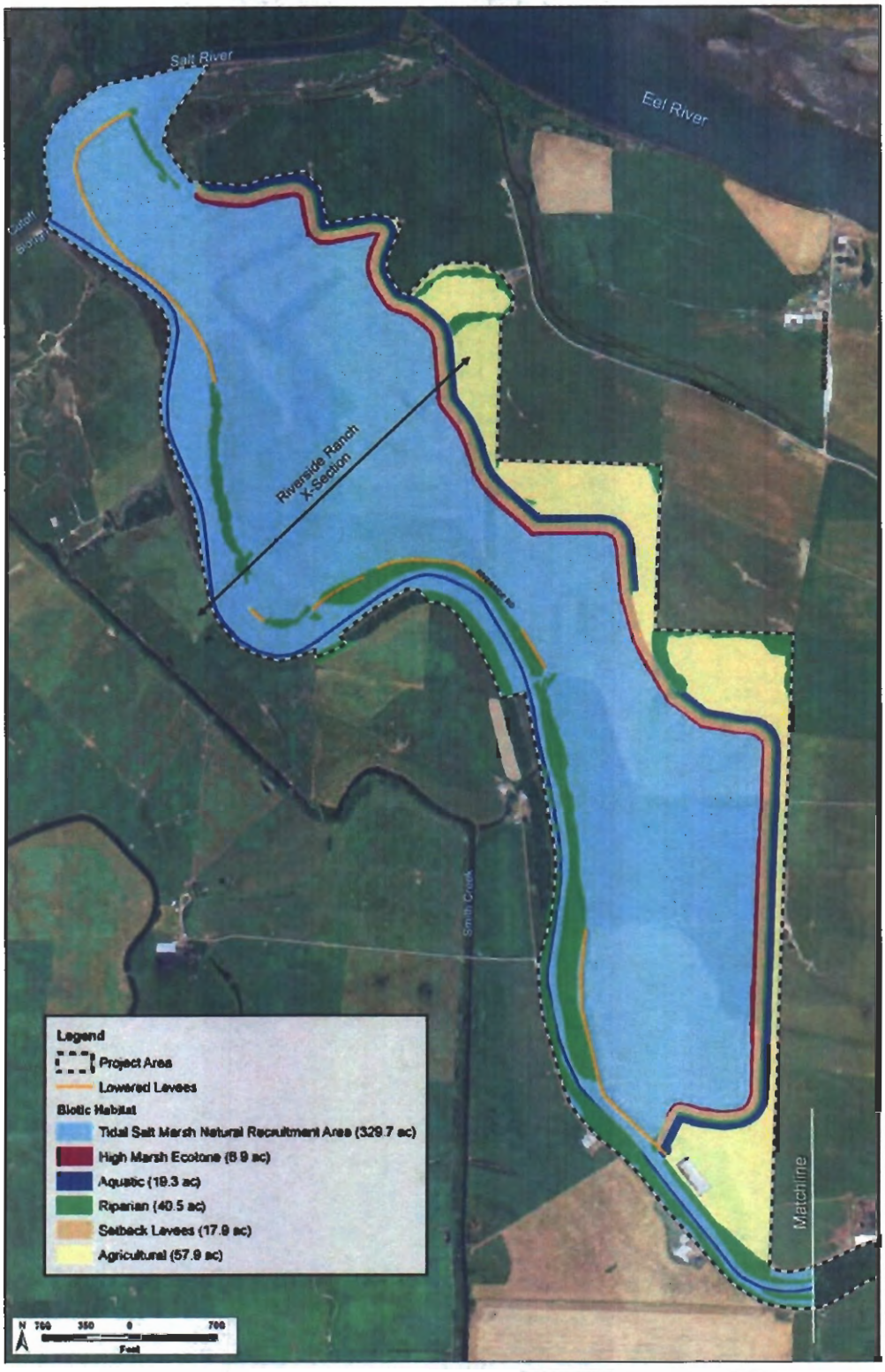


Figure 2-15

Riverside Ranch Revegetation Area

Source: H.T. Harvey & Associates, 2011

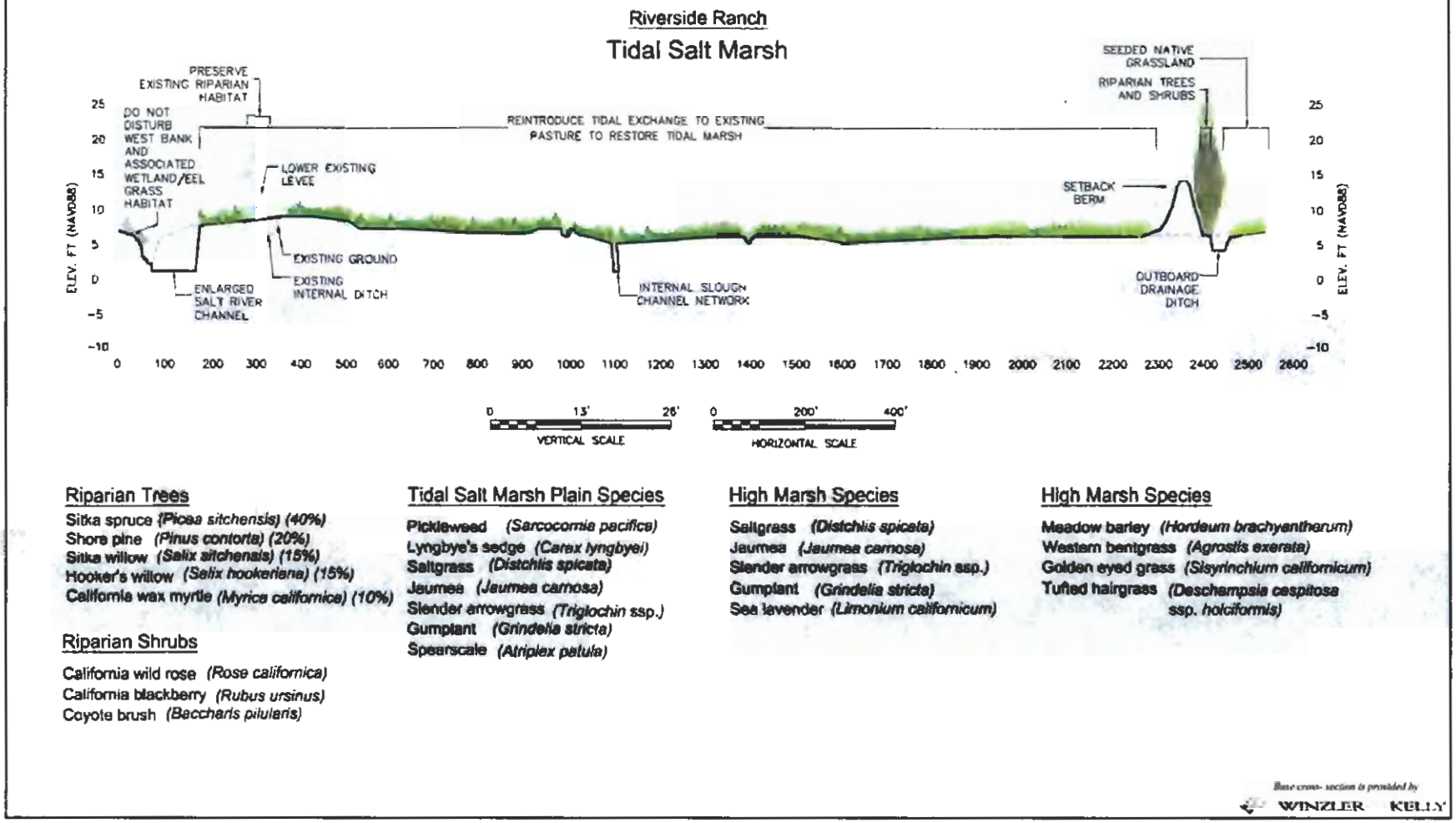


Figure 2-16

Typical Revegetation Section - Riverside Ranch

Source: H.T. Harvey & Associates, 2011

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

SALT RIVER ECOSYSTEM RESTORATION PROJECT
RARE PLANT
MITIGATION AND MONITORING PLAN

Prepared by:

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5630 South Broadway
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27 January 2011

Project No. 3117-05

983 University Avenue, Building D • Los Gatos, CA 95032 • Ph: 408.458.3200 • F: 408.458.3210

CONSERVATION AND REINTRODUCTION PLAN

The conservation and reintroduction strategy for the Salt River Ecosystem Restoration Project Rare Plant Mitigation and Monitoring Plan is species-specific not only because of the unique nature of each of the species of concern (i.e., Humboldt Bay owl's clover, Lyngbye's sedge and Point Reyes bird's beak).variability in local abundance, but also because Lyngbye's sedge and eelgrass each differ in reproductive strategy and propagation from the other 2, Humboldt Bay owl's clover and Point Reyes bird's beak, which are hemiparasitic.

- **Humboldt Bay owl's clover**:

  (1) Three populations of Humboldt Bay owl's clover (totaling 58 individuals) were mapped within the project area during 2010 sensitive species surveys (Winzler & Kelly, 2010). Of these 3 populations, only 1 population occurs in a location where project construction impacts are presumed unavoidable (Figure 2). This population consisted of <10 individuals within an area of approximately 1 square foot. Salvage of this single population was considered, however, the salvage process would require collecting the plant and the surrounding soil in order to adequately capture the seed bank. Because this population is growing in an area dominated by a thick growing cover of dense-flowered cordgrass (*Spartina densiflora*), salvage was therefore discounted as an option. Dense-flowered cordgrass is an invasive perennial that competes with native salt marsh species and typically invades salt marsh habitats to form dense monospecific stands. It can spread both by seed and by vegetative means and is difficult to eradicate once it establishes. A control plan for *Spartina densiflora* is currently being prepared by the California Coastal Conservancy and its partners to eradicate *Spartina densiflora* in Humboldt Bay, the Eel River Delta, and the Mad River Estuary. In an effort to support regional efforts to eradicate *Spartina densiflora* and to refrain from spreading it to other areas of the restoration site, this one population of Humboldt Bay owl's clover will not be salvaged. The following restoration strategies will be employed for the populations not directly impacted by construction.

Strategy

To increase the likelihood that existing populations of Humboldt Bay owl's clover persist through site construction, and to re-establish impacted or extirpated populations post construction, a multi-tiered approach is prescribed:

(1) Avoiding disturbance to existing populations of Humboldt Bay owl's clover to maintain functioning population structure and genetically-diverse source material for the recovery of impacted populations post construction. Avoidance measures include avoiding direct impacts during project planning and avoiding construction staging and access in areas of known populations wherever feasible. Environmentally sensitive area (ESA) fencing should be

2414

installed around the perimeter of the known population onsite and within 100 ft of known populations that will not be directly impacted.

(2) Collection of seed from known populations of Humboldt Bay owl's clover to provide locally-sourced material for nursery propagation and reintroduction post-construction. Seed should be collected at maturity in late summer and stored under appropriate conditions until ready for propagation. Adequate seed will be left from collecting areas to maintain the existing population. Because of the need for multiple growing seasons to establish sufficient host species cover and also due to variability in annual seed viability, it is recommended that seed be collected from remaining populations during multiple growing seasons if deemed necessary to ensure that adequate and viable seed is available for propagation and reintroduction. Propagated replacement plants can be used to establish in-kind replacement population at similar sites in the project vicinity, or once the vegetative state of the impact site attains sufficient vegetative cover for Humboldt Bay owl's clover; the species can then be reintroduced within the immediate area of impact. Suitable host plants growing at or above 7.5 ft MLLW in the Riverside Ranch portion of the project will need to be identified prior to the planting of any seedlings to increase the potential for individual plant success. Once suitable marsh elevations and host plants are established, 60% of the seedlings will be planted in Riverside Ranch and 40% will be held in the nursery as a contingency. If the planted seedlings establish and are doing well after the first year, the remaining nursery seedlings will be installed. If planted seedlings do not successfully establish the plants held in reserve will be used as replacement plantings

(3) Identification of sites within the project area with suitable, elevations and tidal exchange for Humboldt Bay owl's clover reintroduction and/or natural recruitment.

(4) Sufficient vegetative cover of salt marsh host plants is required for establishing Humboldt Bay owl's clover; realizing that it may take approximately 2 to 5 years for such vegetative cover to establish within the immediate area of impact in the restored marsh at Riverside Ranch. Humboldt Bay owl's clover may be propagated with a range of possible salt marsh host plants that also typically occur at or above 7.5 ft MLLW to increase the likelihood for successful establishment once field conditions are suitable for reintroduction. Assumed host plants could include pickleweed and salt grass.

(5) Active replanting/reintroduction of Humboldt Bay owl's clover in areas located in high marsh at or above 7.5 ft MLLW (Eicher 1987). Areas of known occurrence impacted during site construction, as well as areas where Humboldt Bay owl's clover exists but which will not be impacted by site construction, should serve as reference areas.

- **Lyngbye's sedge**:

Lyngbye's sedge is widely distributed across the project area both in locations to be impacted by site construction and in locations not to be impacted by site construction. In Humboldt Bay, Lyngbye's sedge, typically colonizes easily along the edges of slough, at the mouths of streams as they enter salt marsh areas, and at the high ends of sloughs (Personal communication, Andrea Pickart, 2010). It is anticipated that remaining populations of Lyngbye's sedge not impacted by site construction, as well as populations of Lyngbye's sedge existing beyond the perimeter of the project site, will provide viable seed for natural re-establishment across the project area. Because this is an early successional, pioneer species, Lyngbye's sedge is likely to be one of the initial plants to establish on the site post-construction. Lyngbye's sedge is expected to form mono-specific stands on disturbed portions of the site and depending on local disturbance events, these populations may persist for several years post-construction. Rapid colonization by Lyngbye's sedge would be viewed as beneficial from the perspective of bare soil stabilization and habitat creation.

Strategy

(1) Minimizing disturbance to existing populations of Lyngbye's sedge to the extent possible to retain functioning population structure and localized genetic source material for the recovery of those populations impacted as a result of project construction;

(2) Collect seed from existing and/or non-impacted populations of Lyngbye's sedge within the project area to serve as secondary source material in the event that actual natural recruitment post-construction is less than expected. Seed collection should occur when the seeds have ripened (July to September). It may also be advisable to collect a specified amount of seed annually post-construction to ensure the availability of viable seed throughout the mitigation and monitoring period;

(3) Monitor impacted areas and areas where Lynbgbye's sedge is expected to recruit to determine level of natural recruitment.

(4) The option of transplanting Lyngbye's sedge during construction was considered. However, this would involve removing specific sections of plants, transporting the removed plants to an onsite location or a nursery while the channel was constructed, and then moving the plants back to the reconstructed channel for replanting. After considering the potential for plant mortality, the feasibility and the cost of this option, and the potential for the spread of *Spartina densiflora* during replanting, this alternative was not included as a recommendation.

4 of 14

- **Point Reyes bird's beak**

Point Reyes bird's beak, unlike the 2 prior-discussed species, was not observed within the Salt River Ecosystem Restoration Project area during the rare plant surveys conducted by Winzler and Kelley (2010). However, because Point Reyes bird's beak has the potential to occur within the project area, and it is fairly threatened in California with a moderate degree or immediacy of threat, this species is included in this rare plant mitigation and monitoring plan. Because Point Reyes bird's beak is a green-root hemiparasite like Humboldt Bay owl's clover, the protocol for conservation of the former is similar, notably the need for salvaging and relocating populations identified within areas with definite project construction impacts. If this species is discovered on the project site during pre-construction surveys, the conservation strategy would be similar to that of Humboldt Bay owl's clover.

Strategy

(1) Minimize disturbance to any existing populations of Point Reyes bird's beak that are discovered during construction. Minimize direct impacts during project planning and construction.

(2) Minimize disturbance to existing populations of Point Reyes bird's beak to maintain functioning population structure and genetically-diverse source material for the recovery of impacted populations post construction. Minimize direct impacts during project planning and avoiding construction staging and access in areas of known populations wherever feasible. Environmentally sensitive area (ESA) fencing should be installed within 100 ft of known populations that will not be directly impacted.

(3) Salvage individuals and populations in areas with definite construction impacts. As part of the salvaging process, as much adjacent soil as possible should be captured to minimize transplant stress and to retain naturally-deposited seed bank. The soil captured in the salvage process should be monitored periodically so that seed-bank recruits can be adequately maintained either for containerized seedling transplants or grown to maturity for subsequent seed production;

(4) Identify sites within the project area with suitable, elevation and tidal regime for Point Reyes bird's beak reintroduction and/or natural recruitment. Such areas would likely include areas of known occurrence impacted during site construction, as well as areas where Point Reyes bird's beak exists (including nearby sites that do not lie within the project area). Suitable host plants will need to be identified prior to the planting out of seedlings to increase the potential for re-introduction success;

(5) Because sufficient vegetative cover is required for establishing Point Reyes bird's beak, and realizing that it may take approximately 2 to 5 years for such

5 of 14

vegetative cover to establish, it would be useful for the plant propagation specialists to propagate Point Reyes bird's beak with a range of possible salt marsh host plants to increase the likelihood for successful establishment once field conditions are sufficient for reintroduction;

(6) In the event that Point Reyes bird's beak is not observed during or prior to project construction, but the project wishes to include it in the long-term re-vegetation plan purely out of conservation interest, seed collection and propagation methodologies similar to that described for Humboldt Bay owl's clover should be implemented and followed.

- **Eelgrass**:

Eelgrass was observed along a continuous 3 to 4 foot wide band on either side of the Salt River channel along the lower 7,500 feet reach of the project area. Based on bathometric surveys of the Salt River channel, eelgrass beds are understood to exist at elevations ranging from 0 to 4 feet (NAVD88) or -1.5 to 2.5 feet (MLLW). In Humboldt Bay, eelgrass typically colonizes between -1.5 to 1 ((MLLW) in muddy to fine-sand substrates. Approximately 1.2 acres of eelgrass will be disturbed during construction of the Salt River channel. The internal slough network proposed as a component of the Riverside Ranch tidal marsh restoration will create tidal slough channels that will share similar hydraulic and geomorphic characteristics of the existing Salt River channel and assumed suitable eelgrass habitat. Figure 3 depicts the extent of the proposed internal tidal slough network and projected eelgrass habitat created will be approximately 8.7-acres. The following measures are proposed to ensure the establishment of native eelgrass in the created habitat.

Any remaining populations of eelgrass not impacted by site construction, as well as populations of eelgrass existing beyond the perimeter of the project site, will provide viable seed for natural re-establishment across the project area

Strategy

(1) Perform transects prior to construction to verify the extent of eelgrass cover and density within areas of impact.

(2) Minimize disturbance to any existing populations of eelgrass populations not included in the construction footprint to the extent possible, to retain functioning population structure and localized genetic source material for the recovery of impacted eelgrass population.

(3) Monitor natural recruitment for 3 years to determine whether eelgrass is naturally recruiting in newly created channels.

(4) If eelgrass does not establish (in the first 3 years), actively plant eelgrass using the most current scientific methods. A combination of methods may be used,

including natural recruitment, bare root planting, and seed buoy techniques described above (*Reproduction and Propagation*).

(5) If required, active planting will be done in the spring to allow the plants to establish, flower, and set seed in the same year in which the eelgrass is planted.

(6) To the extent possible, install eelgrass plantings at the same tidal elevation as the impacted eelgrass populations and in areas with similar habitat and water quality characteristics.

7914

PLANT PROPAGATION AND CULTURE

If plant propagation is conducted, Table 2 contains a partial list of greenhouse operators for whom may be capable of providing plant propagation.

Table 2. Potential Plant Propagation Specialists for the Salt River Ecosystem Restoration Rare Plant Mitigation and Monitoring Plan.

NAME	CONTACT INFORMATION	POINT OF CONTACT
Freshwater Farms, Inc.	5851 Myrtle Avenue, Eureka, CA 95503 (707) 834-4379	Cindy Pemberon, Nursery Manager
Samara Restoration	PO Box 4586 Arcata, CA 95518 (707) 601-3478	Eric Johnson, Humboldt Restoration Manager/Co-Owner
Humboldt Fish Action Council Nursery	1280 Hatchery Rd. Blue Lake, CA 95525 (707) 498-2123	Suzanne Isaacs, Manager
Living Earth Landscapes	5307 Boyd Rd. Arcata, CA 95521 (707) 822-7663	Keith Hamm, Owner
College of the Redwoods Farm	7351 Tompkins Rd. Eureka, CA 95501 (707) 722-4640	Call for point of contact
Humboldt Botanical Garden	PO Box 6117 Eureka, CA 95502 (707) 442-5139	Call for point of contact

8 of 14

MONITORING PLAN

INTRODUCTION

Monitoring for both the Salt River Ecosystem Restoration Project (H. T. Harvey & Associates 2010) and this Rare Plant Mitigation and Monitoring Plan will be performed annually for a 10-year period following mitigation implementation to determine if the project is fulfilling its mitigation obligations. Specifically, monitoring by a qualified biologist will determine if the project is meeting its commitments to provide suitable habitat for replacing impacted populations of Humboldt Bay owl's clover and Lyngbye's sedge and possibly Point Reyes bird's beak, 3 plant species considered rare or threatened by the California Native Plant Society (CNPS 2010). In addition, monitoring will determine whether sufficient eelgrass habitat has been created to mitigate for impacts to eelgrass populations during construction.

The mitigation areas for the rare plants described in this plan occur primarily within the Riverside Ranch portion of the project. New habitat areas for Lyngbye's sedge may occur along the Salt River Channel upstream of Riverside Ranch, with the projected upstream expansion of the tidal prism. Additional habitat will be created that will support salt marsh species that will server as host species for Humboldt Bay owl's clover in the restored high marsh in riverside Ranch. The restored channel and newly created tidal channels in Riverside Ranch are expected to provide extensive areas for natural recruitment of eelgrass. By the end of the 10-year monitoring period, the mitigation areas for rare plants within the greater Salt River Ecosystem Restoration Project site should be sufficiently achieving the long-term goals outlined in this plan with little chance of failure. The results of the annual monitoring will be compared with the annual success criteria to determine either if the mitigation obligations have been met, or if the trajectory is on course for the mitigation obligations to be met. In the event that the final success criteria have not been met by the end of Year 10, monitoring will continue until the criteria have been achieved.

FINAL SUCCESS CRITERIA

Plant Presence/Absence

Humboldt Bay owl's clover and Point Reyes bird's beak. The presence of established and functioning populations of Humboldt Bay owl's clover and Point Reyes bird's beak equal to or exceeding the population size existing within the project area prior to construction will be used as the primary indicators of successful rare plant mitigation within the Salt River Ecosystem Restoration Project area. If Point Reyes bird's beak is not found during project pre-construction monitoring, then monitoring and the associated success criteria will not be required for this species.

Plant Cover

Lyngbye's sedge. Percent cover by Lyngbye's sedge will be measured throughout the project area where the hydrologic setting is such that this species is expected to colonize. Monitoring efforts will be directed in the relatively narrow band of inter-tidal habitat along the Salt River corridor at the lower limit of the low marsh. It is anticipated that any populations of Lyngbye's

9/9/14

sedge not impacted by project construction will serve as reference populations when assessing the colonization and establishment of populations post-construction. The final success criteria for Lyngbye's sedge total cover shall be a minimum of 50% within the areas of suitable hydrology and elevation for plant establishment.

Native eelgrass. Percent cover criteria of the project's naturally recruiting or planted eelgrass beds will be measured in Years 1 through 5. Any populations of eelgrass not impacted by project construction, in addition to an identified reference population of eelgrass in the vicinity of the project site, will also be monitored. The populations of eelgrass in the vicinity of the site will serve as reference populations to determine whether regional variations in water temperature, salinity, turbidity or other factors may be limiting eelgrass establishment at the site.

PERFORMANCE CRITERIA

Trend characteristics will be used to monitor and evaluate the extent to which Humboldt Bay owl's clover, Lyngbye's sedge and Point Reyes bird's beak have successfully established within designated areas of the Salt River Ecosystem Restoration Project area. Trend characteristics for Lyngbye's sedge, including plant cover and natural recruitment, will be monitored in Years 1, 3, 5, 7 and 10. Similarly, trend characteristics for Humboldt Bay owl's clover and Point Reyes bird's beak, including plant presence/absence and natural recruitment, will be qualitatively documented in Years 1, 3, 5, 7 and 10 for pre-existing populations (and after the establishment of suitable host plants for all non-preexisting populations). The results of the trend characteristics monitoring will aid in the maintenance and management of the rare plant mitigation areas within Riverside Ranch and will help to ensure mitigation success.

Trend characteristics will also be used to monitor the establishment of eelgrass within the newly constructed channels. Eelgrass monitoring results from the restoration area will be compared with monitoring results from any remaining eelgrass beds onsite or eelgrass beds in adjacent reference areas. Monitoring of restoration and reference areas will take place at the same time. Percent vegetative cover and stem density will be calculated for any naturally recruited eelgrass beds within the restoration area, as well as in reference areas. Tracking this performance trend is key to ensuring that the site is developing along a trajectory to create approximately 1.41 ac of eelgrass habitat with similar density and cover as the impacted populations. The monitoring results will be analyzed on an annual basis and used to inform the adaptive management strategy as outlined above in the *Conservation and Reintroduction Plan* section of this report.

MONITORING METHODS

Record Drawings

Within 8 weeks of the completion of site construction, a qualified restoration ecologist will inspect the Salt River Ecosystem Restoration Project site and consult with a project engineer to ensure that any necessary changes to planting specifications for rare plants and eelgrass are documented in the record drawings created for the project. The record drawings will illustrate significant deviations from the final constructions plans and specifications for the site. Deviations that will be documented are primarily changes in channel dimensions and elevation,

10914

which would subsequently affect the location and amount of potential salt marsh habitat. These record drawings create a basis for future analysis of the mitigation site.

Plant Presence/Absence

The presence/absence of Humboldt Bay owl's clover will be determined by counting the number of individuals occurring in the 2 existing populations documented prior to site construction and in populations planted (i.e., re-introduced) or recolonizing post-construction. A similar strategy will be employed for Point Reyes bird's beak in the event it is observed prior to or during site construction. Once host plant vegetative cover is sufficient to support the re-introduction and/or natural colonization of Humboldt Bay owl's clover and Point Reyes bird's beak, monitoring should include counts of known populations at the project site, including pre-existing, re-introduced, and naturally colonized.

Plant Cover

Plant cover by Lyngbye's sedge should be determined by employing a scientifically acceptable methodology (e.g., quadrat sampling using 1-square meter quadrats). This will be achieved by randomly establishing sampling locations along impacted portions of the Salt River where the elevation and hydrologic regime are suitable for the establishment of this species by natural recruitment. As noted, and based on field observations, it is anticipated that that the primary sampling area will consist primarily of a narrow band of inter-tidal in between open MLLW and MHHW. Sampling efforts will strive to document representative Lyngbye's sedge cover over a minimum of 1% of the anticipated Lyngbye's sedge natural recruitment area, noting however, that the total area sampled will depend on the actual amount of habitat created during project construction.

Adequate sample size of Lyngbye's sedge will be determined using the method found in Kershaw (1973). The relationship between cumulative average percent cover and quadrat number will be evaluated in the field during the first sampling. This is accomplished by graphing the cumulative average percent cover on the Y-axis against the number of quadrats on the X-axis during the first sampling. The point at which the slope approaches zero indicates a sufficient sample size (i.e. number of quadrats). Quadrats will be located throughout the site in a stratified-random design along permanently marked transects.

Monitoring for percent cover of eelgrass shall be performed per monitoring methods described in the Southern California Eelgrass Mitigation Policy (NMFS 1991). Plant density (number of shoots per m^2) and percent vegetative cover (area) will be monitored at 6 months, and Years 1-5 after transplanting is complete. Monitoring will be performed during the active vegetative growth periods, avoiding the winter months of November through February. In addition to monitoring at the restoration site, concurrent monitoring will be performed at an adjacent reference area for comparison purposes and to account for any natural variation that may be occurring in the region.

11 of 14

Natural Recruitment

Natural recruitment will be qualitatively assessed by a trained botanist or restoration ecologist throughout the rare plant mitigation area and in the eelgrass restoration area in Years 1, 3, 5, 7 and 10. The presence of native and non-native grass and forb species recruits, including exotic invasive plants, will be assessed and reported. Of particular concern are exotic invasive species that may inhibit the establishment and/or health and vigor of Lyngbye's sedge, Humboldt Bay owl's clover, Point Reyes bird's beak and eelgrass.

Photo-documentation

Photo-documentation for the Salt River Ecosystem Restoration Project Rare Plant Mitigation and Monitoring Plan will be conducted from a number of fixed locations in Years 1, 3, 5, 7 and 10. Photographs will also be taken to record notable events such as fire, flood, vandalism or erosion that may significantly affect mitigation success. The locations of the photo-documentation points will be selected when the record drawings are developed. Key locations will include: (1) salvaged and/or re-introduced populations of Humboldt Bay owl's clover, Point Reyes bird's beak and eelgrass, (2) non-impacted populations of Lyngbye's sedge, Humboldt Bay owl's clover eelgrass that are non-impacted during project construction, (3) locations deemed suitable by a qualified restoration ecologist for the establishment of Lyngbye's sedge and eelgrass and once vegetative cover is sufficient, also Humboldt Bay owl's clover and Point Reyes bird's beak, (4) locations seeded or planted with any of the 4 before-mentioned species, and (5) any naturally-recruited populations of Humboldt Bay owl's clover, Point Reyes bird's beak, or eelgrass.

Management Recommendations

Based on the data collected and the observations made during annual monitoring, modifications to site management such as weed control, re-seeding or re-planting may be included in each monitoring report. Recommendations will identify potential impediments to restoration and conservation efforts, and where appropriate, will propose adaptive solutions to problems encountered on-site.

MONITORING SCHEDULE

The proposed monitoring schedule for the rare plant mitigation area is presented in Table 3. Monitoring will be conducted in the mid to late summer (July through August) of Years 1, 3, 5, 7 and 10 when Lyngbye's sedge, Humboldt Bay owl's clover and Point Reyes bird's beak have reached maturity and are in flower and more easily identified. The schedule for eelgrass monitoring is somewhat different and is based on the monitoring schedule recommended in the southern California Eelgrass Mitigation Policy (NMFS 1991). Table 3 lists the years in which each attribute will be monitored. It is unlikely that vegetation establishment will occur in Year 1, however the site will be monitored in the event that any of these 4 species naturally reestablishes in order to ensure their protection. Monitoring reports will be prepared in Years 1, 3, 5, 7 and 10 following data collection and analysis and will be submitted to the Humboldt County Resource Conservation District (HCRCD).

12414

Table 3. Monitoring Schedule for the Salt River Ecosystem Restoration Project Rare Plant Mitigation and Monitoring Plan.

MONITORING TASK	EIGHT WEEKS POST-PROJECT CONSTRUCTION	6 MONTHS[2]	Year 1[1]	Year 2[2]	Year 3[1]	Year 4[2]	Year 5[1]	Year 7[3]	Year 10[3]
Record Drawings	X[1]								
Plant Presence/ Absence			X		X		X	X	X
Plant Cover		X	X	X	X	X	X	X	X
Natural Recruitment		X	X	X	X	X	X	X	X
Photo-documentation		X	X	X	X	X	X	X	X

[1] Monitoring to occur for all 4 species
[2] Monitoring to occur for only for eelgrass
[3] Monitoring to occur for only Humboldt Bay owl's clover, Lyngbye's sedge and Point Reyes birds beak

Monitoring

A qualified biologist will monitor the rare plant mitigation area during Years 1, 3, 5, 7 and 10 for Humboldt Bay owl's clover, Lyngbye's sedge, and Point Reyes bird's beak. Monitoring for eelgrass will occur in years 1-5. In addition, a qualified restoration ecologist will monitor the project during construction to ensure that the mitigation area is installed as described in this plan. The restoration ecologist will also oversee the removal and reinstallation (re-introduction) of populations of hemiparasitic plants (e.g., Humboldt Bay owl's clover and Point Reyes bird's beak) and eelgrass that may be salvaged or relocated prior to and/or during project construction.

Project Sign-off

It is anticipated that monitoring will be conducted for 10 years. At the end of the monitoring period, a final monitoring report will be prepared to establish whether the rare plant mitigation area has achieved its final success criteria. If the mitigation site has successfully met its success criteria, a letter will be sent to the HCRCD acknowledging the condition of the site. It is anticipated that the project will be considered a success when the performance criteria are met in Year 10. If populations of the species of concern are thriving well beyond the final success criteria by Year 7, a request for early sign-off may be considered.

DATA ANALYSIS AND REPORTING

Data analysis for the rare plant mitigation area will be conducted as soon as possible following collection of field data. Minimizing delays between data collection and data analysis provides an opportunity to return to the site to follow up on any discrepancies encountered in the original data set. The yearly monitoring results will be compared with results from previous years to evaluate the progress of the rare plant mitigation area.

Following data collection in Years 1, 3, 5, 7 and 10 (for the rare plants) and Years 1-5 (for eelgrass), a monitoring report will be prepared and submitted to the HCRCD. Reports will include an introduction, methods, results, discussion, management recommendations, and

13 of 14

photo-documentation sections. The Year-10 report will summarize the rare plant mitigation area, evaluate the site's overall performance, and provide final maintenance recommendations. Monitoring will cease when the site has met its success criteria or when it is expected to meet the success criteria with little chance of failure.

14914

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SALT RIVER ECOSYSTEM RESTORATION PROJECT
ADAPTIVE MANAGEMENT PLAN

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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.

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 should 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.

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.

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.

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.

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.

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 should 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.	No action 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 should 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 should 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 should be completed for 4 to 6 months during the dry season (May through October). The duration of monitoring will be weather dependent and instruments should 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.	No action 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	No action 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.
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	**Active SMAs** 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)	**Active SMAs** 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. **Passive SMAs** 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	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.	No action 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.

MANAGEMENT ELEMENT	PROJECT OBJECTIVE	MONITORING METHODS	MONITORING FREQUENCY	MANAGEMENT TRIGGER	POTENTIAL MANAGEMENT ACTIONS[1]
		<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)	during winter and summer baseflow periods.		Remove obstructions. Install or modify instream structures to redirect or concentrate flows.

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 should 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 should 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) are proposed in the mainstem Salt River and Eel River Estuary. Four of the recorders shall be installed at the following locations: 1) immediately downstream of the confluence with the new northern Riverside Ranch connector channel; 2) immediately downstream of the confluence with the new southern (upstream) Riverside Ranch connector channel; 3) at Dillon Road Bridge; and 4) immediately downstream of the confluence of Francis Creek. In order to evaluate the tidal and salinity exchange within Riverside Ranch, the fifth multi-parameter recorder shall be located inside Riverside Ranch at habitat constructed for tidewater goby. Water surface elevation monitoring should 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 should be collected within and near the bottom of the water column. The initiation of monitoring will be weather dependant and instruments should 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 should 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 should 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 should 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.

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 should 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)	Four times yearly for 1-month periods during 2 spring and 2 neap tide events to coincide with channel capacity monitoring for the Salt River (Table 1). A 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.	No action 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	No action 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. Annual survey during the summer, 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).	No action 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.

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 should 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 should 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 surveys 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 should be performed within and near the bottom of the water column. This monitoring should 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.

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 should 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 should 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.	No action 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 should be performed at the same time and at locations where tidal stage and DO is monitored. Sampling locations should 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 22-23°C (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.	No action 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

MANAGEMENT ELEMENT	WATER QUALITY OBJECTIVE	MONITORING METHOD AND LOCATION(S)	MONITORING FREQUENCY	MANAGEMENT TRIGGER	POTENTIAL MANAGEMENT ACTIONS[1]
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.	No action 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.

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 should 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).

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 should 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.	No action 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.	No action 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. Monitoring of planted salt marsh species using transect monitoring. Measure percent cover of 0.05% of the planted surface area. Annual vegetation monitoring per HMMP (H. T. Harvey & Associates 2010) which includes: • Salt marsh percent cover vegetation monitoring based on success criteria in Years 3, 5, 7, and 10 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 salt marsh species in Years 3,5,7, and 10 Annual monitoring in Years 1-5, 7, and 10.	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.	No action 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 should 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.	No action 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 should 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	Weedy vegetation dominates the restoration area and threatens to spread to adjacent landowner properties.	No Action 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).	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	No action 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	Pikeminnows greater than 10 inches with evidence of piscivory become dominant in the project area to the exclusion of native species	No action 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.

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 should be performed per the HMMP (H. T. Harvey & Associates 2010) during the 3-year plant establishment period for the project. 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 should 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.

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 should 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 should 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 should 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 should 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 should 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 should 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 relative abundance of pikeminnow, habitat preferences, dietary preferences, movement patterns, and other factors.

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 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 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.

Table A-1. Potential Maintenance 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	Project-wide	June 15 – 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
2	Remove obstructions if deemed necessary to maintain habitat and hydrologic function	Project-wide	June 15 – 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
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 15 – 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
4	Channel excavation to remove sediment to improve channel function	In channel, Project-wide	June 15 – October 15	0-120 days	Moderate	Heavy equipment for excavation	0-25,000 CY of Sediment	FEIR MM: A-F, H-K, N-S BMP: d, f
5	Additional Riverside Ranch breaches and/or levee lowering	Riverside Ranch levees	June 15 – 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
6	Conduct pre- or post-storm maintenance to remove excess sediment	In channel, Project-wide	Year-round	0-30 days	Moderate	Heavy equipment and hand crews	0-25,000 CY of Sediment	FEIR MM: A-F, H-J, N-S BMP: f, g
7	Repair failed or damaged road-stream crossings	Within 100 feet of road-stream crossings	June 15 – 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
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 15 – 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
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 15 – 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
10	Trim or remove vegetation and/or invasive vegetation as necessary to maintain stream function and bioengineering design approach per project plans	Outside of planted areas and outside of existing mature riparian vegetation not older than 10years. (i.e. SMAs, active channel and active bench)	June 15 – March 15	0-120 days	Frequent	Herbicides, hand pruning tools and possibly chainsaws and brush cutter/mowing or other light equipment	0 – 5 Acres Trees no larger than 4" dbh	FEIR MM: A-F, H-K, N-S BMP: c, i
		For maintenance access and maintenance of active channel vegetation/ bioengineering	June 15 – March 15	0-120 days	Frequent		0-5 Acres Trees no larger than 6" dbh	

	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]
		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	Riverside Ranch Tidal Marsh[7]	June 15 – 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
		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 15 – 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
13	Raise height of berms without expanding footprint and/or filling wetlands	Existing berm locations only	June 15 – October 15	0-120 days	Infrequent	Heavy equipment for grading	0-9,000 LF of Berm	FEIR MM: A-F, H-K, N-S
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 15 – 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
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
16	Apply/place excavated sediment on Agricultural Lands	Agricultural Lands	Year-round	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

[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.

[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.

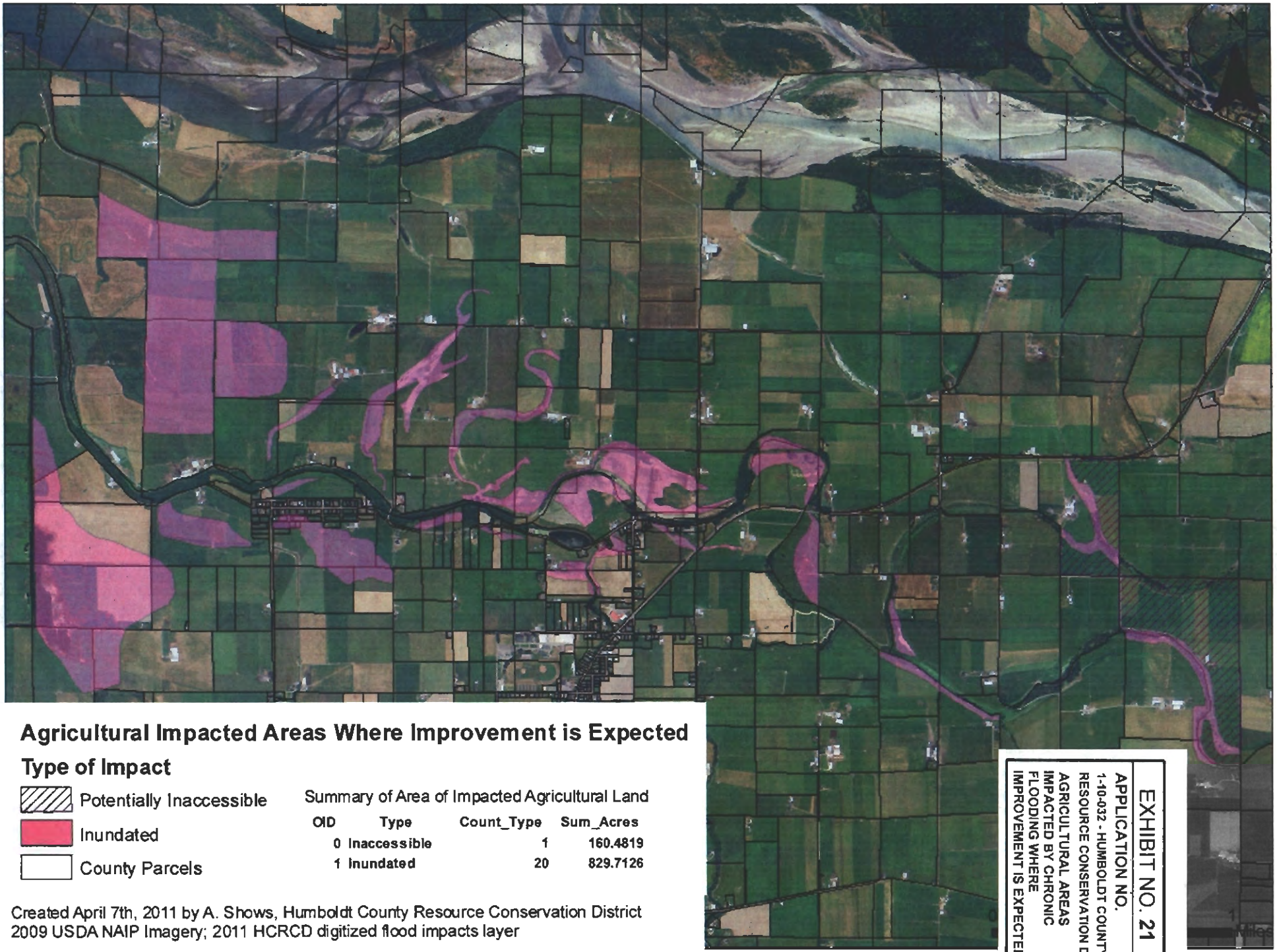
[4]Anticipated Frequency categories include: Frequent (every 1-2 years), Moderate (every 2-5 years), Infrequent (every 5-15 years), and Rare (15+ years, or not at all)

[7] May require amendment to Coastal Development Permit and additional consultation as deemed necessary.

[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
O	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



Agricultural Impacted Areas Where Improvement is Expected

Type of Impact

- Potentially Inaccessible
- Inundated
- County Parcels

Summary of Area of Impacted Agricultural Land

OID	Type	Count_Type	Sum_Acres
0	Inaccessible	1	160.4819
1	Inundated	20	829.7126

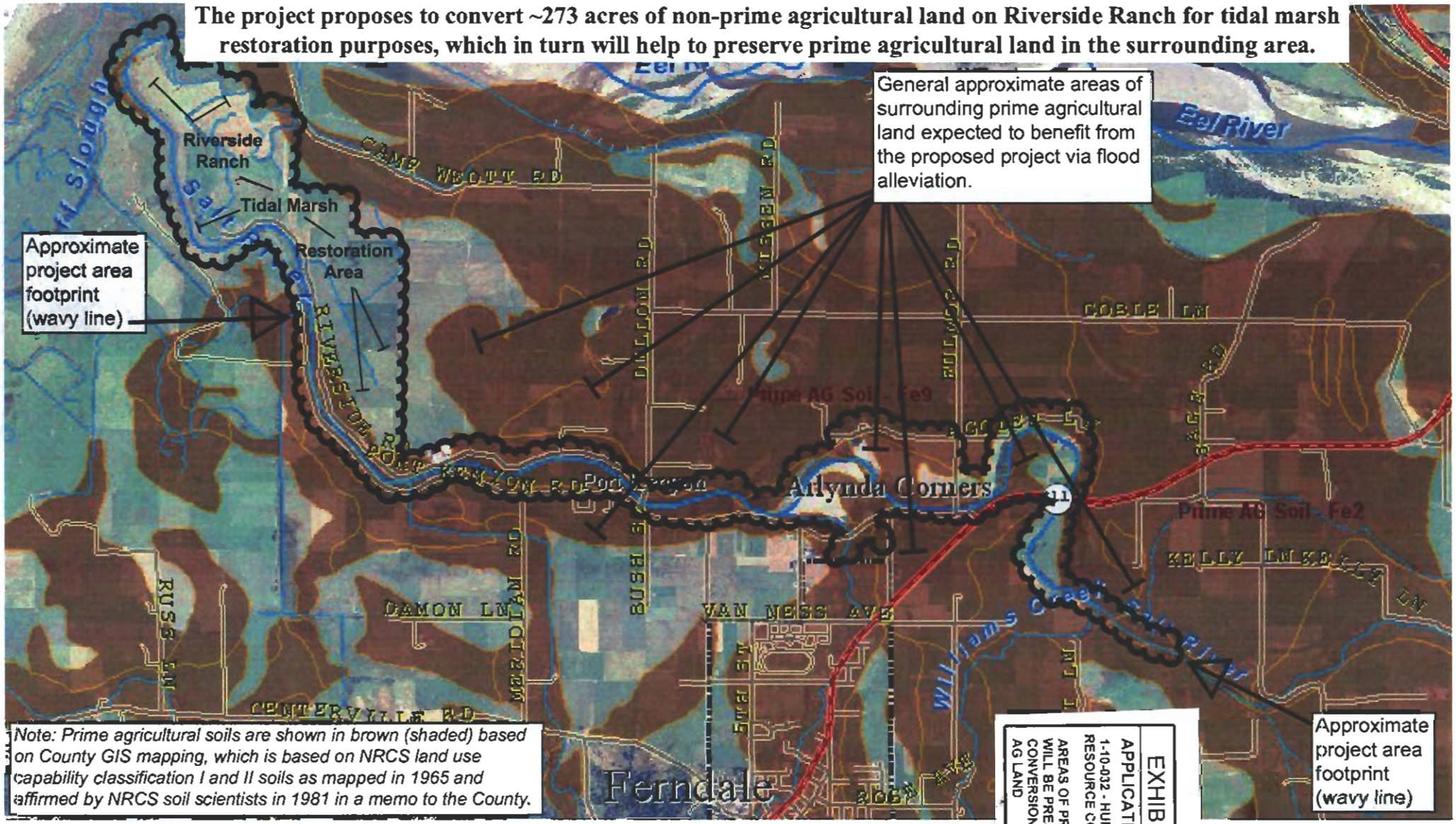
Created April 7th, 2011 by A. Shows, Humboldt County Resource Conservation District
2009 USDA NAIP Imagery; 2011 HCRCD digitized flood impacts layer

Exhibit B - 2011

EXHIBIT NO. 21

APPLICATION NO.
1-10-032 - HUMBOLDT COUNTY RESOURCE CONSERVATION DIST.
AGRICULTURAL AREAS IMPACTED BY CHRONIC FLOODING WHERE IMPROVEMENT IS EXPECTED

The project proposes to convert ~273 acres of non-prime agricultural land on Riverside Ranch for tidal marsh restoration purposes, which in turn will help to preserve prime agricultural land in the surrounding area.



Note: Prime agricultural soils are shown in brown (shaded) based on County GIS mapping, which is based on NRCS land use capability classification I and II soils as mapped in 1965 and affirmed by NRCS soil scientists in 1981 in a memo to the County.

EXHIBIT NO. 22

APPLICATION NO.
1-10-032 - HUMBOLDT COUNTY RESOURCE CONSERVATION DIST.

AREAS OF PRIME AG LAND THAT WILL BE PRESERVED BY THE CONVERSION OF NON-PRIME AG LAND

ADDENDUM TO FINAL ENVIRONMENTAL IMPACT REPORT: SALT RIVER ECOSYSTEM RESTORATION PROJECT
SCH# SD2007-05-6
(April 13, 2011)

Prepared by Humboldt County Resource Conservation District
In association with the State Coastal Conservancy

1. Purpose

This document was prepared by the Humboldt County Resource Conservation District in association with the State Coastal Conservancy, as an addendum to the Final Environmental Impact Report for the Salt River Ecosystem Restoration Project (SRERP). The Final Environmental Impact Report (FEIR) was prepared by Grassetti and Associates and certified by the Humboldt County Resource Conservation District ("lead agency" or "HCRCD") on February 24, 2011. This Addendum is prepared pursuant to the California Environmental Quality Act of 1970 (California Public Resources Code §§ 21000-21177), as amended, and the CEQA Guidelines (California Code of Regulations (C.C.R.) title 14, §§ 15000-15387) as amended.

The Salt River Ecosystem Restoration Project FEIR, section 3.9 discusses the potential impacts from implementation of the project on agricultural resources in the region. Specifically Impact 3.9.1-3 assesses changes in the existing environment which could result in the conversion of farmland to non-agricultural use. In its response to comments, the HCRCD developed additional information concerning the extent and duration of flooding in the project area. This analysis was incorporated into the FEIR prior to certification. Nonetheless, the HCRCD has conducted further analysis of the potential agricultural impacts from the preferred alternative of the project to clarify the anticipated impacts and mitigation that will occur from the Project. The lead agency has determined that this analysis is necessary to provide additional information to the public, but development of a supplemental environmental impact report is not necessary since the impacts to the resource remain less than significant and there is no change to circumstances under which the project is being undertaken.[1] The assessment confirms that the selected alternative of the SRERP,

[1] The CEQA Guidelines identify the decision making process the lead agency should use to determine the type of CEQA document appropriate. The CEQA Guidelines (14 C.C.R. §15164(a)) specify that the lead agency shall prepare an addendum to a previously certified EIR if some changes or additions are necessary, but none of the conditions described in Section 15162 calling for preparation of a subsequent EIR have occurred. According to Section 15162, a subsequent EIR **shall not** be prepared for the Project unless the lead agency determines, based on substantial evidence in light of the whole record, that one or more of the following conditions are met:

- Substantial changes are proposed to the Project which will require major revisions to the FEIR due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects;
- Substantial changes occur with respect to the circumstances under which the Project is undertaken which will require major revisions to the FEIR due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects; or
- New information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the FEIR was certified as complete, shows any of the following:
  — The Project will have one or more significant effects not discussed in the FEIR;

as designed, will have no different effects on agricultural resources or elements of the environment other than those described in the FEIR.

Based on the analysis in this Addendum, no revisions are needed to the FEIR because no substantial changes in the proposed action relevant to environmental concerns have occurred, no new significant impacts and no substantial increase in the severity of significant impacts previously identified in the FEIR and no new information relevant to environmental concerns bearing on the proposed action has come to light that would indicate the potential for new, significant impacts not discussed in the FEIR.

2. Analysis of Agricultural Impacts of the Salt River Ecosystem Restoration Project

2.1 Area Description

The Eel River Delta, Humboldt County is the location of the Salt River Ecosystem Restoration Project. The project area and surrounding environs consist largely of grasslands used for agricultural production, particularly dairy production and beef-cattle operations. Virtually all of the area is classified as prime farmland, with pockets of rural residential areas interspersed in this agricultural community. There are few viable and legitimate enterprises remaining in this County once heavily dependent on logging and fishing; the dairy and beef cattle industries are two such economic contributors.

While pastureland represents, on average, about half of all farm acreage in the United States and 58 percent in California, dairy and beef pastures occupy a remarkable 82 percent of the farmland in Humboldt County. Milk is the county's top consumable agricultural product, worth $43 million in 2004, and a majority of the County's approximately 65 dairies are located in close proximity to the project. Each dollar in farm milk sales generates eight dollars in local economic activity, supporting steady incomes and jobs within a wide range of related businesses, from feed to finance.[2]

Dairy farming is a well established sector of the Humboldt County economy. According to the Ferndale Chamber of Commerce website; "The dairy-farming Danes, arriving in the 1870s, brought practices from their homeland. Each small neighborhood of dairymen formed its own cooperative creamery. By 1890 there were eleven separate creameries operating in the immediate Ferndale area. Ferndale butter was considered the finest in the state, bringing premium prices in San Francisco. Ferndale acquired its first nickname, 'Cream City.'

Shortly after 1900 many of the small creameries consolidated into larger creameries. The Central Creamery, located on north Main Street, became the mother plant of the Golden State Creamery,

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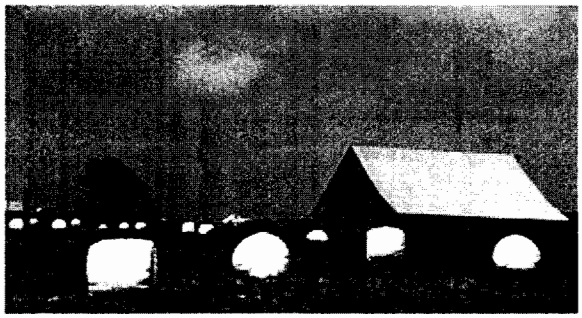
— Significant impacts previously examined in the FEIR will be substantially more severe than shown in that FPEIR;

— Mitigation measures or Project alternatives previously found not to be feasible would in fact be feasible, and would substantially reduce one or more significant impacts on the environment, but the Conservancy declined to adopt the mitigation measure or alternative; or

— Mitigation measures or Project alternatives which are considerably different from those analyzed in the FEIR would substantially reduce one or more significant impacts on the environment, but the lead agency declined to adopt the mitigation measure or alternative.

[2] The Humboldt County Export Economy: Dairy Industry. State of the Industry Report: 2007.

one of the largest in the state. ('Challenge' brand dairy products are from the remaining cooperative creamery, the Humboldt Creamery in Fernbridge.)



Ferndale's pioneer creameries were responsible for a number of innovations in dairy processing and dairy management which helped revolutionize the dairy industry. Among these firsts were:

- the production of the first sweet cream butter
- the first butter wrapping and cutting machines
- the first dry-milk processing on the Pacific Coast
- the first milk tank truck
- the first cooperative creameries
- the first cow testing program in California
- development of the nationally-known Gray-Jensen dry milk process
- development of the Peebles dehydration process.

The project vicinity, locally referred to as the Ferndale Bottoms, is a traditional center of dairy production that remains economically viable. The Humboldt Creamery organic milk processing plant, now owned by Foster Farms Dairy, is located in Fernbridge, less than 5 miles from the project area. Specialty cheese producers in the area, such as the Loleta Cheese Company (located less than 10 miles away) and the Rumiano Cheese company, also provide a market for locally produced milk. Agricultural support services, such as equipment dealers and supply stores, are also present in the immediate vicinity. While small by state standards, Humboldt's industry of approximately 65 dairies, a handful of processors and dozens of support businesses is more impressive in a larger context, ranking amongst the top six percent of dairy-producing counties nationwide.

Economic Factors

While lower-cost, larger-scale producers in other parts of the state grow simply by adding cows to an already crowded feedlot, the pasture-based farms in Humboldt, which average about 1.5 cows per acre, don't have that luxury. Here, ranchers must continue to use their land in more innovative ways, competing with quality and product specialization as opposed to price. For 40 Humboldt dairies—16 of them located in the Ferndale area[3]—organic milk production has become one way to take advantage of the area's pastoral setting, utilize the methods of sustainable agriculture, and ensure a commitment to producing milk free of artificial hormones. Organic milk is still a small percentage of the overall dairy market, but as a commodity it is growing at more than 20 percent a year. Current demand for organic milk far exceeds supply, with prices nearly double those for conventional milk.

The property value of agricultural land in the Eel River Delta is high, and there is very little land available for rent or purchase. The land is owned and used by local dairies, beef producers, or held as investments by retired dairymen or their heirs. Inflation of property values has slowed in recent years, but deflation is absent. As reported in an appraisal report for property within the project

[3] 2011 California Certified Organic Farmers directory listing of organic dairies in Humboldt.

footprint dated January, 2011, ranchers compete strongly for any delta land offered for sale or rent, and land typically sells for $5,000 to $10,000/acre. To further document this valuation, a 100-acre NRCS easement on the Vevoda property near Port Kenyon and along the Salt River recently sold for approximately $10,000/acre, although that price was applied regionally, and is widely disputed as a reasonable easement value for the area.

Flooding Impacts

Episodic flooding has always been common along the lowland areas of the Eel River Delta, and catastrophic floods on the Eel will always occur. However, the 1,388 inhabitants of Ferndale and surrounding dairies, farms and ranches are now severely impacted by increased **chronic** flooding and persistent ponding. What has changed over the past 25 years is that lands that used to flood and drain, no longer do so. According to one Landowner interviewed by the HCRCD, in the 1955 and 1964 floods the flood waters subsided within 3-4 days on his property. Now, according to interviews with several producers throughout the project area, water persists on some pastures for up to eight months out of the year.

As relayed to the HCRCD by affected landowners, a series of events occurred sometime in the late 1990s that impacted the drainage and hydrology of the area. Williams Creek was rerouted at its confluence with the Salt River channel by a sediment plug. Now flows are redirected in the opposite direction. The loss of these waters reduced flows available to help flush sediment out through the Salt River channel. Additionally, a change in maintenance practices occurred. Prior to this time, according to landowner accounts, individual landowners conducted routine maintenance to keep the channel free of vegetation and excess sediment. A change in regulations and threats of legal actions and fines deterred this type of maintenance. As the channel began to fill in, water started to flow across different properties. This resulted in a myriad of individual actions to divert water and, ultimately, has completely disrupted natural drainage patterns. Now due to sedimentation and aggradation of the historic Salt River Channel, chronic flooding and *long-term* ponding of floodwater is initiated seasonally in many areas. Average rainfall in Ferndale is 44.2 inches per year (USDA 1993), with most rain falling October through April. Landowners report flooding now results from only moderate rainfall events and ponding persists much longer than before in many areas that drained via the Salt River. According to interviews conducted with representative landowners by the HCRCD and based on HCRCD staff experience in the area, it was determined that at least 750 acres experience routine flooding and decline or loss of agricultural productivity as a result of flooding and persistent ponding (Exhibit A and Exhibit B, and descriptions, below).

Aggradation has virtually eliminated any known and definite Salt River channel forcing water from rain events across roads and pastures, through barns and around houses throughout the area between the confluence with Reas and Williams Creeks, a distance of over four (4) miles. At least 20 homes and at least a similar number of dairies have been flooded routinely for the past several years. Similarly, Francis Creek is so impacted by sediment that Port Kenyon Road acts as the channel for Francis Creek high flows and sediment loads. Port Kenyon Road, an important county thoroughfare, was closed for months last year until emergency-permitted work enabled the County to reopen the road for public safety purposes. Needless to say, the closure of Port Kenyon Road presented a costly inconvenience to dairies, ranchers and truckers accustomed to utilizing that major thoroughfare and jeopardized the homes, health and safety of residents.

River, some of which will be restored to wetland, riparian, and aquatic habitats by the project, is severely affected by flooding and frequently can only be grazed between 5 and 9 months per year. Project implementation is expected to significantly reduce flooding duration on approximately 750 acres of the project area, thereby greatly enhancing its productivity.

2.3.3 Economic Evaluation of Agricultural Productivity

The ample rainfall and mild climate create cost-effective pastureland with little need for heat or air-conditioning for the cows and goats, unlike dairies in the Central Valley. With these cost savings, small, Humboldt County dairies are able to compete with Central Valley dairies. While virtually all land in and around the project footprint is classified as prime agricultural soil, it is clear that not all prime agricultural soil in the Project vicinity is created equal. Like the extent and duration of flooding, the productivity of pasture throughout the Ferndale area is highly variable. Generally speaking, pasture in the upstream areas of the Salt River tends to be far more productive than pasture in the lower reaches. Pasture at Riverside Ranch has severely deteriorated over the past several years. Feed taken off Riverside Ranch over the past two years has had very low nutritional value based on nutrient analysis conducted, and approximately ½ of the feed on the ranch is reported to have no nutritional value (J. Becker pers comm.).[8]

A former Humboldt County University of California Cooperative Extension (UCCE) Dairy Adviser did an analysis of the grass productivity of several dairies in the Ferndale bottoms, and presented the following ranges of productivity (names redacted for privacy):

Dry Matter	Acre/month		
	LOW	HIGH	AVE
DAIRY A	267	804	
	619	1250	
DAIRY B	592	967	
	349	790	
AVERAGE	457	953	705

Obviously pasture productivity is directly related to economic prosperity. Dairy records show that the average Jersey cow on dairies in this area makes 35 pounds of milk per day with a milk fat percentage of 3.7. The average cow weighs 1,000 pounds. Using the University of Wisconsin pasture forage intake calculator for dairy cows, a total dry matter intake of 27.19 pounds per cow per day is derived. This equates to 843 pounds of dry matter per month per cow (27.19 x 31 days). One Animal Unit Month (AUM) for this area, therefore, equates to 843 pounds of dry matter per month.

Table 1, below, summarizes the following analysis of project-related gains and losses in agricultural productivity. At the Riverside Ranch (generally accepted as a low productivity soil) the proposed conversion of 273-acres of pasture land to saltwater marsh would result in the loss of 124,761 pounds of dry matter production per month (457 x 273 acres). This is enough grass production to

[8] Dairy operations at Riverside Ranch were in decline well before the acquisition of the property in 2007. The appraiser reported that the four structural improvements on the property were in extremely poor condition and having an estimated remaining economic life of five to ten years....the property's highest and best use, as improved, (is) continued use as a Grade "A" dairy until such time as the improvements have exhausted their economic life.

support 147 Animal Unit Months (AUMs) (124,761/843). Annually, this is 1,497,132 pounds of dry matter, or 1,776 AUMs (1,497,132/843).[9]

An additional 52 acres of pasture land along the Salt River channel will be converted to aquatic, riparian, and freshwater wetlands habitat. Upstream soil types are far more productive than Riverside Ranch, and produce as much as 953 pounds of dry matter per month per acre. One can conservatively estimate average production of 705 pounds of dry matter production in upstream areas. Conversion of 52-acres of upstream area would therefore result in the loss of 36,660 pounds of dry matter production per month (705x52), or 43 AUMs. Annually, this is 439,920 pounds of dry matter, or 522 AUMs (439,920/843).

Assuming the absence of flooding, and associated diminishments of productivity, the total loss to prime agricultural land productivity resulting from Project implementation would be approximately 161,421 (124,761 + 36,660) pounds of dry matter per month, or 191 AUMs (161,421/843). Assuming average production levels for the year, the total loss would be 1,937,052 pounds of dry matter annually, or 2,298 AUMs. (1,937,052/843).

However, the degraded and worsening conditions of agricultural properties along the channel corridor and elsewhere in the Ferndale Bottoms necessitate adjustment to the analysis. During an average year, flooding occurs in many pastures along the Salt River channel corridor for periods lasting at least 1 to 6 months resulting in about half as much productivity on impacted areas. Frequently, the flooding duration renders grass production infeasible, and necessitates conversion of pasture to feed production, particularly corn.

A conservative assumption is that at least 750 acres of high quality pasture are flooded annually for from 1-6 months, reducing productivity on these areas by at least half, or necessitating their conversion to corn production in some instances.

High productivity pasture in the upper project area should produce from 800 to 900 pounds of dry matter per acre per month. For the affected area, at the low end of this range, this equates to 600,000 pounds of dry matter per month (800 x 750 acres) or 712 AUMs (600,000/843). Annually, this equates to 7.2 million pounds of dry matter, or 8,541 AUMs. Flood induced reductions in productivity on these pastures are estimated to reduce dry matter production by half to 300,000 pounds of dry matter per month, or 356 AUMs. This reduces annual production to 3.6 million pounds of dry matter or 4,271 AUMs on an annual basis.

Assessing forage productivity is one way of analyzing anticipated agricultural benefits from reduced flooding. Calculating anticipated increases in milk production is another useful metric for determining if the project in its totality has a significant adverse or beneficial impact on agricultural resources. To begin this analysis, one compares the annual AUM net loss from land conversion to the annual AUM net gain from land improvement. As shown in Table 1, this comparison provides an annual net gain of approximately 1,973 AUMs. Assuming 35 pounds of milk/day per cow in the project area, this equates to an additional 2.1 million pounds of milk produced per year, or $600,000 in additional milk sales at the current price for organic milk of $28/cwt[10], as a result of the project. According to the Humboldt County Economic Development Strategy, each dollar in farm milk sales

[9] This is a generous assessment of the production level at Riverside Ranch. Flooding and changes to vegetation types there have rendered much of the property unusable for pasture, and many of the remaining portions of poor agricultural value.(Becker, pers.comm)

[10] cwt is equivalent to 100 lbs or about 12 gallons.

generates eight dollars in local economic activity. Using this multiplier, the project would provide approximately $4,800,000 annually in local economic benefits.

3 Additional Benefits of the Proposed Project

Today's regulatory climate renders obtaining permits for individual flood prevention/alleviation efforts cost-prohibitive, and practically impossible. There are at least two recent and unresolved enforcement actions in the Ferndale area specifically originating from individual attempts to remediate flooding or ponding. A secondary but no less important benefit of the project is the provision of a well defined, expeditious and affordable regulatory context for channel maintenance and the remediation of flooding and ponding.

The Adaptive Management Program outlined in the FEIR provides specific performance measures for the project, approved triggers for initiating maintenance, approved methods for maintaining performance, and a ten-year planning horizon under the initial Army Corps permit for conducting maintenance. It is widely understood within the community that this approach provides a constructive departure from well-intentioned but poorly executed individual attempts at hydraulic engineering, some of which have resulted in violations with the Army Corps of Engineers and the Coastal Commission. Prevention of remedial flood control actions taken by individual operators would avoid the present trend of simply shifting flooding problems from one property to the next within the project area and environs.

Beyond the immediate benefits to productivity offered by the project it is important to note that the Project provides significant protection and assurance against flooding related damage—a cost typically borne by the taxpayer. The replacement value of the average dairy would range from $1 - $4 million. Overall ranch and dairy replacement value ranges in the project footprint are incalculable, but likely exceed $50 million. The Ferndale Wastewater Treatment Plant alone would cost an estimated $2 million to fully replace. The 20 homes in the area receiving protection from the proposed project typically range in the $500,000 to $1 million range. Therefore, the protection of residential value ranges from $10 -$50 million.

Moreover, a significant benefit of the proposed project is the economic multiplier effect of increased productivity resulting from decreased flooding and ponding. For the life of the project, anticipated increases in tax revenue would significantly offset any public expense associated with the project construction costs.

4. Conclusion

The project area has suffered a significant decline in productivity and agricultural output due to frequent flooding of prime agricultural land. Moreover, conditions worsen with each passing year. A prospective analysis of flooding and ponding would undoubtedly reveal a significant and ever-growing threat to the economic viability of the Ferndale agricultural community. Therefore, Project delays would undoubtedly yield more significant benefits in the form of areas requiring assistance as increased areas of pasture would be flooded and ponded due to worsening conditions. Needless to say, those "benefits" would be of small consolation to the agricultural community.

Fortunately, this area's productivity can be restored as an economic contributor to the local and State economy by reduced flooding and ponding in the Project area. This can also be achieved with

substantial improvements to the tidal scouring anticipated to occur at Riverside Ranch. However, these and other benefits can only be achieved through Project implementation. It is also worthwhile noting that the majority of project funding comes from resource enhancement funding sources.

As explained extensively throughout the FEIR, the Project is unique in many respects, notably in its provision of dual benefits to agricultural resources and natural resources. For a variety of reasons identified in the EIR and here, analyzing the Project's impacts to agricultural resources on a simplistic acre to acre is inappropriate; this type of approach ignores the clear advantages to farm productivity posed by the Project, the relatively low productivity of the agricultural land to be used for the project, and the long-term advantages to agriculture in the project area from restoring the natural sediment-conveyance functions of the river system. By alleviating flooding in the project area on farm acreage that is either temporarily or permanently rendered un-farmable, the project will return to productivity a significant amount of productive acreage. By restoring productive farmland in the project area, the benefits accrue on-site, and in-kind.

The following calculations, summarized in Table 2, illustrate this point. As discussed above, the project will result in a net gain of approximately 1,973 AUMs in the vicinity, or approximately 164 additional cows year-round (1,973/12). Given that the average stocking rate in the vicinity is 1.5 acres per dairy cow, the project's net agricultural benefits essentially are returning no fewer than 247 agricultural acres to production. When the impacts are further examined through the lens of increased productivity, the benefits are truly substantial. The unique aspects of this widespread project, and the flood alleviation benefits it offers to the agricultural community as a whole, demand the holistic analysis provided above. Conversion of some acreage at Riverside Ranch, a low productivity area of the Eel River Delta already susceptible to tidal inundation, combined with the restoration of a functional Salt River channel, is the only practical means of providing substantially increased benefits to agricultural productivity elsewhere in the project area. Therefore, from the perspective of acreage impacted by the proposed project, the impacts to agriculture are less than significant.

Although 273 acres of prime farmland will be taken out of production at Riverside Ranch, and 52-acres within the channel corridor, these impacts will be more than offset by increases in productivity within the project footprint and in surrounding areas. Despite the defined conversion of acreage, ***no net loss of agricultural productivity will occur in the project area.*** This trend is due to the increased conveyance of water, diminished ponding of water on pasture, and increased productivity of non-flooded pasture resulting from the project. The Final Environmental Impact Report correctly determined that impacts to agricultural resources were reduced to a level less than significant.

5. Findings

Based on the above analysis and discussion, no revisions are needed to the FEIR because no substantial changes in the proposed action relevant to environmental concerns have occurred, no new significant impacts and no substantial increase in the severity of significant impacts previously identified in the FIER would result from the proposed changes included in the Project, no substantial changes to environmental circumstances have occurred since the FEIR was certified, and because no new information relevant to environmental concerns bearing on the proposed action has come to light that would indicate the potential for new significant impacts not discussed in the FEIR.

Table 1. Anticipated Changes in Agricultural Productivity and Revenue Due to Implementation of the Salt River Ecosystem Restoration Project.

Area	Productivity (lbs Dry Matter/ acre/month)	Change in Productive Acreage (ac)	Change in Annual Dry Matter Production (lbs DM/yr)	Change in Annual Animal Unit Months*	Change in Annual Milk Production (lbs/yr)**	Change in Annual Milk Sales (dollars/yr)***
Riverside Ranch	457	-273	-1,497,132	-1,776	-1,926,914	($539,536)
Adjacent to Salt River	705	-52	-439,920	-521.9	-566,208	($158,538)
Project Vicinity	800	375†	+3,600,000	+4,270.5	+4,633,452	$1,297,367
Overall Area			**+1,662,948**	**+1,972.6**	**+2,140,330**	**$599,293**

*Assumes 843 lbs of dry matter is equivalent to one Animal Unit Month (AUM), based on the University of Wisconsin pasture forage intake calculator for dairy cows assuming average production rate of 35 lbs of milk/ day with a milk fat percentage of 3.7 and an average cow weight of 1,000 lbs.

** Assumes average production rate of 35 lbs/cow/day

*** Assumes price of organic milk is $28/cwt (hundredweight).

† Assumes a 50% increase in productivity on 750 acres of agricultural land in the project vicinity that is significantly affected by flooding.

Table 2. Anticipated Changes in Agricultural Productivity in Acre Equivalents

Area	Change in Annual Animal Unit Months*	Change in Acre Equivalents**
Riverside Ranch	-1,776	-222
Adjacent to Salt River	-521.9	-65.2
Project Vicinity	+4,270.5	+533.8
Overall Area	**+1,972.6**	**+246.6**

*See Table 1. Assumes 843 lbs of dry matter is equivalent to one Animal Unit Month (AUM), based on the University of Wisconsin pasture forage intake calculator for dairy cows assuming average production rate of 35 lbs of milk/ day with a milk fat percentage of 3.7 and an average cow weight of 1,000 lbs.

** Assumes an average stocking rate for the region of one AUM per 1.5 acres (G. Markegaard, pers.comm.)

EXHIBIT C - LANDOWNER TESTIMONY

To ascertain the effects of natural and anthropogenic changes to drainage patterns in the Eel River valley and their resultant impact to agricultural land, the Humboldt County Resource Conservation District (HCRCD) went directly to the landowners. Interviews were conducted with Landowners who hold property in representative areas throughout the project footprint, adjacent to and upstream of Riverside Ranch. The interviews were conducted by Amber Shows, Salt River Project Coordinator during the month of September, 2009. Additional testimony about economic losses and reduced agricultural production resulting from flooding can be found in a letter written to the State Water Resources Control Board and Department of Water Resources by the Vevoda family in May of 2006.

In April of 2011, HCRCD staff re-visited some of the landowners originally interviewed in 2009 to verify and update areas of flooding and ponding. Mapping was completed by the RCD to document this updated information. Interviews were also conducted with additional landowners around the project area. These new areas are also included on the updated map.

The information from the individual interviews provides background on how drainage and flooding has worsened over time and compares current conditions to conditions that existed just 20 years ago. These interviews are intended as a representative illustration of what is happening across a much larger landscape in the Ferndale Valley. Some of this information was provided in aggregate form in the CEQA document. It is provided here in narrative as recorded in notes taken during the interviews. Landowner and ranch names have been redacted for privacy.

INTERVIEWS - 2009

Landowner A

Landowner A moved to the property in the late 1990's, early 2000's. Within the first few years the conditions of the property changed dramatically due to a rupture in a retaining bank on an adjacent slough. The conditions of the pasture have continued to worsen every year since.

Landowner A reports that sometime in the late 1990s, Williams Creek was rerouted out of its original Salt River channel heading west to Eaton Slough (or Perry Slough or Old River) heading in the opposite direction. Between that time and 2002 the water from Williams Creek would flow east then north into Eaton Slough. When Eaton Slough would fill to capacity, overflow waters would flow back into the old Salt River channel upstream of Williams Creek that contains primarily Coffee Creek water. When that water body filled, a spill way would carry waters onto their property. Waters would remain close to the original Salt River and Eaton Slough channels and were common in the months between December and April. After April, the flood waters would recede and the ground was productive pasture land and fences remained intact and could be maintained year after year.

In 2002, Williams Creek water could no longer be contained in Eaton Slough because of the large amount of sediment that had been deposited there since the rerouting of the creek in the late 1990s. Consequently, the waters broke through the eastern bank, carving a channel into Ranch pasture adjacent to the Slough. In essence, Williams Creek now runs parallel to its old channel roughly 60 ft inside the fence on their property. The effects from this are as follows:

- **2,240ft of perimeter fenceline along Eaton Slough and 350ft of crossfencing** have been destroyed by high flows and associated floating debris and aquatic vegetation or buried by silt. The perimeter fencelines consist of 3" fenceposts every 6ft with 7-strand smooth hotwire and crossfencing may consist of metal t-posts and 3- to 4 -strand barbed or smooth wire or simply single strand hotwire. Currently temporary fencing (single strand hotwire) is used as perimeter fencing.
- Standing water remains on roughly **7acres** of pasture **year round** making it unusable for agricultural purposes.
- **The standing water has changed the vegetation from pasture grasses to coarse wetland vegetation that the livestock will not readily eat.**
- Landowner A estimates that they've lost the ability to pasture **25 head of cattle** a year because of flooding.
- Temporary winter flooding **reaches higher levels than it did before**, further reducing the limited pasture available for cattle to graze.
- Because the Eaton Slough and Salt River channels have a reduced capacity due to aggradation of fine sediment, the two exit routes out of the family residences are underwater during significant amounts of time during the winter months. The southern route has been closed during the winter for some time, but more recently the northern route is experiencing closure and inaccessibility by small cars when it never has before.

Landowner B

Landowner B's ranch is located just north of the Salt River upstream of the Francis Creek confluence. Landowner B has been on this property his entire life, preceded by his father and grandfather. He dairied here until the late 1980s before leasing the facility out. The property is 120 acres.

The source of surface water on this property is rainfall; it does not receive drainage from adjacent fields or streams. Rainfall would collect in a swale that runs through the property and drain to the west then south to the Salt River via two other landowners' properties. **Landowner B reported that in the 1955 and 1964 floods the flood waters subsided within 3-4 days on that property.**

The Salt River channel where this drainage once emptied is now filled with sediment, referred to as the Francis Creek sediment plug. The landowner adjacent to the Salt River here was receiving floodwaters from Landowner B's Ranch and others yet there was nowhere for this water to go. Apparently this landowner built a berm at his property boundary to prevent Landowner B's Ranch surface drainage to cross his property. This forces the collected water to sit until it is either pumped out or until it evaporates, adding another 12-18" of standing water to what was already there. The landowner between these two, Landowner X - a new owner and beef rancher - experiences the same drainage issues as Landowner B's Ranch.

Beginning in the early 1980s, Landowner B noticed that the drainage issues were impacting his agricultural resources. There are about **10-15 acres** of land that, because it is under water, has been partly or wholly removed from their agricultural routine **for 6 months** of the year. Descriptions of these changes are listed below:

- The milking herd has been reduced by **15 cows** because of the reduction of pasture ground.
- The heifer herd **(30-50 cows)** has been moved entirely off this property onto leased property because of the reduction of pasture ground.
- The manager pumps the water out of the swale into irrigation lines as soon as he can in the spring. He typically pumps 7-10 days in late April or early May. He estimates this to cost **$1000 each year.**
- Once the water is pumped out, the manager needs to reseed this area which at a little under $300/and acre, would conservatively cost **$2500** each year.
- He estimated that he could get **5 tons of dry matter off an acre per year, adding up to 50-75 tons of dry feed** that he now has to purchase and ship from elsewhere. He also estimated that a load **(25tons) of feed per month,** roughly between December and April, is purchased to supplement the feed that is not available due to inundation.
- In the parcel adjacent to another landowner's field, Landowner B used to farm carrots and corn, but now it doesn't dry up until September on a dry year. **It is 3 acres that used to be crop land that now won't support pasture grass or crops.** This piece used to be drained by a tidegate, which has since been covered in sediment.

Landowner C

Landowner C runs a dairy on the south bank of Coffee Creek across this water body from another landowner. His drainage/flood issues are the same as theirs, i.e. Coffee Creek water is now joined by Williams Creek water and neither drains out through the Salt but rather through Eaton Slough (Old River). In the past 5-6 years, Landowner C has seen **30 acres** go out of production from **October through May**. In the past this area would flood **but drain quickly**, not requiring reseeding as it does now. He has not had to reduce his herd size but he has had to supplement feed in the winter – about **4 loads a year at 25 tons/load**. He has also had to put considerable time and money into farming and reseeding these 30 acres to get summer production off of it. **He estimates that the cost of supplemental feed and farming and reseeding to be $60,000 per year.**

Landowner Y and D

Landowner Y owned the dairy off Hwy 211 between 1975 and 2005, before selling to Landowner D, the current owner, in 2005. He said between 1975 and 1998 he didn't notice a trend in increased flooding on his property. In the winter of 1998/1999 the Williams Creek diversion occurred and he said the difference was "night and day." He experienced significantly more flooding and loss in production on his dairy after 1999. The flooding situation has worsened since then, and the new landowner struggles with keeping his land under production.

The water that reaches the property used to be limited to surface runoff and Coffee Creek water. Now Williams Creek water had been added to the mix, greatly increasing the volume of both water and sediment. Water reaches the property by flowing from Williams Creek up the Salt channel, through Eaton Slough and filling a large slough that runs northwest to southeast which, when filled, drains out north into Old River passing under Hwy 211. **Before 1999, drainage channels didn't begin to hold water**

until January on an average year and would drain within a few days. Now water fills the channels earlier, to a higher level and stays longer.

The main concerns of the current and previous landowners are that more land is underwater for longer every year than before 1999, and that the water is so deep in the channels that it cuts off access to adjacent owned and leased pastures.

- Water begins to pond with the first rain event or first 1-2" of rain, whereas it wouldn't start ponding until January before.
- Water stays longer because it doesn't have a channel suitable to carry it.
- The result of the above two impacts means that **pasture is underwater an additional 2-3 months** since 1999. (This is probably in the bottom of the swales)
- The water level has also risen, increasing the acreage of inundation, with the addition of Williams Creek water, the previous Landowner estimated this **acreage around the channels to be 25-30 acres**. This acreage is underwater **3-4 months more than before 1999**.
- The flooded channels prevent access to 150 acres of pasture. To access the fields, landowners have had to risk driving equipment if they think it's shallow enough, or construct temporary stream crossings. This past winter, the current landowner had to use a drift boat to rescue a newborn calf stranded on one such field (aptly named Island Field – 14 acres). **Without flood alleviation or a permanent stream crossing structure, the landowner will soon not be able to access this 150 acres**.
- The previous Landowner estimated he spent an additional **$3000-$4000 on feed** (about two loads or 50 tons) during a rainy season because of the loss of pasture. And about $300/acre for farming and reseeding roughly a third of the inundated acreage (about 10 acres), totaling **$3000 a year to farm and reseed**.

This Landowner was re-contacted in 2011 and reported an increase in flooding on his property that persists on average 6 months. Landowner reports that flooded pastures produce 20% of what adjacent fields do. Confirms that current flooding is caused by the dysfunction of the Salt River and believes that restoring the Salt River channel would improve drainage on his property.

INTERVIEWS 2011

Landowner E

The area represented on the map of my property and adjacent to it looks accurate. After the rains stop it takes about 3 weeks for the flooded area to decrease to approximately 25% of its size. This ponding then lasts much longer. This level of flooding occurs on my property at least 6-8 times a year. It doesn't take much rain to cause this type of larger flooding on my land now. Compared to earlier years on this property have seen about a 50% decrease in production. Overall soil productivity has been lost. Compared to 20 to 30 years ago the flooding has worsened, smaller storms cause flooding that didn't before. Landowner E further indicated his belief that excavating the Salt River channel would improve drainage on the property and eventually improve the overall productivity of the soils.

Landowner F

On the map shown by the RCD of flooding on this property, Landowner F acknowledged that it represented the long term, persistent flooding, but noted the short term major flooding is greater than what is shown. It would take about 2-3 weeks for the larger flooded areas to drain down to the level where it then just stays flooded or ponded. On average, the long-term flooding shown on the map persists at least 5-6 months and Landowner F reports the duration is getting longer over the years. Once that base level of flooding occurs it stays until well into spring or summer.

Landowner F believes soil productivity has dropped as a result of the flooding by 50% over the past 20 years and now has to farm and seed. Landowner F reports that the fields drained much better 20 years ago when the channel was still functioning and the situation continues to worsen. The landowner reports that this year he will spend approximately $20,000 more for feed than prior years. Further notes that during this same time other fields that drain better have cows back out on fields and he has to feed.

Landowner F stated his belief, based on historic experience, that the Salt River excavation will help drain his property and looks forward to improving drainage connections between his property and the Salt channel. He further states his belief that the improved drainage will improve soils and forage production on his property.

When asked if he had anything else he'd like to share, Landowner F said "With the flooding and the geese, it's very hard for me to stay in business. The Salt River project is taking too long to implement."

Landowner G

Landowner G verified the area shown on the map, but noted additional flooding on his property that needed to be added. He reports that high rain events tend to pond and drain to a certain point – but then it stays flooded for at least 6 months. These larger flooding events tend to happen 3-5 times a year, then it drains down to a persistent flooded area. There is a field drain, but it is plugged by the aggradation of the Salt River.

Once the flooding dries up some forage may come back, but at least 10 acres need to be farmed and is planted with oats/corn each year. Landowner G believes he has lost at least 40-50% production from the impacted areas. He reports that he can't access at least 15 acres for at least 6 months each year and that is a conservative estimate.

Landowner G stated his belief that the current issues on his property are caused by the dysfunction of the Salt River and that the Project will help drain his property like they did 20 years ago. He further states his belief that the improved drainage will improve soils and forage production on his property.

Landowner H

Landowner H verified the extent of inundation depicted on the map. He reports that collectively the land is under water at least 3 months. If there is a significant long break in storms it drains down some, but is still too wet to run cattle or get equipment out. Extensive flooding occurs 3-4 times a year, draining somewhat depending on rainfall events. Flooding starts November/December and he can't let cattle back out until April or May.

Landowner H reports that the quality of forage that grows after flooding recedes is not good for dairy cows. He stated his belief that the current issues on his property are caused by the dysfunction of the Salt River and that things have gotten much worse over the last 20-30 years. He believes the Project will help drain his property and hopes for other drainage improvements by the county once the project is completed. He added that he hopes the project happens as soon as possible.

Landowner I

Landowner I verified the depiction of flooding on the map. He reports persistent flooding that lasts approximately 4 months. Areas will not drain once rain stops and water also flows into a neighbor's fields. He says that after the flood waters recede no forage remains and that he farms the impacted area.

He stated his belief that the current issues on his property are caused by the dysfunction of the Salt River and that things have gotten much worse over the last 20-30 years. He believes the Project will help drain his property and would like to see it get done.

Landowner J

Landowner J verified flooded areas on the map he was shown. He reported that for the past 2 years flooding has remained on the fields for 5-6 months, not completely draining off even during long breaks in the weather. Once flooding is present the fields remain flooded until the end of May.

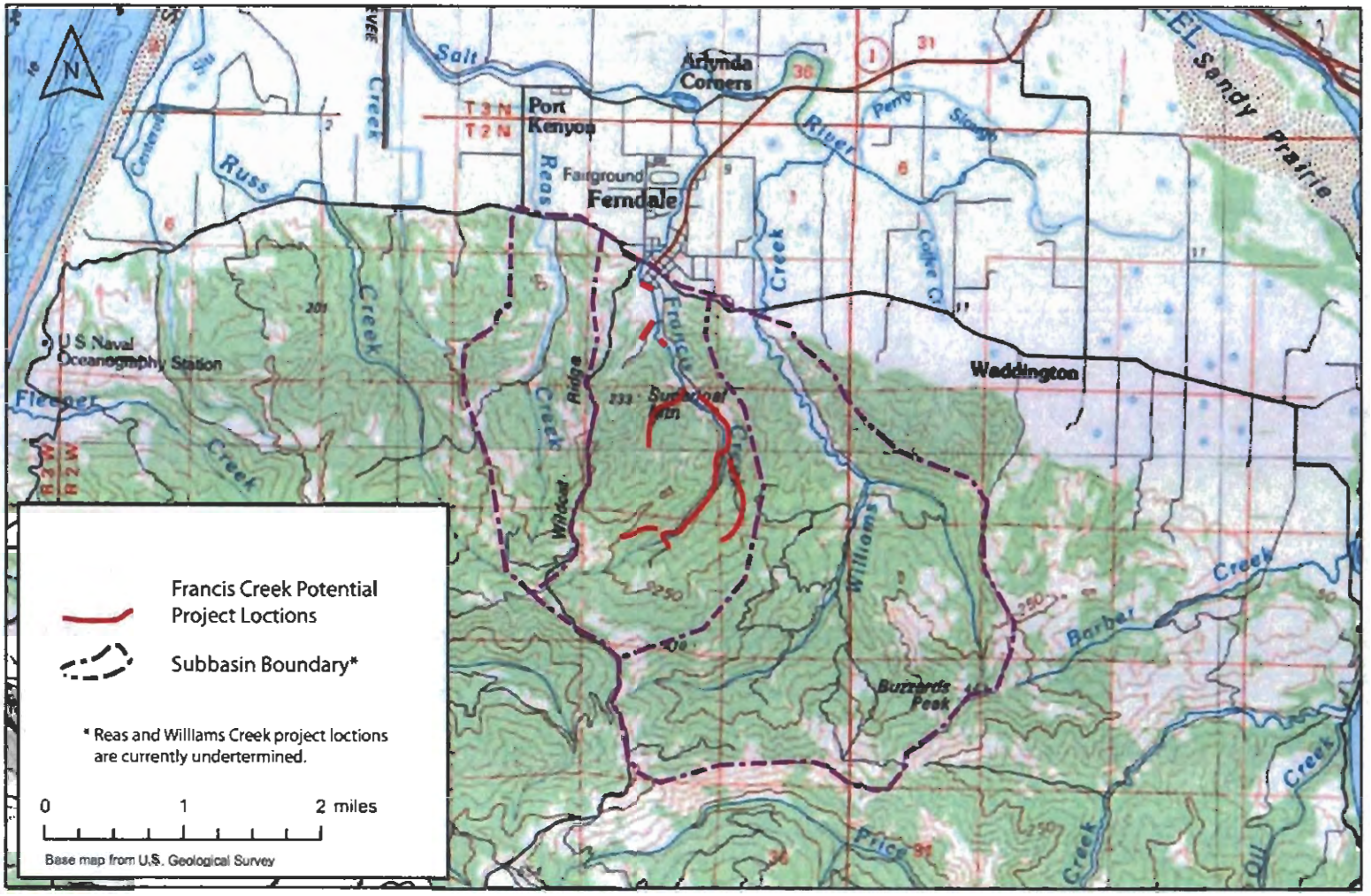
He states that productivity of his soils has dropped due to the persistent flooding, reporting an approximate 40% reduction in overall productivity over time. He has had to change practices due to worsening conditions. He also reports that he has approximately 150 acres that he loses access to due to flooding. He is able to access that part of his ranch from the County road, however the road is often impassable as well.

He stated his belief that the current issues on his property are caused by the dysfunction of the Salt River and that things have gotten much worse over the last 20-30 years – that his fields drained 20-30 years ago. He believes the Project will help drain his property and that he would see immediate beneficial effects on drainage and soils. Landowner J reports that he supports all efforts to implement this project.

Landowner K

Landowner K added additional acreage of flooding to the map he was shown. He has two parcels that are both impacted by flooding and reports that one is impacted about 6 months and the other 5 months. The frequency of flooding is approximately 4-5 times a year. He notes that the places used to drain better.

He states that productivity is lost all year because the existing forage is dead, plus there is a general loss of soil productivity due to saturation. He estimates a 100% loss of production on one parcel and 60% loss on the other. He notes that the flooding impacts have gotten significantly worse over the past two years. Landowner K believes that the excavation of the channel corridor will improve the drainage on his properties and improve the overall productivity of his soils.



Historic and Potential Upslope Sediment Reduction Areas

and Forest Consultants, 2009

EXHIBIT NO. **24**

APPLICATION NO.

1-10-032 - HUMBOLDT COUNTY RESOURCE CONSERVATION DISTRICT

UPSLOPE SEDIMENT REDUCTION AREAS